# "HUMAN EYE INADEQUATE"

## **INSTANT REPLAY AND THE POLITICS OF VIDEO**

by

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# Abstract

This thesis examines the cultural history of instant replay video technologies and techniques. It approaches this subject by looking at the technological, social, and economic environments in which video appeared in the late 1950s, and the commercial adaptations of its use in the 1960s. Based on primary research in engineering and broadcasting archives, and a survey of popular and trade press from the time, this project analyzes the development of video technology as a means of "timeshifting" network programming and its subsequent adaptation as a means of automation, evidence production, and self-improvement. This project also traces the conceptual and cultural history of the "instant" and the "replay" as phenomena that developed within and around practices of sports spectatorship in the late 19<sup>th</sup> century and early 20<sup>th</sup> century. This thesis concludes by describing how localized forms of timeshifting extended and accelerated established forms of machine-mediated management and helped to popularize nascent forms of cybernetic management based on personalized feedback loops.

# Résumé

Cette étude considère l'histoire culturelle des technologies et des techniques de vidéo, et de la reprise instantanée par vidéo. Cette étude traite ce sujet en examinant les environnements technologique, social et économique dans lequel la vidéo est apparue dans les années 1950, et les adaptations commerciales de son utilisation dans les années 1960. Basé sur des recherches d'archives primaires, et un survol auprès de la presse spécialisée et la presse populaire de l'époque, ce projet analyse le développement de la technologie vidéo comme un moyen de «timeshifting» la programmation et son adaptation subséquente comme moyens d'automatisation, de la production des preuves, et de l'auto-amélioration. Ce projet retrace également l'histoire conceptuelle et culturelle de l'«instant» et le «rejouer» en tant que phénomènes qui se sont développées autour des pratiques des spectateurs de sport à la fin du 19<sup>e</sup> siècle et au début du 20<sup>e</sup>. Cette thèse conclut en décrivant comment les formes de «timeshifting» localisée ont étendu et accéléré les formes naissantes de la gestion par médiation machinique, et ont contribué à populariser les formes naissantes de la gestion cybernétique, basée sur des boucles de rétroaction personnalisées.

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My companion and best friend, the hilarious and brilliant Bridget Moser, has chosen to spend her life with me, a debt I can never really repay. I am eternally grateful for the home we have created together. For Tania and Robert

Here at last is the mechanical baseball pitcher, for which we have all been anxiously waiting. Prof. Hinton of Princeton has invented it, and in its present state it looks like a dangerous weapon, but it is said to be much safer than a human pitcher. At present the machine, which is warranted to make curves that will hopelessly puzzle the most skillful batsman, is arranged to be operated by human agency, but future improvements will remove that objection. A neat portable dynamo can be utilized to work the pitcher, and the mechanical catcher and batsman that will soon be evolved, and will be easy enough to invent when the pitcher is perfected. Then all that will be needed will be a mechanical umpire of boiler iron made on the principle of the automaton chess player of long ago. The National game will then have reached its perfect flower, and we shall no longer, we trust, be chagrined by bulletins reading. "New-Yorks 1, Baltimores 3."

Editorial, New York Times May 28, 1896

#### Introduction

Instant replay was born on December 7, 1963, fifteen days after the assassination of John F. Kennedy. In the fourth quarter of the final regular season college football game between the United States Military Academy's Black Knights and the United States Naval Academy's Midshipmen, CBS's producer for the game, Tony Verna, used a modified video tape recorder<sup>1</sup> to cue, rewind, and replay a touchdown by Army's quarterback. The video recorder, normally housed at Grand Central Station, was brought to Philadelphia for the game so that Verna could experiment with the instant replay process. When the game's play-by-play announcer was prompted that the replay was coming, he tried to forestall confusion from home viewers by shouting, "This is not live! Ladies and Gentlemen, Army did not score again!"<sup>2</sup>

Navy was the president's team and he attended the Army-Navy game every year.<sup>3</sup> The game was a large enough cultural event to displace the assassination as the headline story in national newspapers. Navy's star quarterback, Roger Staubach, was the cover story of the issue of *LIFE* magazine that was in press when the president was killed; in place of Staubach ran the individual frames of Abraham Zapruder's footage of the

assassination in Dallas. For the two weeks that preceded the game, audiovisual scrutiny was at an all-time high. After Kennedy's assassination and Jack Ruby's murder of Lee Harvey Oswald, the instant relaying of information by remote television reporters and the slow motion repetition of news and private footage became the operative modes of accessing and absorbing the coverage. Evidence and explanation were the watchwords of this period; what did and did not count as proof of how the president was killed became the proxies for endless discussions of who had killed him and why. Within this acutely charged social-political environment, video made its first public appearance as a reflexive medium, signaling an emergent media regime that eventually replaced film as the dominant visual means of evidence and knowledge production.

Beginning with Ampex's development of a practical video recorder in 1956, videotape was widely adopted as a solution to the challenges of centralized broadcasting. Initially, networks employed videotape as a means of recording broadcast television for timeshifting programming into western time zones. Although the ascent of videotape as a broadcasting technology is well documented, less documented is the history of video's use as an instructional medium. Yet, by 1963 videotape was already well established as a training tool for large institutions. Football teams, in particular, had served as early sites of experimentation. Though relatively less "instant" than later video systems, the usefulness of videotape as an instructional medium was always constructed around the immediacy of its playback potential. As such, Verna's replay united both the private use of videotape as a training tool and its use as a timeshifting technique in television broadcasting by employing the timeshifting architecture to display the reflexive potential

of the technology. It also leant a name and a public platform—sports broadcasting—to the use of video replay as a means of determinant judgment making.

This is a thesis about video as a new medium and the process of establishing its dominant uses within and beyond the broadcast regime of the 1950s and 1960s. While most of its examples are American, Canadian settings, Japanese manufacturers, and globally spanning corporations play a central role in the commercial and industrial adoption of video, while international audiences and workers are the named and unnamed subjects implied in the promotion of video assemblages as a transformative technologies. Lisa Gitelman writes that, "New media are less points of epistemic rupture than they are socially embedded sites for the ongoing negotiation of meaning as such."<sup>4</sup> Video technology is a paradigmatic example of the contested negotiation of new media in the 1960s. Although we are familiar with some of its uses in the background and foreground of television broadcasting, video use in fact spanned the multiple registers of everyday life.

Video replay was unique in the ways it re-mediated television recording. While videotape technology was designed to be imperceptible, "so that prerecorded programs were formally indistinguishable from lives ones for audiences),"<sup>5</sup> for viewers at home, video replay suggested that the live stream of content was susceptible to transformation. In other words, video began by first, "timeshifting the flow of programming" and second, "timeshifting the flow of images."<sup>6</sup> As such, video replay follows in a long line of media technologies perceived to express virtuosity over time. Through the repositioning of video replay as a localized, observational technology, the broadcast-based virtuosity over the flow of time transformed into an authority over the movements and operations of

human beings in instructional settings. Video replaced previous forms of visual instruction and error correction by adding greater flexibility to the processing of images and by accelerating access to audiovisual information.

As a television technology brought to the factory floor, video was separate from the broadcasting infrastructure in practice, if not in interpretation. Broadcast television remained the central site of video technology's figuration. Instant replay grew out of sports broadcasting to become an industrial, judicial, medical, and instructional technique; yet, at every point in its ascendance, video technologies were always imagined to operate with the same high level of hermeneutic certainty as the sports highlight. Sports highlights were thus treated "as part of a hermeneutic process of scientific discovery, which, among other things, allows the viewer to outguess the referee and see what 'really' happened."<sup>7</sup>

The industrial and commercial uses of video replay in the 1960s established the contexts, applications, and ideals through which video became a dominant means of surveillance and evidence production. Governments, corporations, schools, hospitals, police forces, and sports teams appropriated the formal aesthetics and techniques of video replay from broadcast television and reinstrumentalized video loops, as well as instant, slow, and freeze frame replays as elevated forms audiovisual access. The acceleration of timeshifting multiplied the usefulness of video for practically any purpose.

In popular press and trade journals throughout the 1960s, training through instant replay became a form of self- or auto-rationalization. Video training in this period involved an extension of the Taylorist method with the added intermediary of the camera–recorder-monitor assemblage. Video replay is pervasively described as

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"exposing" hidden truths: in these cases, the hidden truth of how much more productive a worker could be. Video is thus central to a teleology of maximum productivity expressed through the illuminating capacities of the mechanical witness and crystallized in humanmachine assemblages built around instantaneous feedback.

The thoroughgoing pursuit of new contexts and greater granularity for video technology married claims of video's mechanical objectivity with its potential as a feedback medium. Extracting greater granularity from video involved developing both an institutional and descriptive system for managing instantaneous playback. Immediate video timeshifting became the newest technological complement to the automation and streamlining of bureaucratic cost-saving management techniques, techniques that sought to reorganize and reinforce standardized training through systems increasingly built on personalized feedback and strict policies of surveillance and reportage. As such, it became a part of a new technique for the *cybernetic* management of individuals, groups, and bureaucracies: management built on communication and control, self-correction and automation, and the establishment of systems that integrate human, technology, and environment.

As a form of magnetic recording, videotape technology is capable of "instantaneous recording." Briefly, this means that when content is recorded it is immediately available for playback. Instantaneous recording separated video from film in function, cost, and conviviality of use. It is also the technological basis for the aestheticization of instant replay and the usefulness of video in management contexts, as a high-speed form of audiovisual feedback.

Behind the notion of instant replay are two features, each indicated in an appeal to the potential of instantaneous recording. The expressed potential of videotape often depicted its inherent superiority as a recording medium through reference to either its "accessibility" or its "repeatability." Lucas Hilderbrand has written about how magnetic tape bears the marks of use and re-use, branding videotape, because of this material feature, as an "access medium".<sup>8</sup> Elsewhere, access and repeatability figured in the advent and popularity of video recording as an artistic mode of expression. In institutional settings, however, video access and repeatability take on meaning through the instrumental usefulness of the medium.

Speaking to the integration of access and repeatability, instant replay solidified a number of capacities of magnetic recording that Ampex used to sell audio, data, and video recorders. Among these features was the saleable capacity to recreate events exactly as they had previously occurred. As early as 1950, Ampex had developed magnetic tape as an information technology. In the company's promotional materials from the period, they suggest magnetic tape for use in geophysical exploration, shock and vibration recording (in military applications), flight tests, manufacturing process control, facsimile recording, and servo control in machine operations. A second but related category of applications is described as the "uniform re-created through the registering of signals—Ampex's example is a timely one, they suggest that while a bomb only explodes once in physical space, "a bomb explodes a hundred times from tape."<sup>10</sup> The third category of application was the databasing of information. For example, Ampex suggests that audio recording be used to record heart sounds. "For teaching purposes these tapes

are like having hundreds of live patients instantly available on call."<sup>11</sup> A similar use is suggested for using tapes to record voltage changes in nerve and brain functions, "tapes saved from unusual pathological conditions become a valuable fund of research material that can later be referred to or studied in the light of new theories or techniques."<sup>12</sup> All of these uses reflect two previously existing scientific practices: the emergence of a "recent and contingent" science based in mechanical objectivity, with its attendant emphasis on automation;<sup>13</sup> and the use of graphical methods for the display of information, a practice that is meant to be both abstract and universal, as well as a labour-saving.<sup>14</sup>

The proclaimed capacity for "event recreation" was a feature discursively endowed in magnetic tape itself. These proclamations are not at all new and come with each generation of recording media. It is precisely the limited capacities of each media technology, from the phonograph, to stroboscopic photography, to an Ampex instrument recorder, that delimit what can and cannot constitute an "event." What remains consistent over the development from audio and data recorders to video recorders is a professed faith in the *telos* of error correction, achieved through repetition and recursive feedback loops: "the idea of the feedback loop implies that the boundaries of the autonomous subject are up for grabs, since feedback loops can flow not only *within* the subject but also *between* the subject and the environment,"<sup>15</sup> writes Hayles. In this way, videotape develops as an institutionalized cybernetic management tool.

In the opening pages of *The Principles of Scientific Management* Frederick Winslow Taylor tenders a comparison meant to clarify the argument of his book and obviate criticism of his management methods. He writes

The English and American peoples are the greatest sportsmen in the world.

Whenever an American workman plays baseball, or an English workman plays cricket, it is safe to say that he strains every nerve to secure victory for his side. He does his very best to make the largest possible number of runs. The universal sentiment is so strong that any man who fails to give out all there is in him in sports is branded as a "quitter," and treated with contempt by those who are around him.

When the same workman returns to work on the following day, instead of using every effort to turn out the largest possible amount of work, in a majority of the cases this man deliberately plans to do as little as he safely can—to turn out far less work than he is well able to do—in many instances to do not more than one-third to one-half of a proper day's work. And in fact if he were to do his best to turn out his largest possible day's work he would be abused by his fellow-workers for so doing, even more than if he had proved himself a "quitter" in sport.<sup>16</sup>

Though this statement is by no means unique in its sentiment (even today), it is still noteworthy for a number of reasons. First, it points out the frustration that Taylor felt throughout his late career in trying to get his scientific method adopted; that despite his joining of a supposedly rigorous supervisory technique with an individualized pay structure, he failed time and again to account for worker resistance to these new designs.<sup>17</sup> Second, it points to a belief that has come to resemble truth: that sports are a primary site of pure human effort. This second commonplace has come to imply, at different times, that sport develops from unadulterated meritocracy; and more importantly, that management systems can take root and function unimpeded, structurally and systematically, in sports. Such a belief appears to depend on the assumption that worker/player resistance is neutralized by the pursuit of victory.

The dominant understanding of immediate video playback practices as "instant replays" is a result of the inescapable association of video replay with sports broadcasting. Using current professional football as a model, the figuration of instant replay in sports has been two-fold: first there are *reflective judgments*, in which instant replay, slowmotion, and freeze frame video are used to aesthetically embellish the football broadcast

and to create affective montages that are incorporated in National Football League (NFL) films. Margaret Morse and John Fiske have both written about the transformative aspects of the replay and the implied gaze of the home viewer.<sup>18</sup> Morse argues, "the frequent repetition of the same play in slow motion marks the game on television from the outset as no longer occurring in a world subject to the laws of the ordinary linear and unidirectional time" and that "the slowness which we associate with dignity and grace transforms a world of speed and violent impact into one of dance-like beauty."<sup>19</sup> Morse points to the often ignored aesthetic conventions of sports broadcasting, which are usually dismissed as flagrantly sensational. A dismissal of the reflective, aesthetic appreciation of televised sport, however, is entwined in the dynamics of class and taste that work to socially distance, say, contact sport from ballet.<sup>20</sup>

Second, replay is also used to make *determinant judgments*, based on what are considered empirical facts.<sup>21</sup> Video replay, as an empirical instrument, became a preferred mode for the judgment of action, and as a result, the home viewer became reified as a preferred seat of judgment. This is evidenced in the remaking of the stadium in the form of the home viewer, with increasingly sophisticated video and sound systems and seating arrangements that guarantee a clear view of a screen in exchange for obfuscated views of the field. It is further evidenced in the widespread use of replay in the officiating of the game—and in cases where these uses are prohibited, the frequent controversies surrounding the lack of replay as the final authoritative version of events. Though the standards are fluid, replay use is limited in-game to judgments of boundary, possession, and time infractions and not permitted for calls like "unnecessary roughness" or "unsportsmanlike conduct." Yet, in the extra-judicial sphere of sports management,

video replay is integral in dolling out punishment for on-field behaviour. Finally, researchers looking into the cause and effects of repeated impacts on athletes increasingly rely on video playback.<sup>22</sup> In each of these cases, game logic, corporate management, and scientific research rely on different, contingent logics of what counts as determinable action. It is the negotiation over what counts as determinable action that is the productive substance of video technology's institutional use in the 1960s.

This thesis returns to the use of instructional and hermeneutic technologies in sports management and reportage, seeking to both contextualize the cultural impact of sports as a logical sphere of activity and to read against this interpretation to better understand how video technology is appropriated throughout North American institutions. The use of visual evidence in sports as a means of mediated judgment is now so commonplace that the standard of reversal upon review in American Football, "indisputable visual evidence," has entered into use in legal proceedings in the United States.<sup>23</sup> Since both the conduct and consequences of legal proceedings are more complex than the determination of a first down, it is perhaps unfair to compare the two. What is important, however, in the seepage of review standards from the National Football League (NFL) to the legal sphere is that the system and universe of sports judgment came to appear self-evidently valid. We can draw two conclusions from this example: first that the NFL standard of hermeneutic certainty, however socially constructed, is a enough of a benchmark of common sense to have caused actual legal reforms; second, that the experience of video as an instrument of judgement is experienced and constituted in multiple registers. The circulation of practices of seeing and hearing through video came

to establish the hopes and possibilities for instantaneous recording in the development of observational objectivity.

The history of recorded video since 1956 is defined by a routinized accumulation of audiovisual information that collected and replayed for analysis. This accumulation takes place at work, at play, at home, in the office, at the doctor, and in the car. Instant replay came to both symbolize and substantiate a new mode of knowledge formation that was defined by an emerging facility of access to audiovisual information and idealized notions of recursive improvement, cybernetics, and the self-evident truth of visible evidence. By the mid-1960s, through the advent of affordable electronic video recorders, individuals and institutions were treating the world as immanently archivable. This thesis begins in 1956, moving backward and forwards toward the temporary stabilization of video's meaning as a useful technology.

The first chapter, "The Politics of Timeshifting," traces the appearance of a practical magnetic video recorder and the conjunctural reconfiguration that its widespread adoption represented. The chapter addresses the historical conditions in which video figured at the intersection of social, economic, and aesthetic concerns of the still nascent American broadcasting regime. Though it began as a practical solution to a standard problem of transcontinental broadcasting, even the earliest video recorders were immediately imagined to offer a total reconfiguration of the labour of television production and distribution, a greater control over serial production schedules and repeat programming, and a higher fidelity to the original broadcast material. Thus even in its most banal uses, video was a thoroughly political technology.

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In the second chapter, "From saloon riots to the Canadian case: instantaneity and the replay," I look at the cultural origins of "instantaneity" and a series of controversies surrounding non-video sports replays. This chapter is meant to separate a history of instant replay video from the history of broadcasting, to better understand the political conditions in which experiences of instantaneity and the construction of simultaneity play an important role in the local, mediated experiences of individuals from the 19<sup>th</sup> century onwards.

In the third chapter, "Football, the military, and machine-mediated management," I map the use of film and video training in college and professional football. I then describe the intersection of football and military training techniques, a cooperative operation that expanded with the overlapping use of early video technology. Finally, I review the history of machine-mediated management through the heuristic established by the intersections of film and video.

In the fourth and final chapter, "The emergence of a bureaucratic technology: video in the 1960s," I provide evidence of the use of video replay as an instrumental technology in a wide range of industries and applications. Drawing on archival research from broadcasting archives and the Ampex corporate and engineering records, as well as a survey of trade publications and popular press coverage, I argue that video was fully embedded in capitalist discourses that promoted recursive improvement as a means of efficient management; in the case of video, such assertions were often married to claims that video feedback exposed truer and more honest selves, aligning efficiency and rationalization with personalized forms of therapy and self-help. The chapter further discusses the way video was integrated in law enforcement and legal systems as a

preferred form of evidence and a cost-friendly means of record-keeping. Thus, the final chapter shows the patterned development of video's accessibility and repeatability as bureaucratic techniques of management.

Looking at these moments in the history of video, this thesis offers an alternative history of video as a medium of postwar capitalism. The problematization of timeshifting before and after the introduction of recorded video illustrates how the engineering of a "practical" video recorder was never a neutral feat. In its approach to cultural historiography, this thesis outlines how the largely ignored aesthetic features of temporal displacement helped constitute shifts in the relationships between economic, material, and subjective forces and in turn altered the bonds between new recording media and the standards of evidence and observation. By providing an accelerated means of recording and playback, video recording reconfigured the already reified construction of television liveness. In attempting to settle the experience of television viewership *and* participation, recorded video lent the multiple televisual infrastructures of daily life an authority increasingly based in multiple temporalities and instantaneous feedback.

<sup>&</sup>lt;sup>1</sup> The Ampex VTR-1000

<sup>&</sup>lt;sup>2</sup> Tony Verna, *Instant Replay: The Day That Changed Sports Forever* (Beverly Hills, CA: Creative Book Publishers International, 2008), 14.

<sup>&</sup>lt;sup>3</sup> In an especially macabre gesture, for the 1963 game, the Kennedys had fifteen orphans sit in the presidential box. "Kennedy Family Invites Orphans as Game Guests," *The Washington Post*, December 7, 1963.

<sup>&</sup>lt;sup>4</sup> Lisa Gitelman, *Always Already New: Media, History and the Data of Culture* (Cambridge, MA: The MIT Press, 2006), 6.

<sup>&</sup>lt;sup>5</sup> Lucas Hilderbrand, *Inherent Vice: Bootleg Histories of Videotape and Copyright* (Durham: Duke University Press, 2009), 38.

<sup>&</sup>lt;sup>6</sup> Credit is due to Yvonne Spielmann for this handy simplification of the turn in video's early development, from broadcast technology to replay technology. Yvonne Spielmann, *Video: The Reflexive Medium*, trans. Anja Welle and Stan Jones (Cambridge, MA: The MIT Press, 2008), 251.

<sup>7</sup> Margaret Morse, "Sport on Television: Replay and Display," in *Regarding Television: Critical Approaches--an Anthology*, ed. E. Ann Kaplan (Frederick, MD: University Publications of America, 1983), 49.

<sup>8</sup> Hilderbrand, Inherent Vice: Bootleg Histories of Videotape and Copyright.

 <sup>9</sup> Ampex Corporation, *Data Recording, Machine Control and Process Regulation by Ampex Magnetic Tape Recording*, Series 2: Box 83 (Ampex Corporation records, M1230.
 Dept. of Special Collections, Stanford University Libraries, Stanford, CA, circa 1950), 11.
 <sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> Lorraine Daston and Peter Galison, *Objectivity* (New York; Cambridge, MA: Zone Books, 2007), 115-83.

<sup>14</sup> Robert Michael Brain, "The Graphic Method: Inscription, Visualization, and Measurement in Nineteenth-Century Science and Culture" (Ph.D. dissertation, University of California, Los Angeles, 1996).

<sup>15</sup> N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 2.

<sup>16</sup> Frederick Winslow Taylor, *The Principles of Scientific Management* (New York; London: Harper & Brothers, 1911), 3.

<sup>17</sup> He was not alone. As Noble notes, Taylor's system was only ever fully adopted in two factories and was banned from all military and government operations from 1916—1949. The "man problem," as Noble calls it, plagued the engineers of Taylor's era, who, having stripped all craftwork from labour, sought to create new reasons for workers to feel motivated. David F. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (Oxford; New York: Oxford University Press, 1977), 262.

<sup>18</sup> Morse, "Sport on Television: Replay and Display," 248-52; John Fiske, *Television Culture*, Second ed. (London; New York: Routledge, 2011).

<sup>19</sup> Morse, "Sport on Television: Replay and Display," 49.

Morse and Fiske are concerned with unpacking the attraction and repulsion to the male sports body on television. For Morse, this "body on display" lacks the alibi of the determinant replay and is more explicitly homophilic. I am not interested in continuing this argument, yet Morse's text remains one of the fullest descriptions of the replay's polyvalent meanings.

<sup>20</sup> Pierre Bourdieu has written rather extensively on the inseparability of sport and the larger social whole, with particular attention on the class treatment of bodily proximity. Pierre Bourdieu, "Program for a Sociology of Sport," *Sociology of Sport Journal* 5, no. 2 (1988).

<sup>21</sup> Some readers will recognize these two categories as those used by Immanuel Kant in *The Critique of The Power of Judgment*. While my reading of Kant is through the more recent Guyer and Matthews translation, I have not retained their translations of *bestimmend* as "determining" and *reflectirend* as "reflecting." Immanuel Kant, *Critique of the Power of Judgment*, trans. Paul Guyer and Eric Matthews (Cambridge, UK; New York: Cambridge University Press, 2000).

<sup>22</sup> Video playback was used to analyze injuries as early as the 1970s, while current research into cranial impacts uses helmet kinematics-matched game video to compare

visual evidence with data readings of head direction, velocity, and impact. See, for instance, David C. Viano, Ira R. Casson, and Elliot J. Pellman, "Concussion in Professional Football: Biomechanics of the Struck Player, Part 14," *Neurosurgery* 61, no. 2 (2007).

<sup>21</sup> (2007).
<sup>23</sup> Chad M. Oldfather and Matthew M. Fernholz, "Comparative Procedure on a Sunday Afternoon: Instant Replay in the NFL as a Process of Appellate Review," *Indiana Law Review* 43, no. 1 (2009): 70.

### **Chapter 1 – The Politics of Timeshifting**

The politics of timeshifting are well catalogued in the history of preservation media. For video, the historiography usually couples the personal use of video recorders and subsequent digital formats with changes in the consumer market and legal status of media artifacts and distribution systems. In such histories, the subjective community is composed of consumer citizens adapting their habits and behaviour though available technologies. The usual adversaries are corporations, legislators, and a constituency of professional and amateur activists with diverging definitions of copyright, property, and fair use.

The standard history of the politics of television timeshifting includes some or all of the following: the division of broadcast territory into time blocks, used to delay broadcasts and to deliver roughly equivalent viewership percentages;<sup>1</sup> the development of home video recording equipment, and the recording of TV programs for personal use;<sup>2</sup> the Vanderbilt Television News Archive's fair use battles;<sup>3</sup> the reordering of cultural memory through the videocassette market;<sup>4</sup> the Supreme Court of the United States' 1984 decision in favour of personal timeshifting in *Sony v. Universal Studios*; and, finally, contemporary legal and policy battles over the status of timeshifting in the form of livestreaming and file sharing. Yet, this history presumes that the normal time of video content is its scheduled, broadcast television time. It also presumes that the foremost feature of timeshifting video is the capacity to store content, usually legally protected content. Timeshifting is imagined, in other words, in how it is used to bend the infrastructural contingencies of social space.

My history begins with the initial attempt to synchronize television time with "clock time."<sup>5</sup> In the 1950s, broadcast time was divided for purposes of television standardization as the commercial pressures of television management pushed the broadcast networks toward more localized experiences of television time, so that the uniform, "national" audience was in fact a series of smaller, subdivided audiences.<sup>6</sup> A further twist is that the technique of standardization—videotape—was also the harbinger of broadcast time randomness, a feature achieved once home viewers were able to record and preserve programs for viewing at any time.<sup>7</sup>

Television networks attempted to maintain the temporal continuity of broadcast time zones for the sale of advertising, just as national borders constrain the flow of information because of conflicts between rights holders. Regulations that limit the timeshifting of content are an attempt by property holders to maintain what Slack and Wise call *social space*, "the production of social relations over time."<sup>8</sup> Thus, in the rehearsed history, personally timeshifting the flow of television programming threatened the social contingency of infrastructural space by threatening the consistent flow of commodities. In these terms, the personal video recorder did not compromise the "liveness" of television; liveness was first and foremost compromised by the exigencies of having demographically similar audience shares across time zones. It was less important to have live programming than it was to have a live audience. Thus, from the beginning, timeshifting the flow of programming entered the television production regime as a primarily commercial policy.

When it came to timeshifting the *flow of images*—what I call "local timeshifting"—the possibilities of instantaneous recording were exploited as solutions to

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the widespread needs of post-war institutional management. Due in part to the early availability of video tape recorders (VTR) to large institutions, local timeshifting was also a means of reconfiguring labour relations through the reimagining of the workplace as a site of recursive feedback. The maintenance of large scale (broadcast regimes) and small scale (e.g. the home, hospital, workplace, etc.) social relations through time and space are what make video a signal medium of the 1960s. Video's instantaneous recording appealed to a view of "fast information" as economically and socially more valuable and this acceleration of information gathering must be situated within the networks of people, institutions, and things that create this information and bring it into display. Instantaneous media were originally concerned with aligning the present with "the instant." As Mary Ann Doane writes, the "prized singularity of the instant is also always pitted against its legibility as generalized information."<sup>9</sup> Though it *is* concerned with accelerating access, instant feedback video was not concerned with accelerating time, but about slowing down, fragmenting, and analyzing the singularity of the instant, as an event deepened with meaning in the present.

Lucas Hilderbrand—one of the most attentive theorists to video's consumer appropriation—writes,

Videotape is a storage device, a category of functional technology to which users don't usually ascribe the status of a medium. Yet, I suggest, videotape has been something more than just a dependent storage device; it has transformed relationships between users and screens and, through its limitations and artifacts, has introduced its own aesthetic qualities as well. That it has been eulogized and eroticized further suggests its cultural importance as a medium.<sup>10</sup>

There are many such arguments for videotape's medium or format specificity. For the purposes of this chapter, I extend one view offered by Hilderbrand, by approaching the heterogeneous history of video as a functional medium. While video has many formats,

the patterned consistency of its use in both broadcast and observational implementations indicates that video is a technology that meets the threshold of a medium, taking "medium" to mean the "socially realized structures of communication, where structures include both technological forms and their associated protocols."11 Compatibly, as John Nerone suggests: "Media are defined historically. Media are networks of relationships that can be constructed, reconstructed, and deconstructed in various ways with varying implications for where power is located and how it is exercised."<sup>12</sup> The use of video did not invent these socially realized structures, nor did it create networks where none existed; in some cases it cemented existing relationships, accelerated existing processes, and strengthened or weakened existing power imbalances. In short, video was a social medium entering an already woven network of relationships; it had (and has) an undecided political future; and the history and struggle of video use helped to temporarily articulate its functioning with specific political constellations. In the history of videotape as a recording medium, the socially realized structures of communication in which it was imbricated corresponded to the various uses of videotape as a transmission medium, a storage medium, and a means of accessing instant audiovisual feedback.

#### Video Débuts

The simplified, market history of video recording was initiated in 1956.<sup>13</sup> In this history, the Ampex Corporation, having developed German Magnetophon technology into the first commercially practical audiotape recorders,<sup>14</sup> used these same principles to develop the first broadcast quality television videotape recorder, the VRX-1000.<sup>15</sup> Using tape provided by the 3M corporation, the Mark IV prototype of the VRX-1000 was demonstrated on April 14th, 1956, in front of the representatives of the American

networks at the conference of the National Association of Radio and Television Broadcasters<sup>16</sup> and debuted on network television on November 30, 1956, with CBS's 15-minute news program *Douglas Edwards and the News*.<sup>17</sup>

The central feature of magnetic tape is "instantaneous recording." Instantaneous recording simply means that recorded content is available for playback *as it is recorded*. In the case of early magnetic recording, the same equipment recorded, erased, and played back the tape. In the documentation for the VR1000, Ampex engineers explain magnet recording:

Magnetic recording tape contains multitudes of ferrous oxide particles deposited on a plastic backing. During the recording process the tape is moved through the magnetic field at the gap in the record head, and the resultant flux pattern on the tape – created by the ferrous oxide particles being aligned in accordance with the field – is a function of the instantaneous magnitude and direction of the original signal *at the moment that the tape leaves the head gap.*<sup>18</sup>

A few notes regarding the implications of this intricate description: First, videotape was an analog magnetic recording technology, meaning that unlike film, its recordings were made by transforming electrical signals into patterns of recorded materials that were replayable using only the same kind of machine; second, videotape is a linear recording medium, meaning that content was recorded in a linear spatial sequence on the tape; third, videotape was always capable of storing *both* audio and visual information on the same tape; and fourth, by virtue of the fungibility of the metal coating, videotape was reusable.

There were immediate aesthetic, economic, and social consequences of videotape's potential for instantaneous recording in 1956. Ostensibly, the introduction of video recording meant that television production could continue as normal and an operator would merely need to press "record" to capture the process on tape; or, more optimistically, programs could be produced and edited on tape before broadcast. Either

way, tape signaled the end of the intervention of filmmaking in the television production process.

The second significance of instantaneous recording is embodied in its accelerated playback. While it took years for the potential of this acceleration to develop, the speed of video's instantaneous playback was nevertheless unfamiliar to viewing audiences. The crystallization of this experience is the instant replay. Whereas "replay" and "instantaneity" were not new concepts in 1956—on television or otherwise—the coalescence of video's instantaneous recording in an aesthetic form was novel in both its speed and its incorporation into the broadcasting timeline. Instant replay is an example of operational aesthetics<sup>19</sup> wherein the otherwise invisible fact that a program is recorded becomes visible: it lays the manufacture of timeshifting bear as an experience of aesthetic appreciation and, eventually, scrutiny.

The first subject of video recording was the television industry itself. More specifically, videotape was introduced at the National Association of Radio and Television Broadcasters convention in 1956. In the engineering and corporate mythology of the VRX-1000, the demonstration of video recording's operational aesthetic to television executives was revelatory, and featured a near-instant replay as its signifying moment:

Most of us were much more anxious to get back to what we considered the most pressing business at hand—talk of a potential recession that kept cropping up stubbornly, and fall program plans to stave off NBC and ABC. Well, the first thing we knew, after a brief introduction from Bill, we were looking at pictures of ourselves on the monitors not only taken just seconds before, but of a quality that was hard to realize was actually electronically duplicated and not "live." It took a few seconds before we realized the significance of what we had seen, and then, for all the world like a football crowd cheering Doak Walker or Bobby Layne trotting off the field after the winning touchdown, the entire audience rose to its feet and applauded spontaneously.<sup>20</sup>

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While this quote handily foreshadows the central place football touchdowns occupy in the figuration of video recording, moments of uncanny recognition are a standard feature of recording media history and videotape's history is no exception.<sup>21</sup> When, a year later, during Dwight Eisenhower's second inauguration, the networks replayed his swearing in repeatedly, it supposedly startled at-home viewers.<sup>22</sup> A similar story is told—though there is no evidence to prove its veracity—about the first instance of instant replay in 1963: viewers supposedly wrote and phoned CBS infuriated and confused about the events on their television.<sup>23</sup> Whether these stories are true accounts of the reaction to incrementally accelerating replay or simply reflections of a standard reaction to new media, they are still stand-ins for the excitement and fear surrounding video-mediated experiences of instantaneity. With the linear time of television broadcast interrupted, the stuttering flow of replayed television exposed the cracks in the liveness of the television signal.

Ampex underestimated the demand for video recorders and, in fact, their investment in developing the technology was quite small.<sup>24</sup> Ampex anticipated sales of around two-dozen machines over the first four years but by 1960 had sold 550 machines to networks, individual stations, and private firms interested in the possibility of instantaneous recording.<sup>25</sup> The question then, is, was Ampex merely poor at judging the "desire" for a magnetic tape recorder, or, did the VRX-1000 and subsequent recorders manufacture a demand for solutions to the challenges of television time management?

The argument I undertake below states that magnetic tape recording entered into the television industry as a technology of production management and was always imagined as a technology of automation. Indeed, the spread of video recordings created a demand for the greater control of already aired programming in the form of syndicated programming as a saleable commodity—a demand that did not exist with the comparably low-quality kinescope recordings that video replaced. In 1956—and ever since television production was concentrated through the manufactured scarcity of talent, the localization of production facilities, and the conflation of television infrastructure with other kinds of utility infrastructure.<sup>26</sup> In mobilizing videotape technologies, networks and electronics producers appealed to the ideological logic of efficient distribution, which was a proxy solution to a number of economic, aesthetic, and social challenges associated with the centralized process of trans-continental broadcasting. The effective construal of video as a necessary solution to the problem of efficiently distributing higher quality recordings is of a piece with the reified view of the networks as necessary actors in American unity.<sup>27</sup>

The late 1950s marked a time of acute instability for television producers, which led to an era of increased homogeneity in the style of programming and the methods for producing it.<sup>28</sup> In large part the growing homogeneity "reflects the shift from live anthology drama to filmed action adventure."<sup>29</sup> This shift was not without controversy and video was integral in the change to pre-recorded programming. The early history of video recording was also an expensive and finicky practice. Not only were the machines prohibitively expensive for small outfits, they were equipped with several sets of temperamental vacuum tubes necessary for the precision required for broadcast quality video. The machines also had a special affinity for the tapes they produced. Since each machine was unique in the precise way it guided the tape and the way the recording/playback heads met the tape, a recording could only be played back on the machine on which it was recorded: "If a show had to be held for a long time … CBS

stored the heads with the tapes and hoped for the best."<sup>30</sup> Any use of videotape as a longterm storage medium was far off but this machine-tape symbiosis may have helped foreclose any early experiments in this regard. Early recording for playback was thus a machine-localized practice, a fact elided when the pre-recorded material was massively broadcast and the signs of recording became invisible. The specificity required of the tape and the machine suggests a finer grain of temporality, what we can call an "institutional temporality" that was based in the conditional repeatability of programming. This conditional repeatability delimited the storage potential of videotape and suggested that repeatability, as a function of videotape, existed very tenuously within its putative purpose as a broadcasting medium.

Recording television for timeshifting was also not a novel practice. Although the first many generations of Ampex recorders were too expensive and intricate for small operations (they cost as much as \$75000),<sup>31</sup> they were an improvement over the status quo. Prior to 1956, the four networks (CBS, NBC, ABC, and DuMont) employed kinescopes for their timeshifting needs. Kinescope recordings were filmed and rebroadcast copies of television programs; kinescope film cameras used special rotating shutters meant to compensate for the difference in frame rates between the NTSC standard of 29.97 frames-per-second and film's 24. These recordings were lossy and noisy, they exaggerated the gray scale of the television image, and they produced extreme "halo" effects.<sup>32</sup> In short, viewers west of the Eastern Time Zone saw a much depreciated version of the broadcast. Moreover, because kinescope recordings were made on film, they were expensive to produce and had limited commercial value after their initial use. In 1951, 550 million feet of film was required for recording television on film, NBC and

CBS shipped 86 combined hours of recordings each week,<sup>33</sup> and the networks far surpassed Hollywood studios as the largest consumers of film stock.<sup>34</sup> By 1958, a cost comparison showed that a kinescope recording cost between \$110–\$120 per hour while an early tape cost \$300 per hour (one reel) but could be reused a hundred times.<sup>35</sup> As a material cost, therefore, the relative surplus value of the tape reel was thirty to forty times that of film stock. In addition to higher fidelity and conviviality of use, the videotape functioned to reduce the material costs of doing business in television.

In the 1950s, the politics of timeshifting were further shaped by the contracts the different networks held with various unions. Videotape entered the television industry during the height of black balling practices and union busting in Hollywood and technological solutions presented a way of controlling the amount of time workers actually had to work to produce a program.<sup>36</sup> Videotape was the newest in a long line of technologies that further automated the production process of television. By making the production process more predictable and less dependent on the randomness of live production, an efficient means of prerecording television offered the potential of reshaping TV labour. CBS—by far the biggest supporter of the Ampex video project, as a rival to the NBC-owned RCA-couldn't pre-record its programs on film because one of their unions (the International Brotherhood of Electrical Workers) couldn't contractually shoot on film; only another union could film programs, but not on CBS property.<sup>37</sup> While not explicated in this way, the arrangement was clearly organized to use the "liveness" of television as a guarantee of continued work for the union's members, a struggle with a precedent in the American Federation of Musicians' battles against the talkies.<sup>38</sup>

Writing the night of videotape's first demonstration, and published on the front page of the next day's *New York Times*, Val Adams expressed the trans-industrial potential that video offered for "re-presenting information" and simultaneously restructuring labour relations:

An electronic device for recording television programs on magnetic tape and playing them back almost instantaneously through a normal TV system was demonstrated here today ... Although Ampex's first recorder is designed to meet the needs of television networks and stations, the potentialities of the device are virtually unlimited. Undoubtedly it can be utilized by science and industry in many ways for storing and re-presenting all kinds of information.

The introduction of the device is bound to set off long and arduous jurisdictional battles between various motion picture and television unions.<sup>39</sup>

When videotape debuted in its first practical form in 1956, in front of the network executives, it hailed the possibility of a complete reorganization and automation of the television production and broadcast process. As proof of the use of videotape in the process of standardizing and automating television reproduction, by 1958, NBC had replaced the use of kinescopes with a dozen video recorders:

Eight Ampex and four RCA machines recorded programming in half-hour shifts, rewound the tapes, cued them up, and replayed them at the appropriate later hour—all controlled automatically. Though these machines were by no means foolproof, and required a great deal of attention and adjustment, compared to kinescope operations, they practically ran themselves.<sup>40</sup>

Thus, American networks at the end of the 1950s faced a series of economic and aesthetic challenges to which video offered a unified solution. Confronted with the film stock's deficiency of a lack of fidelity to broadcast television, its non-recyclability, and a labour arrangement organized against the storability of film, the apparent potential of videotape—the capacity to simultaneously record, and to re-record tapes—married together the solutions to these problems under the rubric of easier timeshifting. In short order, videotape appeared as a means of automating the maintenance of social space but

doubled as a means of maintaining uneven social relations between the managers of television production and the subsidiary participants in the production process.

These solutions were recapitulated two years later in the documentation for the latest model of Ampex's video recorder, the VR1000:

Advantages inherent in recording on high quality magnetic tape recorders include **fidelity** of reproduction; high storage capacity (a standard audio recorder operating at a tape speed of 7-1/2 IPS provides over 60 minutes of playing time from a reel of tape 10-1/2 inches in diameter); the **economy** of being able to erase and re-record a tape whenever desired; the fact that the recorded program is **available for immediate replay** without any processing, or may be stored indefinitely.<sup>41</sup>

As this passage indicates, video represented a means for resolving aesthetic, materialeconomic, and temporal challenges of centralized television production. We should question, given this evidence, whether the supply of these solutions in fact helped redefine the deficiencies in existing systems. Video's popularity, as I earlier stated, was underestimated; its impact, therefore, was then retrospectively reified as a direct result of its materiality and thus a change in social relations is replaced, in understanding, by a change in technology.

Although both kinescope recording and video recording involved reformatting the television signal, each reconfigured the economic, labour, and aesthetic values involved differently. This is a case of what Lisa Gitelman calls the controversies of "material meanings" of an artifact, which she describes as the "nexus of cultural practices, economic structures, and perceptual and semiotic habits that make tangible things meaningful."<sup>42</sup> In this case, the controversy of video's "material meanings" centered on the already very concentrated sites of power in television production, and was a controversy built into the logic of new media technologies as bearers of transparent

immediacy.<sup>43</sup> Yet, the reconfiguration of the material meanings surrounding the shift from film to video was effaced by the increased fidelity of video recording to the original television signal. Increased fidelity is of a piece with the streamlining and standardization of timeshifting as it aims to offer the same experiences to both temporally and spatially displaced audiences.

Television production in the 1950s accelerated and helped to further centralize the network model of distribution, which already tended toward a greater extraction of value from the recorded materials, whether on film or magnetic tape. This extraction, before 1956, was regulated by the small lag time between broadcasts, from the material used, and from the workers involved in the production of the programming. Once "canned" programming became the norm, reruns, serial reproductions of tapes, and syndicated programming did in fact allow for the re-monetization of content. Pre-recorded programming also meant that writers could make a lucrative career creating programming, while networks increased their profits from syndication six-fold in the first eight years after the introduction of videotape.<sup>44</sup> While the IBEW contract temporarily stalled one network's ability to create pre-recorded programming, the shift was nonetheless complete by the mid-1960s. Nearly every aspect of pre-recorded programming favoured the streamlined, network-centralized production process. David Davidson, the head of the Writers Guild of America said in 1961 that the telefilm industry already operated as an "assembly line" or "sausage factories."<sup>45</sup> Whereas film, in practice, was a medium suited to preservation, the instantaneous temporality of videotape's accelerated recording speed appeared to promise greater control and better streamlining of an already extremely controlled and streamlined process.

#### Ampex and reel time

Ampex formulated the challenge of a practical recorder in terms of a challenge of temporality. Videotape machine engineering was entirely conditioned by the uses and people meant to be using the tape: assumptions about *who* and *how* video would be used were included in designing the recording speed, playback time, and instant access capabilities of the videotape recorder. In the 1958 edition of the manual for the Ampex VR1000, the opening pages state, "three basic problems had to be solved in designing a practical magnetic tape recorder for video applications:"

- 1. High head-to-tape velocity had to be provided to record the high frequency components of the video signal. . . .
- 2. Adequate playing time, using reels of reasonable size, had to be available.
- 3. Some means had to be found to record and reproduce the entire video signal, from the very low frequencies to the very high frequencies.<sup>46</sup>

This simplification describes a balance needed between the bandwidth concerns of the video signal—reproducing "the entire video signal"—and the physical dimensions of the tape. First, the bandwidth concern grew out of an attempt to develop a recording medium that would appear unmediated. In other words, the artifacts of video recording needed to be imperceptible to a TV viewer. Such artifacts would threaten the ideological valence of liveness—of co-presence and immediacy—that was the hallmark of the nationally united audience.<sup>47</sup> "Liveness" as an ideology depends also on the constant "flow" of programming,<sup>48</sup> and on the perception "the text issues from an endless supply that is sourceless, natural, inexhaustible, and coextensive with psychological reality itself."<sup>49</sup>

Second, the speed that the tape could safely and manageably move across the recording heads limited how small the reel of tape could be. The standards of American television broadcasting determined the necessary tape length. Meaning, in other words,

that a tape that could hold sixty minutes of content was necessary. Third, tape density determined the quality of a recording relative to the tape used: faster speeds meant more information recorded on the tape but also meant that more tape was quickly consumed. Far from a pure engineering challenge, videotape was a social undertaking. Accordingly, the technology produced out of this undertaking contained the values of networked and centralized broadcasting within its design.

At one point, Ampex described how an imaginary videotape recorder could function, without any attempts to compress the information. In theory, such a recorder was possible long before a practical recorder was developed. Ampex described the recorder in terms of the signal-to-noise ratio, the level of distortion, and the necessary speed of the tape. In conventional audio recording at that time, the tape was fed at 7.5 inches-per-second (IPS). To record video using the same method with the same density the tape would have to move at 2000 IPS, or 113 miles-per-hour. The required speed would be intolerable for both the machines and people involved. Extremely precise heads could reduce the speed required but would still produce roughly 60000 feet of tape for a one-hour recording, and a reel 38-inches in diameter. This behemoth-a three-foot disk—would cost about \$4000 for one hour of tape.<sup>50</sup> Engineering challenges are social challenges, and the requirements for Ampex engineers were videotapes that could fit both the production process of television and the human dimensions of its operation. Reel size, like other format standards, was thus a compromise between the norms of fidelity, the standard duration of content, the patterns of usage, and the spatial constraints of the physical artifact.<sup>51</sup>
For instance, reel size in both film and video has varied with the popularity of different recreational uses. Early reels produced by Edison's Kinetoscope Company used fifty feet of film. In 1894, Edison established a contract with the Lathams for the production of prizefight films at the Black Maria. Within a month, the Lathams had converted a film camera to use 150-foot reels, the length necessary for a single boxing round. And spectators could pay to move from one projector to the next, as each held the next round in the fight.<sup>52</sup> Then, in 1977, the competition between Sony and Panasonic over Beta and VHS formats fully incorporated assumptions about the use of videotape by at-home viewers and similarly invoked the popularity of sports spectatorship as a benchmark for a format standard:

During the negotiations, [RCA and Panasonic] considered the programs most recorded on video cassette recorders. They agreed that, similar to the Japanese experience, the programs most likely to be recorded would be movies and sports. The requirements for recording sporting events differ in the two countries, however, since American football, one of the most popular sports, requires at least 3 hours.<sup>53</sup>

For this reason, Panasonic eventually proposed a 2/4-hour switchable VHS system (the SP/LP system), and RCA accepted. Subsequent electronics companies adopted a standard that was originally chosen to accommodate the length and popularity of American football.<sup>54</sup> While these guidelines may have appeared arbitrary in their time, and common sense today, they were shaped by, and in turn shaped, contemporary patterns of use and temporalities of consumption.

## Looking towards replay

Thus, as a matter of physical engineering video recording was always technically feasible, once the principles of magnetic audio recording were established. The technology, however, would have to fit the bandwidth costs, existing norms of signal-to-

noise ratios, and both the spatial and temporal human dimensions of television broadcasting. Videotape's instant-access temporality fit with the corporate striving for accelerated and centralized television production in the conjuncture of the 1950s. By the early 1960s, circumstances changed, and the mediation of the video recorder appeared on television as an aesthetic trope for the representation of time and action in the form of the "instant replay." Eventually, instant playback became a full-fledged, codified, standardized, and preferred technique of observation, evidence production, and judgment; video replay became a central means of rationalization and automation in industrial and postindustrial settings. For the individual of the 1960s, this experience of video recording appeared as both a part of and apart from broadcast television. Yet, as we've seen, instant replay was prefigured by the network broadcasting adoption of video technology, which capitalized on the possibilities of using videotape for automation: in one stroke, the networks reorganized their labour arrangements, concentrated the distribution of television, streamlined the production of programming, and created a new aesthetic for the rebroadcast and replay of television content.

<sup>&</sup>lt;sup>1</sup> William Lafferty, ""A New Era in TV Programming" Becomes "Business as Usual:" Videotape Technology, Local Stations, and Network Power, 1957-1961," *Quarterly Review of Film and Video* 16, no. 3 (1997).

<sup>&</sup>lt;sup>2</sup> Ann Gray, "Behind Closed Doors: Video Recorders in the Home," in *Boxed In: Women and Television*, ed. Helen Baehr and Gillian Dyer (London: Pandora, 1986).

<sup>&</sup>lt;sup>3</sup> Hilderbrand, Inherent Vice: Bootleg Histories of Videotape and Copyright.

<sup>&</sup>lt;sup>4</sup> Will Straw, "Embedded Memories," in *Residual Media*, ed. Charles R. Acland (Minneapolis: University of Minnesota Press, 2007).

<sup>&</sup>lt;sup>5</sup> Eugene Marlow and Eugene Secunda, *Shifting Time and Space: The Story of Videotape* (New York: Praeger, 1991).

<sup>&</sup>lt;sup>6</sup> Jonathan Sterne, "Television under Construction: American Television and the Problem of Distribution, 1926-62," *Media, Culture & Society* 21, no. 4 (1999).

<sup>&</sup>lt;sup>7</sup> Hilderbrand, Inherent Vice: Bootleg Histories of Videotape and Copyright.

<sup>8</sup> Jennifer Daryl Slack and J. Macgregor Wise, *Culture + Technology: A Primer* (New York: Peter Lang, 2005), 136.

<sup>9</sup> Mary Ann Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive* (Cambridge, MA: Harvard University Press, 2002), 208.

<sup>10</sup> Hilderbrand, Inherent Vice: Bootleg Histories of Videotape and Copyright: 35.

<sup>11</sup> Gitelman, Always Already New: Media, History and the Data of Culture: 7.

<sup>12</sup> John Nerone, *Violence Against the Press: Policing the Public Sphere in U.S. History* (New York; Oxford: Oxford University Press, 1994), 17.

<sup>13</sup> Hilderbrand, via Armes, argues that videotape's medium specificity is more closely aligned with the history of audio than that of cinema or photography. Though the challenge of fitting roughly 250 times the information on the magnetic tape retarded the development of a usable videotape from audiotape systems. Frederick M. Remley, "The Challenge of Recording Video," in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (New York: IEEE Press, 1999). Roy Armes, *On Video* (London; New York: Routledge, 1988); Hilderbrand, *Inherent Vice: Bootleg Histories of Videotape and Copyright*.

<sup>14</sup> Beverley R Gooch, "Building on the Magnetophon," in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (New York: IEEE Press, 1999), 82-89. By 1950, Ampex was the largest producer of audio recorders.

<sup>15</sup> Remley, "The Challenge of Recording Video."

<sup>16</sup> Albert Abramson, *The History of Television, 1942 to 2000* (Jefferson, NC: McFarland, 2003).

<sup>17</sup> John C. Mallinson, "The Ampex Quadruplex Recorders," in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (New York: IEEE Press, 1999), 160.

<sup>18</sup> Emphasis in original. Ampex Corporation, *VR1000 Instruction Manual* (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, 1958), 1.

<sup>19</sup> Operational aesthetics, as Neil Harris describes them in relation to the work of P.T. Barnum, signified "a delight in observing process and examining for literal truth." This feature of the instant replay holds true throughout its history, though it is maybe more closely aligned with aesthetic "beauty" than Harris would allow. Neil Harris, *Humbug: The Art of P.T. Barnum* (Boston, MA: Little, Brown, 1973), 79.

<sup>20</sup> Attendee, quoted in Jeff Martin, "The Dawn of Tape: Transmission Device as Preservation Medium," *Moving Image* 5, no. 1 (2005): 53.

<sup>21</sup> Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham, NC: Duke University Press, 2000).

<sup>22</sup> Laurence Laurent, "Viewers Startled by Tape's Quick Repeat," *The Washington Post*, January 22, 1957.

<sup>23</sup> Verna, Instant Replay: The Day That Changed Sports Forever.

<sup>24</sup> Success as a commercial technology was never guaranteed and, by all accounts, the 3M tape they used for this first demonstration made a significant improvement to the showing.
<sup>25</sup> Lafferty, ""A New Era in TV Programming" Becomes "Business as Usual:" Videotape Technology, Local Stations, and Network Power, 1957-1961."

<sup>26</sup> Sterne, "Television under Construction: American Television and the Problem of Distribution, 1926-62."

<sup>28</sup> William Boddy, *Fifties Television: The Industry and Its Critics* (Urbana and Chicago: University of Illinois Press, 1990), 187.

<sup>29</sup> Ibid.

<sup>30</sup> Martin, "The Dawn of Tape: Transmission Device as Preservation Medium," 56.

<sup>31</sup> Marlow and Secunda, *Shifting Time and Space: The Story of Videotape*.

<sup>32</sup> Abramson, The History of Television, 1942 to 2000.

<sup>33</sup> Ibid., 48.

<sup>34</sup> Stewart Wolpin, "The Race to Video," *Invention & Technology* (Fall 1994).

<sup>35</sup> Martin, "The Dawn of Tape: Transmission Device as Preservation Medium."

<sup>36</sup> This is an intentional echoing of Marx's observation on the use of machinery for cheapening commodities and increasing relative surplus value. Karl Marx, *Capital: A Critique of Political Economy, Volume 1*, trans. Ben Fowkes (London: Penguin Classics, 1990), 492-93.

<sup>37</sup> Abramson, *The History of Television, 1942 to 2000.* 

<sup>38</sup> Donald Crafton, *The Talkies: American Cinema's Transition to Sound, 1926-1931* (New York: Scribner, 1997), 218-21; Elizabeth Fones-Wolf, "Sound Comes to the Movies: The Philadelphia Musicians' Struggle against Recorded Music," *The Pennsylvania Magazine of History and Biography* 118, no. 1/2 (1994).

<sup>39</sup> Val Adams, "TV Is Put on Tape by New Recorder," *The New York Times*, April 15, 1956. Adams makes special reference to the Screen Actors Guild and the American Federation of Television and Radio Artists, though the adoption of videotape unsettled labour relations throughout the television production process, mainly through the practice of pre-recording programs.

<sup>40</sup> Martin, "The Dawn of Tape: Transmission Device as Preservation Medium," 54.

<sup>41</sup> Emphasis added. Ampex Corporation, VR1000 Instruction Manual: 1.

<sup>42</sup> Lisa Gitelman, "Media, Materiality, and the Measure of the Digital, or, the Case of Sheet Music and the Problem of Piano Rolls," in *Memory Bytes: History, Technology, and Digital Culture*, ed. Lauren Rabinovitz and Abraham Geil (Durham, NC: Duke University Press, 2004), 203.

<sup>43</sup> Jay Bolter and Richard Grusin, *Remediation* (Cambridge, MA: MIT Press, 1999).

<sup>44</sup> Boddy, *Fifties Television: The Industry and Its Critics*: 177.

<sup>45</sup> As quoted in Body, *Fifties Television*: 196.

<sup>46</sup> Ampex Corporation, *VR1000 Instruction Manual*.

<sup>47</sup> Jane Feuer, "The Concept of Live Television: Ontology as Ideology," in *Regarding Television: Critical Approaches*, ed. E. Ann Kaplan (Frederick, MD: University Publications of America, 1983).

<sup>48</sup> Here I mean the second of the three senses of "flow" elucidated by Williams: "Flow of this second kind, however, is centrally important in our experience of television, since it shows, over a sufficient range, the process of relative unification, in a flow, of otherwise diverse or at best loosely related items. Raymond Williams, *Television: Technology and Cultural Form* (New York: Schocken Books, 1974), 97.

<sup>&</sup>lt;sup>27</sup> Ibid., 4.

<sup>49</sup> Beverle Houston, "Viewing Television: The Metapsychology of Endless Consumption," *Quarterly Review of Film Studies* 9, no. 3 (1984): 184.

<sup>51</sup> For a comparable description of how the Mp3 format was engineered to reflect assumptions about its use, its listeners' ears, and the norms of available bandwidth, see: Jonathan Sterne, "The Mp3 as Cultural Artifact," *New Media & Society* 8, no. 5 (2006). <sup>52</sup> Dan Streible, *Fight Pictures: A History of Boxing and Early Cinema* (Berkeley:

<sup>52</sup> Dan Streible, *Fight Pictures: A History of Boxing and Early Cinema* (Berkeley: University of California Press, 2008); Ray Gamache, "Genealogy of the Sportscast Highlight Form: From Peep Show to Projection to Hot Processor," *Journal of Sports Media* 5, no. 2 (Fall 2010).

<sup>53</sup> Hiroshi Sugaya, "Consumer Video Recorders," in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (New York: IEEE Press, 1999).

<sup>54</sup> Ibid.

<sup>&</sup>lt;sup>50</sup> Ampex Corporation, *VR1000 Instruction Manual*: 4.

#### Chapter 2 – From saloon riots to the Canadian case: instantaneity and the replay

This chapter concerns the pre-history of televised instant replay by approaching the notions of instantaneity and "the replay" through the emergence of an experience of synchronicity that is attached to the reception and circulation of sports results around the turn of the 20<sup>th</sup> century. The second section introduces controversies over the "material meaning" of the replay. In an early boxing match replay, crank speeds and operational temporalities are situated at the intersection of a dispute over the objectivity of film as a new, documentary technology. In a second example, prototypical instant replays of broadcast sport are at the centre of a political balancing act between English- and French-speaking Canada. In short, this chapter uses the rubric of sports reception to look at the ways in which "the instant," instantaneity, and practices of replay emerge alongside and often help to co-constitute the media of their transmission.

Both Dan Streible and Anna McCarthy use the case of boxing spectatorship to renew an understanding of the early days of cinema and public television, respectively.<sup>1</sup> In Streible's work, the practices and controversies of exposition surrounding prizefight films expand a standard history of cinema that ignores the low-class, non-centralized, and often-illegal circulation of materials. As Streible writes, fight pictures make up a significant portion of the earliest films made for exposition, with the Corbett-Fitzsimmons fight (1897) ranking as film's first great attraction, helping to strengthen a common association between boxing and cinema.<sup>2</sup> These associations were not accidental.

Sports texts and events have a long history of association with formal, technical, and commercial experimentation with audio-visual media: athletes, racehorses and various sports-military ballistics were common subjects of serial photography beginning with Marey and Muybridge;<sup>3</sup> the Army-Yale football game was featured in the first allsound newsreel in 1927;<sup>4</sup> outdoor, remote television transmission debuted using the Epsom Derby as its subject;<sup>5</sup> German television made a mass public premiere during the 1936 Berlin Olympics;<sup>6</sup> instant replay premiered in the fourth quarter of the 1963 Army-Navy football game; the widespread adoption of CCTV surveillance in the UK is, policywise, tied to the funding of new CCTV systems for use on football grounds, funded by the Football Trust, in 1985; facial recognition surveillance systems were first tested, by the Tampa Bay Police Department, at Super Bowl XXXV, in 2001;<sup>7</sup> and in 2014, Brazilian police will be equipped with glasses that incorporate database scanning and facial recognition technology to identify "suspect" faces within large crowds at the World Cup.<sup>8</sup> This list is in no way complete, and each one of these cases takes place at a different intersection of government, business, public, police, and engineering interests, yet they nonetheless index the regularity with which sports act as a public staging ground for the introduction, promotion, or tweaking of new media technologies and assemblages.

Sport has been, in developed industrial countries, a highly commercialized arena in which public and private investments in new technology are rarely questioned. This includes instant replay, which, based on the history I have undertaken, needn't be seen as "sports technology" or even just a "broadcasting technique." Yet, though these associations are contingent, they are effective in the ways that they alter the perceived possibilities of new media. Sport sites and sport texts bring together apparently closed systems, clear aesthetic-kinetic traditions, established modes of spectatorship, and ample commercial investment. Streible suggests that the early success of fight films was due to a combination of technical and social compatibility. First, that "the brief, contained, recognizable, kinetic action of a round of boxing was well suited to the technical limitations of the first motion pictures,"<sup>9</sup> and second,

The social network of self-described sporting and theatrical professionals made the link a consistent and rationalized one. Specific practitioners and promoters forged the affiliation between boxing and cinema, relying on the two practices to publicize each other.<sup>10</sup>

Inching toward the 1960s, Anna McCarthy argues that "localized rhetorics of screen and place"<sup>11</sup> during the emergence of theatre television in the 1940s were compatible with the gendering of television in the home and complemented the spatial classification of larger viewer identities in public space.<sup>12</sup> The classification of segregated time and place surrounding sports transmission and retransmission has a robust and violent past. This is a past that results from the economic and cultural location of information in the 19<sup>th</sup> century saloon, the political struggle over the use of leisure time, the standardization of simultaneous observation, and the emergence of space-binding media.<sup>13</sup> Through telegraphy, television, and film, sports texts become the site and object of a struggle over the right to experience and make sense of live and replayed information.

In order to later situate video replay politically, economically, and socially I undertake a history of the circulation of non-video sports information and replays. If, as I have argued, video meets the threshold of Lisa Gitelman's definition of media as "socially realized structures of communication," the purpose of this chapter is to trace the contingency of one medium (video) to the use of related media (telegraphy, telephony, television) for similar purposes. The purpose here is to avoid reifying the use of video replay in the 1960s as either predetermined or necessary and to demonstrate that even with a great temporal lag, contingent social structures of communication do exist residually and can be resuscitated through the use of new media in new settings.

# **Emergent Liveness**

In the late 19<sup>th</sup> and into the 20<sup>th</sup> century, saloon operators in urban centers installed telegraph and telephone connections to provide patrons with up-to-date sports scores. Madelon Powers cites one illustrative patron from the period, describing the scene:

During the baseball and racing season, it is very common to have score cards given out free of charge. As the game progresses and the results are announced, the score can be kept as accurately by one sitting at a table with his drink as if he occupied a seat on the 'bleachers."<sup>14</sup>

Assertions of the capacity of media to transport audiences are normally associated with radio and television. When the public life of television was less stabilized and the network form of distribution had not yet solidified, theatre television drew on these very assertions: "At the core of the discourse on theater TV were hyperbolic paeans to its superlative powers of liveness, immediacy, and collectivity, usually linked to the experience of sports spectatorship."<sup>15</sup> As Jeffrey Sconce argues, the television screen-asportal is a notion based both on the screen's moving pictures and, more importantly, a mobile conception of liveness attributed to those images.<sup>16</sup> Lynn Spigel calls this association the "hyperrealism" of "being there" and notes that

Television producers and executives often took the promise of hyperreality quite seriously, devising schemes by which to merge public and private worlds into a new electrical neighbourhood. One of the central architects of the new electrical space . . . saw television as an extension of traditional community experiences.<sup>17</sup>

In the ideological milieu of the 1950s, television effectively articulated (contingently, unnecessarily) forms of communal experience with liveness, in part because the meaning of television was still stabilizing as a commercial technology, and not because of the innate power of images to transport individuals. If television executives and producers could sustain the assertion that television maintained a spatiotemporal bind over the

country, it was through the recapitulation of a previously realized structure or network of communication, dependent on the erection of ideological "paeans to its superlative powers" for creating the co-feeling of simultaneity.

Telegraphic means of communicating live updates prefigure spectatorial techniques of the 20<sup>th</sup> century and establish the conditions in which live information became legible. Spectatorial techniques of remote viewership, in other words, were honed before there was a spectacle to see. As telegraphy collapsed the space between sender and receiver, new spaces grew around the nodal points of information circulation. Telegraphic information circulation in the 19<sup>th</sup> century marks the emergence of mediated instantaneity. What we now refer to as liveness was thus nascent as a social attribute of a mediated simultaneity that predated broadcasting.

What *is* consistent between telegraphy and centralized broadcasting is the cultural value attached to "live" information.<sup>18</sup> Indeed, sports events are one of the few televised texts that have retained their currency in being live, but were also integral, along with other "media events," in establishing this value in the first place.<sup>19</sup> John Guillory argues—and I tend to agree—that facts become information when value is added through transmission.<sup>20</sup> Value, in Guillory's equation, is attained when facts received in a contextually significant fashion. Information, however, comes with a "shelf life…a momentary value that drives the development of our information technologies in their quest to speed up, economize, and maximize the effectiveness of transmission."<sup>21</sup> As the following examples show the transmission of sports events and facts, and the creation of contexts of live reception added commercial, cultural, and affective value to the information. Beginning with the telegraphed sports score and continuing through

prototypical television replays, sports information was invested with the political import of its content and exploited through the perception of speed and simultaneity.

As William Uricchio writes with regards to transmission media from the 18<sup>th</sup> century to the present,

The literature on these technologies usually attributes the development of technological infrastructures to military interests, and accordingly inscribes the use of simultaneity for communication, mapping, and surveillance within this offensive or defensive framework. But a less appreciated motive to stimulate technologies of simultaneity had to do with the construction of national identity and the modern state.<sup>22</sup>

Media "instances" are primary in the development of such technologies of simultaneity. In the late 19<sup>th</sup> century, live information became a saleable commodity through the process of becoming an identifiable phenomenon. Emerging as a commercial product between photography and sound reproduction, live reports of social, political, and cultural events were circulating properties around which new and old social relationships reorganized. As early as 1849—within five years of the commercial introduction of telegraph technology—sports results were announced via wire report as live events.<sup>23</sup>

The 1849 prize fight between Tom Hyer and Yankee Sullivan was delayed repeatedly as the combatants and their promoters sought a venue to stage the bout away from the pursuit of law enforcement. Eventually fighting on a remote island in Maryland, telegraph reports communicated the fight's result as well as the hunt for the participants.<sup>24</sup> David Henkin goes as far as describing the Hyer-Sullivan fight as helping to set the preconditions for a successful postal system:

[The fight] created a sense of instantaneous connection among boxing fans gathered at bars and newspaper offices throughout urban America. Americans who imagined that they were living in the same moment as fellow sports enthusiasts in another city were also more likely to turn to the post to conduct ongoing relationships with people they did not see.<sup>25</sup>

This theorization of liveness and the experience of "instantaneous connection" in the 19<sup>th</sup> century suggests a kind of social mediatization, in which media are normalized through their incorporation with other daily activities and existing structures of communication.

The capacity for such live events to appear legible as live, once retransmitted, seems to depend on a coordination of simultaneity. Yet, the fight took place more than three decades before standardized time. The question remains then, what were the conditions of simultaneity prior to the synchronization of civic clock time?

Liveness in the 19<sup>th</sup> century is not liveness as we think of it today, as the unimpeded flow of information. Instead, it is closer to a rough synchronicity of distant events. The standardization of time actually follows from the expressed desire for just such a synchronicity of events for scientific purposes; specifically, standardized time was not an effect of technological change, but a part of a process in which the meaning and usefulness of simultaneity shifted in the mid-1870s.<sup>26</sup> For example, the need for centralized time was expressed in the problematization of geophysical research in the mid-1870s, when scientists discovered that geographically disparate observations of *aurora borealis* were faulty, due to divergent local times.<sup>27</sup> It was also at the turn of the 20<sup>th</sup> century when Einstein and others were working towards a debunking of pure synchronicity. As such, "liveness," by the early 1900s was *only* a question of infrastructure and human experience—as it failed to carry the empirical weight of scientific observation.<sup>28</sup>

Through the manufacture of experiences of simultaneity, we can imagine a sense of mediated instantaneity emerging in the late 19<sup>th</sup> century. Though the necessity of standardized time may have taken root in the arena of scientific observation, the *need* for

standardized time was expressed as a challenge of railway coordination and it was through the telegraphic and rail infrastructure that standardized time was implemented.<sup>29</sup> The telegraph and the railway served as the media through which local time became a stated problem worthy of a standardized solution.

Thus, we can turn the relationship between synchronicity and time around: synchronicity does not follow from standard time; instead, the problem of standard time results from the positive (e.g., sports) and negative (e.g., faulty science) experiences of simultaneous events. Nineteenth century events like prizefights, relayed for a public audience or in the "public interest," helped to establish the conditions in which standardized time seemed possible and eventually necessary.

The construction of synchronicity and simultaneity also leveled the experience of news events into a predictable mode or transmission, reception, and circulation. Describing the unstable experience of communication technologies of this period (the mid-to-late 19<sup>th</sup> century) Richard Menke writes concerning the constant reports of James A. Garfield's health following his shooting:

Because the medium of telegraphic news allowed sudden, frequent updates, the widely noted public sense of "alternating dread and trust," "anxious alternations," or "intense fluctuations of hope and fear" not only reproduced the state of the president's health according to the bulletins but also reiterated the very form of telegraphic transmission: binary, instantaneous, sequential, temporary information.<sup>30</sup>

Menke's categories (binary, instantaneous, sequential, and temporary) are homologous to the perspicuous description of sports events, in which the shape of the event is predetermined and the set of possibilities limited by the closed system of the game. It is also a feature that separates the linear sequencing of events in previous technologies from the instant replay capacities of video. Video's replays are not temporary, sequential, or binary. Instead, video replay information is characterized by its repetition, disassembly of sequential flows, and the ready access to recent events.

## Early sites of simultaneous reception

The 19<sup>th</sup> century and early 20<sup>th</sup> century saloon—like the newspaper office—served as a marketplace for experience and the exchange of information. The saloon as a site of sports spectatorship does not simply appear ahistorically, however, as commercial sports developed in North America as contests often sponsored by such businesses;<sup>31</sup> the turn of the century saloon was also frequently the commercial center of a neighbourhood, especially in new settlements and for newly arrived immigrants:

In these places, where a customer's ties to a neighborhood might be new and tenuous, saloonkeepers cashed paychecks, extended credit, supplied a mailing address or a message drop for men who had not yet found a permanent home...In port cities on the East Coast and the Great Lakes, the saloonkeeper was often the labor contractor for dock work. Many saloons had the only public toilets or washing facilities in the neighborhood...<sup>32</sup>

Along with cash, credit, work, lodging, and bathroom facilities, synchronized communication became another commodity worthy of centralization and community access. Synchronized information is one component of a more dynamic understanding of mediated liveness; if televisual liveness is about the flow of images, then synchronous information is about the transcendence of spatial barriers and the erection of nodal sites of simultaneous reception. The development of centralized sites of communication and of discrete communication events—whether updates on the president's health or the winner of a fight—also give rise to "media instants," moments of inflection coloured by their necessarily binary characteristics. The sports reports sent by telegraph and telephone at the turn of the 20<sup>th</sup> century, are thus what I call "instant relays:" both in the sense of

information *instantly relayed* and in the sense of *an instant, relayed* from one location to be recapitulated in another.

Communal access to instant relays became the basis of a new mode of spectator experience, mediated by both the setting of the bar and the communication apparatus: "Regular gathering in barrooms during major sporting events produced a quality of relationship among fellow enthusiasts which the stadium experience, with its crush of ever-shifting crowds, could not duplicate."<sup>33</sup> As Powers suggests, the saloon combined existing forms of spectatorship with the familiarity of the bar—and, as such, served as a more static site for developing instant relay techniques. In the barroom of the early 20<sup>th</sup> century, information formed the basis of experience and helped to articulate sports spectatorship with the burgeoning understanding of the tavern as a "cultural arena in which liberatory ideals of democratic socializing met the privatizing forces of commerce and insular expressions of community."<sup>34</sup> Co-presence at the site of information reception can produce stark experiences of these "insular expressions of community."

Expanding the near-live experience of the game to new sites through a prototypical form of mass dissemination also provided the foundation for the expression of new class-, racial-, and gender-segregated forms of participation in larger cultural events. The creation of "communities" around sports texts accompanied the entrenchment of existing social communities whose conflicts were now rearticulated to live reporting. Parsing liveness, we can assert that it is composed partly of the converging synchronicity of event and reportage and is subsequently characterized by the continuity of sounds and images that make up the flow of the television stream.

## "Fighting in electricity": Class, replay, and simultaneous reception

If telegraphed reports helped to create a sense of synchronicity, to shift time toward simultaneity, they also served to collapse spatial boundaries erected by social controls on the flow of information. Television, as David Harvey famously argues, is a classic example of capitalism's use of a technology for overcoming spatial barriers.<sup>35</sup> From the Kennedy administration onwards, officials imagined that satellite broadcasting could overcome the spatial boundaries and political blockages of television distribution.<sup>36</sup> I have already rehearsed the description of the telegraph as a space and time compressing technology. But as Dan Streible and Anna McCarthy are apt to note, typical practices of media reception via telegraph, film, and television in the early days of each, not only served to bind space and overcome previously encumbering barriers, but actually served to compress larger social relations into microenvironments of media participation.

Information relay practices built up in bars concurrently with the accelerated upscaling, systematization, and professionalization of the sports industry; professional sports in the late 19<sup>th</sup> century were organized within "emergent rhythms of paid work and leisure in industrial towns and cities, and the weakening of religious prohibitions against fun on Sundays."<sup>37</sup> Of particular contestation in this period was the fight over the working day, the guarantee of leisure time, and the discretionary use of "free" time. Saloons, then, were an integral part of negotiating between work time and leisure time and were "the material result of a long-standing political struggle over leisure."<sup>38</sup> Before the development of television and radio broadcasting, saloons served as intersections of the networked experience of civic events. Along with the expansion of nickelodeon theatres, the quasi-live dissemination of events was an emergent means of making the

"live" audience intelligible. As such, the conventions for experiencing an event "at distance" yet "all together" were developing and the early history of this experience is marked by extreme violence in the presence of collectively received information.

In 1912 in the United States, the Sims Act prohibited the interstate transport of boxing films.<sup>39</sup> Prior to this ban, a championship fight took place between one boxer of African descent, Joe Gans, and his white opponent, Battling Nelson ("The Durable Dane"). The fight ended with Gans defending his title through forty-five rounds. Streible writes that the telegraphed relay of the fight's result produced both "spirited celebration and violent rebuttal."<sup>40</sup> After receiving the news through bulletins, racial violence erupted throughout New York City. The *New York Times* recounted several stories beginning from the moment that the saloon tickers were read aloud, including this one about an African American, "Conway":

Conway was in a saloon at Flushing and Marcy Avenues on Monday night, listening to the returns of the Gans-Nelson fight, which were read from a ticker. When it was announced that Gans had won on a foul, Conway applauded loudly. Three men who had been drinking all night. In the place and who had been cheering for Nelson, followed Conway to a lonely part of Gerry Street, where they attacked him. A policeman found him lying in a pool of blood and called an ambulance. No clue was obtained to the man's assailants.<sup>41</sup>

Locality, for fight results, is constitutive of the material meaning—including the ramifications on a person's health—of decoding information. In 1910, another pre-ban fight between Jack Johnson and James Jeffries was set for July 4<sup>th</sup> in Reno, Nevada. Jeffries, the emblem of white hatred directed at Johnson, came out of retirement to "at least make an effort to reclaim the heavyweight championship for the white race" and to "demonstrate that white man is king of them all."<sup>42</sup> He failed to touch Johnson, who defeated Jeffries by technical knockout.<sup>43</sup> The fight, as the apotheosis of the proxy racial

battles taking place in boxing rings at the beginning of the 20<sup>th</sup> century, was a monumental cultural event. The widespread reception of the proxy event's result quickly transformed information into violent reaction. Again, racially based violence broke out throughout the United States. In the *Los Angeles Times*, lynch mobs, killings, violence against white men who had defended beaten black men, and a women's prison skirmish all followed from the moment that groups of people became aware of the fight's result:

A white man was shot in a race riot in Arkansas and a negro was fatally at Roanoke, Va.

There were disturbances in New York, Pittsburgh and Philadelphia, New Orleans, Atlanta, St. Louis, Little Rock and Houston.

As the night progressed the rioting grew more serious. In New York disgruntled whites fired a negro tenement house. At Mounds, Ill., a negro constable was killed and another man was mortally wounded. Street rioting broke out in Kansas City, Pueblo and Norfolk, and two negroes were shot in New Orleans.<sup>44</sup> [*sic*]

The eventual ban on the interstate trafficking of fight films supposedly resulted from these incidents, but in reality the ban was a part of a larger policy trend that sought to extend the power and scope of Jim Crow laws into work and leisure activities. In fact, the Sims Act echoed the use of the "White Slave Traffic Act" (The Mann Act) to put Johnson in prison for travelling with a white prostitute.<sup>45</sup> The violence against black spectators, the Sims Law, and the segregation of media distribution were fully married to the fear of liveness, simultaneous spectatorship, and the politics of relayed information. The "instant" works to bring larger social relations of difference into proximity around the expectation of information. White violence against black spectators punctuated the reception of a fight result that ran counter to the political, economic, and social dominance of one group over another. Information networks are political and the interfaces of information relay act as points of articulation, connecting existing practices and policies of domination to cultural events and the experience of co-presence. These moments of articulation focus existing social conflicts by magnifying the right of some groups over others to claim the factual and cultural meaning of an event. Thus, the instant not only compresses time and space, event and reception, it also crystallizes sedimented social structures into a moment of factual relay.

The Sims Act, as a policy result, was an attempt to prevent the co-presence of differing classes at the moment of information dissemination and to maintain the segregation of interpretive communities. The riots and killings also prefigure by eighty years the violence surrounding the public circulation of the videotape of Rodney King's beating by the Los Angeles Police Department, an event that more explicitly embodied the controversies of factuality. Whether telegraphic or televisual, the design of information networks cannot fully account for affective responses to events.

The Johnson-Jeffries fight was actually key in the emergence of the live, broadcast audience, and featured early experimentation in "regraphing" the ongoing status of the fight. Attempts to learn about the fight outside of Reno led to new ways of embellishing the ticker report through symbolic systems of representation that linked 19<sup>th</sup> century visual telegraph systems and late twentieth-century online scoreboard technologies. In Chicago—where violence after the Gans and Johnson wins was especially acute—The Northern Amusement Company attempted to recreate the Johnson-Jeffries fight using an electric scoreboard, or as *The Chicago Defender* previewed it, "Johnson and Jeffries Will Fight at Coliseum in Electricity."<sup>46</sup> On the day of the fight, Northern Amusement used "gigantic electrical figures of the fighters on a board 15x24

feet," on which "every blow struck [is] reproduced the same it occurs at Reno."<sup>47</sup> When one of the fighters is knocked down

the board immediately shows the fall by an illuminated figure, as the same instant the name of the striker is illuminated directly above the contestant . . . then commences the referee's count, indicated by electric lighted numerals, as long as the man is on the mat. Should there be a foul, draw or referee's decision, the same is instantly reproduced.<sup>48</sup> [*sic*]

Not only is this elaboration of the ticker tape event a significant shift in the aesthetics of transmission, it also points to the relativity of any notion of "instantaneity." Instantaneity is, per the history of communication, an operative construction that is relative to an era's conception of simultaneity, potential speed and bandwidth of transmission, and available methods of reception. Where recorded video is used in ways that film could not quite be, telegraphed and electronically reproduced boxing matches are "instant" in the sense that there is no quicker access to the information displayed—outside of the stadium itself.

Electric scoreboards became the norm for the spectator sports. During the 1917 World Series between the Chicago White Sox and New York Giants, fans were barred from gathering in public places as a condition of the war. *The New York Times* ran a series of articles after each game in Chicago, attending to the ways fans were making-do and finding access to electric scoreboards:

[October 6] Although police edict will prevent any unusual gatherings in the streets of the city there will be several chances for the fan to learn about the minute details of the game. At Madison Square Garden and the Seventy-first Regiment Armory two immense bulletin boards have been installed, and the game will be displayed in each place. At all of the army encampments around New York a bulletin service has been arranged for, and the soldiers will get first hand information about the bats of New York and the dents made in Chicago's defense.<sup>49</sup>

[October 7] For the first time in many years there was an entire lack of large street gatherings of fans intent on watching bulletin board telling of the progress of the games. The war necessitated a police order forbidding the collecting of large

crowds, and the torn-up condition of Times Square made it impossible to erect a bulletin board such as the fans have been accustomed to see in past years.

However, hotels, amusement places, and several of the larger halls of the city were utilized for the display of the details of the first Giant defeat.<sup>50</sup>

[October 8] While New York's outward excitement created no diversion, in several halls crowds were packed watching electric score boards detail the plays of the game. It was estimated that at the Madison Square Garden and the Seventy-first Regiment Armory more than 25, 000 persons saw the lifelike baseball player boards depict the happenings at Chicago.<sup>51</sup> [*sic*]

Not only does this coverage include the familiar anachronisms of new media ("lifelike"), it is noteworthy that beyond the result of the fight, live, mediated spectatorship itself had become the subject of news coverage. Moreover, these billboards may have gone unnoted had the normal order of spectatorship not been interrupted by the imposition of wartime proscriptions. The subject of these articles is in fact the reworking of normal modes of spectatorship to fit the exceptional political circumstances. Having started in newspaper offices and saloons, the socially realized structure of communication that is the sports relay or "recast" had scaled up to occupy city streets and New York's largest public spaces. The history of the instant replay is thus not only a matter of film and photographic technologies, but also a product of existing infrastructures of reception and the preceding practices of interpretive communities.

# Crank speeds and the Canadian case: 20<sup>th</sup> century filmic replays

I turn now to two final examples of the pre-history of the "replay." In this section, I discuss two controversies surrounding the use of film for replaying sports events, which prefigure the use of video in the 1960s. It is more comfortable to speak of film and video aesthetics than it is the aesthetics of the telegraph, but the purpose of this chapter is to muddy a coherent separation between the two and to elaborate the commonalities that video replay techniques share with earlier, contingent structures of communication.

Replay in any given era is a product of the hopes, ideals, and protocols related to access and repetition.

According to Dan Streible, the 1897 film, *The Corbett-Fitzsimmons Fight*, is the first feature film,<sup>52</sup> running at over 100 minutes in length. The championship fight film was also the first "fight" that women were not barred from viewing, and "was for many viewers their first memorable contact with cinematic presentation."<sup>53</sup> Further, the film was the first successful example of the centralized, mass distribution of a film, and its exposition established a path in which the film was first exhibited for wealthy audiences in venues such as opera houses and later, to the less wealthy, in fairgrounds, storefronts, and parks.<sup>54</sup> Most importantly for my purposes, the film that was for so many the "first film" was maybe most famous for the way the cinematic apparatus could be used to scrutinize a referee's decision.

The fight film portrays a knockout of Corbett by Fitzsimmons in the fourteenth round, after Fitzsimmons strikes Corbett in the solar plexus. As part of the promotion of the film, Veriscope—distributor of the film—stoked controversy by questioning whether the referee had counted too slowly when, in the sixth round, Corbett knocked Fitzsimmons to the mat, and whether Fitzsimmons's knockout had in fact followed from a foul.<sup>55</sup> Throughout the press coverage of the fight, authors claimed that the film and camera assemblage, as an "objective witness," would bear the truth: W. W. Naughton, a mouthpiece for the Corbett camp,<sup>56</sup> addressing the veriscope as a "quasi-scientific display" and tying its expository power to Muybridge's images of racehorses, wrote that "The camera, if it gives all the details distinctly, will verify Corbett's words and convince any reasonable person." *The Examiner* ran drawings that depicted a film strip with singular

frames reinterpreting the facts of the fight, as fit the editorial stance of the publication.<sup>57</sup> We are well attuned to be suspect of claims to camera objectivity, and even in 1897, a controversy of the projector mechanism emerged as a human problem, the fallibility of the referee's counting.

Expositions of the *Corbett-Fitzsimmons* film were always accompanied by a narrator who explained and editorialized about the film—a practice that links telegraphic techniques of reading out the happenings of a sports event with the play-by-play announcers of radio and television. In one case, William Brady, Corbett's manager, used the narrator's position in attempting to prove that Fitzsimmons had been down for a full ten-count. Brady used the human cranking of the projector to manipulate the speed of the film during projection and demonstrate that the count had been too slow. During the showing at the Academy of Music in New York, Brady stopped the film when Fitzsimmons hit the mat in the sixth round and employed the projectionist (a Corbett fan) in secretly slowing the speed while he explicated the facts on screen. He confessed later:

Then my confederate in the projection-booth started the film again—Fitz went down—the film was slowed—and it was a full thirteen seconds on the screen, with me dramatically counting off each second, before he got up again.<sup>58</sup>

In this case, the fight's timekeeper, who happened to be in the audience, confronted Brady, yet the potential of human subterfuge only added to the material controversy of the film's exhibition. Dan Stuart, the film's producer, subsequently supplied the press with statistics on film speed and length, thus assuring that the normal mechanics of exposition became a part of the discourse about fight films and thereby helped to establish the structural contingency of screen, culture, and cinematic "objectivity."<sup>59</sup>

Referee controversies are an inescapable part of playing and watching sports; when video replay debuted, the referee was said to be quickly on the outs. Today, highstakes referee decisions animate constant discussion about the improved objectivity of the camera, though such discussions usually ignore the human involvement in operating and interpreting video evidence, or even deciding on the standards of "evidence" in the first place. The case of the *Corbett-Fitzsimmons* fight is informative because of its familiarity and the fact that a dispute over evidence, the standards and mechanics of replay, the role of cultural intermediaries, and the systems of exposition were each constitutive of the sports film and the feature film more generally. The controversy over the slippage between human time (the referee's count) and machine time became a moment to champion the way film use could exert virtuosity over the flow of time. The subject of the *Corbett-Fitzsimmons* film is as much filmic temporality as it is boxing and human fallibility.

Approaching the entry of video, a final controversy of replay is located by returning to the kinescope. *Hockey Night in Canada* debuted on the Canadian Broadcasting Corporation's (CBC) television system weeks after the network began, in 1952. Television was still in its commercial infancy in Canada and the National Hockey League (NHL) was recovering from the effects of the Second World War. By the mid-1950s, hockey was an established feature of Canadian television, and the NHL was quickly becoming dependent on television for its commercial sustainability; between 1953 and 1960 television ownership increased in Canada from 10 to 80 percent of homes.<sup>60</sup> The institutionalization of hockey within the broadcasting regime required the standardization of the televised production of hockey. George Retzlaff, as head of the

CBC's sports division, was responsible for this standardization and established the number, angle, and use of cameras during broadcasts.

During the mid-1950s, the CBC used kinescope recordings to rebroadcast hockey games from Toronto and Montreal in other Canadian cities. Between 1955 and 1956, Retzlaff was informed about the process of "hot processing," a technique for developing film within 30 seconds of being shot.<sup>61</sup> Retzlaff used hot processing during a single broadcast to show a goal twice, using the time during the player celebrations to develop the film. Due to the CBC's split obligations to Toronto and Montreal, Retzlaff was barred from doing it twice.<sup>62</sup>

Retzlaff was the authority for the Toronto broadcast of *HNIC*. Gerry Renaud was responsible for the Montreal broadcasts. Each week, the national broadcast would alternate between Toronto and Montreal. Since the 1920s, MacLaren advertising was responsible for the media rights of Maple Leafs games and MacLaren's Vice President, Ted Hough, acted as the head of *Hockey Night*. After the hot processed replay, Hough excoriated Retzlaff for diverging from the formula for hockey broadcasts. Specifically, because the Montreal broadcast facilities were not prepared or equipped to replicate Retzlaff's replay method, the Toronto broadcast was barred from doing it. According to Retzlaff, "Nobody at MacLaren ever wanted Toronto to look any better than Montreal."<sup>63</sup> Thus, replays, like cabinet appointments, are implicated in the Canadian political conjuncture of the 1950s. The stated problem of a shared broadcasting regime was alligned with common aesthetic standards. Replays, at the confluence of technology, location, information, and aesthetic technique, became political commodities that threatened to throw the balance of Canadian political equilibrium out of kilter.

Like the relay of information, the replay was always thoroughly political. Whether relying on a film reel, a read-out wire report, or an electric scoreboard, the mediation of sports "instants" was informed by and in turn informed the construction of a standardized subjective experience of time during the reconstruction and industrialization of the United States. As mediated sports events shifted from cursory, telegraphed information to film and TV, the social status of the control of time became a contested feature of their textual circulation. In the early, telegraphic examples, the political import of the quality of the information resulted in social conflict; in TV and film, it was the quality of the manipulation of time that brought uneven social dynamics into relief. In the 1960s, the convergence of "instantaneity" and "the replay" produced a new political conjuncture based on the utility of instants as valuable information and replays as techniques of mediated witnessing, judgment, and improvement.

<sup>3</sup> François Dagognet, Etienne-Jules Marey: A Passion for the Trace (New York;

Etienne-Jules Marey (1830-1904) (Chicago: University of Chicago Press, 1992).

<sup>&</sup>lt;sup>1</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*; Anna McCarthy, *Ambient Television: Visual Culture and Public Space* (Durham, NC: Duke University Press, 2001).

<sup>&</sup>lt;sup>2</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*: 48-49.

Cambridge, MA: Zone Books, 1992); Marta Braun, Picturing Time: The Work of

<sup>&</sup>lt;sup>4</sup> Gamache, "Genealogy of the Sportscast Highlight Form: From Peep Show to Projection to Hot Processor," 95.

<sup>&</sup>lt;sup>5</sup> Albert Abramson, *The History of Television, 1880 to 1941* (Jefferson, NC: McFarland, 1987), 166. The Epsom Derby had also been the subject of a film in 1896 that was rushed through development in an attempt to preserve something of its currency. Gamache, "Genealogy of the Sportscast Highlight Form: From Peep Show to Projection to Hot Processor," 93.

<sup>&</sup>lt;sup>6</sup> Monika Elsner, Thomas Müller, and Peter Spangenberg, "The Early History of German Television: The Slow Development of a Fast Medium," *Historical Journal of Film, Radio and Television* 10, no. 2 (1990).

<sup>&</sup>lt;sup>7</sup> Kelly Gates, *Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance* (New York: New York University Press, 2011), 75.

<sup>8</sup> Robin Yapp, "Brazilian Police to Use 'Robocop-Style' Glasses at World Cup," *Daily Telegraph*(April 12, 2011),

http://www.telegraph.co.uk/news/worldnews/southamerica/brazil/8446088/Brazilian-police-to-use-Robocop-style-glasses-at-World-Cup.html.

<sup>9</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*: 48. <sup>10</sup> Ibid., 51.

<sup>11</sup> McCarthy, Ambient Television: Visual Culture and Public Space: 33.

<sup>12</sup> Ibid.

<sup>13</sup> Harold Adams Innis, *The Bias of Communication* (Toronto: University of Toronto Press, 1951).

<sup>14</sup> Madelon Powers, *Faces Along the Bar: Lore and Order in the Workingman's Saloon,* 1870-1920 (Chicago: University of Chicago Press, 1998), 159.

<sup>15</sup> Anna McCarthy, ""Like an Earthquake!" Theater Television, Boxing, and the Black Public Sphere," *Quarterly Review of Film and Video* 16, no. 3 (1997): 309.

<sup>16</sup> Sconce, Haunted Media: Electronic Presence from Telegraphy to Television: 129-30.

<sup>17</sup> Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (Chicago: University of Chicago Press, 1992), 133-34.

<sup>18</sup> Live information is also highly valued in military operations and business, where coordiantes and figures serve a functional role. Untangling the relationship between this functional role and media "liveness" is project for the future.

<sup>19</sup> Daniel Dayan and Elihu Katz, *Media Events: The Live Broadcasting of History* (Cambridge, MA: Harvard University Press, 1992).

<sup>20</sup> John Guillory, "The Memo and Modernity," *Critical Inquiry* 31, no. 1 (2004): 110. <sup>21</sup> Ibid.

<sup>22</sup> William Uricchio, "Television's First Seventy-Five Years: The Interpretive Flexibility of a Medium in Transition," in *The Oxford Handbook of Film and Media Studies*, ed. Robert Kolker (Oxford: Oxford University Press, 2008), 292.

<sup>23</sup> David M. Henkin, *The Postal Age: The Emergence of Modern Communications in Nineteenth-Century America* (Chicago: University Of Chicago Press, 2006), 23. Elliott J. Gorn, *The Manly Art: Bare-Knuckle Prize Fighting in America*, Second ed. (Ithaca: Cornell University Press, 2010), 93-94.

<sup>24</sup> "The Prize Fight," *Hartford Daily Courant*, February 8, 1849.

<sup>25</sup> Henkin, *The Postal Age: The Emergence of Modern Communications in Nineteenth-Century America*: 23.

<sup>26</sup> The processual development of standardized time is argued for in Lisa Gitelman and Geoffrey B. Pingree, eds., *New Media*, *1740-1915* (Cambridge, MA: The MIT Press, 2003), xxix.

<sup>27</sup> Ian R. Bartky, *Selling the True Time: Nineteenth-Century Timekeeping in America* (Stanford, CA: Stanford University Press, 2000), 101-02.
 <sup>28</sup> For a longer description of the problems of "simultaneity" in scientific observation,

<sup>28</sup> For a longer description of the problems of "simultaneity" in scientific observation, see: Peter Galison, *Einstein's Clocks and Poincaré's Maps: Empires of Time* (New York: W.W. Norton, 2003); Jimena Canales, *A Tenth of a Second: A History* (Chicago: University of Chicago Press, 2009).

<sup>29</sup> James W. Carey, *Communication as Culture: Essays on Media and Society*, 2nd ed. (New York: Routledge, 2009[1989]), 223-27. Bartky notes that Cleveland Abbe, the

scientist confounded by disparate, uncoordinated observations of *aurora borealis*, used the railways as the avenue for time standardization reform and that the leaders of the railway companies themselves did not view the standardization of time as such a pressing need. Bartky, *Selling the True Time: Nineteenth-Century Timekeeping in America*.

<sup>30</sup> Richard Menke, "Media in America, 1881: Garfield, Guiteau, Bell, Whitman," *Critical Inquiry* 31, no. 3 (2005): 650.

<sup>31</sup> Richard Gruneau and David Whitson, "Upmarket Continentalism: Major League Sport, Promotional Culture and Corporate Integration," in *Continental Order?: Integrating North America for Cybercapitalism*, ed. Vincent Mosco and Dan Schiller (Lanham, MD: Rowman & Littlefield Publishers, 2001).

<sup>32</sup> Daniel Okrent, *Last Call: The Rise and Fall of Prohibition* (New York: Scribner, 2010).

<sup>33</sup> Powers, Faces Along the Bar: Lore and Order in the Workingman's Saloon, 1870-1920: 160.

<sup>34</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*; McCarthy, ""Like an Earthquake!" Theater Television, Boxing, and the Black Public Sphere."

<sup>35</sup> David Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change* (Oxford; Cambridge, MA: Blackwell, 1989), 293.

<sup>36</sup> James Schwoch, *Global TV: New Media and the Cold War, 1946-69* (Urbana, IL: University of Illinois Press, 2009), 140-41.

<sup>37</sup> Gruneau and Whitson, "Upmarket Continentalism: Major League Sport, Promotional Culture and Corporate Integration," 237.

<sup>38</sup> McCarthy, Ambient Television: Visual Culture and Public Space: 36.

<sup>39</sup> The 1912 Sims Act banned the interstate trafficking of prizefight films, it was the first American law to limit the trafficking of cultural goods. Enacted following the success of Jack Johnson the ban's ostensible cause was a fear that making Johnson's success over white opponents visible would incite violence against white Americans. The ban, not surprisingly, was a failure, but was not repealed until 1940. Streible, *Fight Pictures: A History of Boxing and Early Cinema*: 243-44.

<sup>40</sup> Ibid., 199.

<sup>41</sup> "Almost a Lynching over Gans's Victory," *New York Times*, September 5, 1906, 16.

<sup>42</sup> "The Latest Sporting News, Local and Telegraphic," *Los Angeles Times*, March 9, 1909.

<sup>43</sup> Jeffries's corner preemptively conceded before Johnson could knock out their fighter.
 <sup>44</sup> "Rioters Rampant," *Los Angeles Times*, July 5, 1910.

<sup>45</sup> Lee Grieveson connects the Mann Act and the Sims Act explicitly, through the case of Jack Johnson. Lee Grieveson, "Fighting Films: Race, Morality, and the Governing of Cinema, 1912-1915," *Cinema Journal* 38, no. 1 (1998); Streible, *Fight Pictures: A History of Boxing and Early Cinema*: 247.

<sup>46</sup> "Fight Shown in Chicago," *The Chicago Defender*, July 2, 1910.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> "Thrills by Ticker Local Fans' Fate," *New York Times*, October 6, 1917.

<sup>50</sup> "Fans Here Are Not Glum over Defeat," *New York Times*, October 7, 1917.

<sup>51</sup> "Local Respect for White Sox Grows," New York Times, October 8, 1917.

<sup>56</sup> Naughton was backed by William Randolph Hearst and the *San Francisco Examiner*.
 <sup>57</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*: 74-76.

<sup>58</sup> William A. Brady, *Showman* (New York: E.P. Dutton & Co., 1937), 180.
 <sup>59</sup> Streible, *Fight Pictures: A History of Boxing and Early Cinema*.

<sup>60</sup> Richard S. Gruneau and David Whitson, Hockey Night in Canada: Sport, Identities, and Cultural Politics (Toronto: Garamond Press, 1993), 105.

 <sup>61</sup> This technique was also considered and tested in network timeshifting.
 <sup>62</sup> Scott Young, *The Boys of Saturday Night: Inside Hockey Night in Canada* (Toronto: Macmillan of Canada, 1990), 97-98.

<sup>63</sup> Quoted in Young: 98.

<sup>&</sup>lt;sup>52</sup> Fight Pictures: A History of Boxing and Early Cinema: 52.

<sup>&</sup>lt;sup>53</sup> Ibid., 52-53.

<sup>&</sup>lt;sup>54</sup> Ibid., 72-73.

<sup>&</sup>lt;sup>55</sup> Ibid., 73-74.



Figure 1 - Étienne-Jules Marey, *Gymnast jumping over a chair; Demney, gallop; Joinville soldier running and jumping;* 1883



Figure 2 - Ampex HS-100 Video Disc Recorder, advertising contact sheet

#### Chapter 3 – Football, the military, and machine-mediated management

In 1932, long before any future for television seemed certain, Orin Dunlap—a writer for the *New York Times*—published a popular volume titled *The Outlook for Television*, in which he and a number of men from industry, broadcasting, military, and scientific backgrounds speculated on the instrumental use of television. Dunlap's predictions are prescient about the way that television, and CCTV especially, were later adapted to industrial use. Every medium has its seers, and television has no shortage of them. *The Outlook for Television* draws on industrial trends that were already established and imagines an accelerated, streamlined, and televisual reiteration. Thus, Dunlap writes of wanted posters broadcast to police booths, televised sports, two-way television phones, and a channel dedicated to showing the master clock at the Naval Observatory in Washington.

In a passage that presages the development of cybernetics, Dunlap imagines airplanes equipped with TV cameras and monitors: "Televised maps will be flashed to the planes. Those directing the battle from behind the lines will see exactly what is going on up front. The gunners will see if they make a bull's-eye, how the barrage is falling and where to direct the shots."<sup>1</sup> The chairman of RCA, Major General James Harbord, echoes these imaginings in his contribution to the volume, adding that "It is within the realm of bad dreams or a delirium that unmanned aircraft loaded with explosives and guided by remote radio control may be sent far into enemy territory."<sup>2</sup> Harbord's "bad dreams" were not far off, instantiated in the guided missile and epitomized in the contemporary Predator drone. Ballistics, not coincidentally, are often at the centre of experimentation and adoption of recording media and computational systems: Mach's instantaneous

photography;<sup>3</sup> Wiener's cybernetic feedback system;<sup>4</sup> ENIAC, the first reprogrammable electronic computer;<sup>5</sup> and magnetic tape,<sup>6</sup> were all either developed explicitly for or adapted to the study of ballistics.<sup>7</sup> The history of modern photography, analytic research, computing, and military science share a primary concern with *things in flight*. It should come as little surprise then that sport, an art of *things in flight*, should become a testing ground and public stage for the appearance of analytic technologies.

## Scientific management and film analytics

The litany of technological developments in cinema begins with the serial photography practices of two people, Eadweard Muybridge and Étienne-Jules Marey; it is commonly understood that these men sought to "capture time," and thereby represent it, as part of a process of using photography for scientific illumination.<sup>8</sup> In tandem with the development of audio recording technologies, photographic and subsequent "emerging cinema" technologies were involved in what Mary Ann Doane calls a "more general cultural imperative, the structuring of time and contingency in capitalist modernity."<sup>9</sup> And for authors like Anson Rabinbach and Stephen Kern, the proto-cinematic practices of Marey and Muybridge in fact joined aesthetic or "cultural"<sup>10</sup> domains with the techniques of rationalization in capitalist management and bureaucratic institutions.<sup>11</sup>

For Rabinbach, Marey's host of scientific instruments used in portraying and measuring locomotion and circulation were all a part of "a science of the economy of the body [that] could unlock the secrets of human labor power, emancipate working energy, and transform work."<sup>12</sup> Marey's motion studies both prefigure and lay the groundwork for managerial rationalization. Marey's close scrutiny of movement, meant to elicit the "secret" economy of movements in animal locomotion, was easily co-opted as a means of

judging and training a generation of more physically efficient manual labourers. Nonoptimized efficiency, here, "is an ergonomic term describing wasted energy and useless gestures."<sup>13</sup> Recording techniques and modes of representation like motion photography and video replay are hybrid endeavors: for one audience they represent aesthetic elaboration, for another, access to previously unseen truths.<sup>14</sup>

Marey's work also embodied an archival accessibility of information. While Marey's methods may be seen to expose and inscribe locomotive and circulatory movement, they were also "meant to provide a basis for comparison of movements which occur at different times or in different places and which cannot be memorized clearly enough."<sup>15</sup> This latter impulse is equally important in discussing the adoption of motion photography and similar techniques in industrial applications; the trace photograph, for instance, not only provides a template for efficiency but also helps to form a database through which all movements are potentially standardized.

Although Frederick Winslow Taylor espoused the usefulness of motion studies, it was his disciple, Frank B. Gilbreth and his wife, Lillian Gilbreth, who applied the use of cinematic techniques managerial efficiency in the development of to chronocyclegraphs—time-lapse films that measured both time and the relative pathways of body parts in movement.<sup>16</sup> Once actions were captured, they were reincorporated into existing systems of authority and a body of knowledge concerning the power and physiology of perception. Serial, stroboscopic, and cinematographic studies, beyond objectifying (and commodifying) motion and time through a discourse of illumination and an alliance with the doctrines of capitalist management, accelerated a trend "toward the increasing standardization and regulation of the observer that issued from knowledge

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of [the] visionary body, toward forms of power that depended on the abstraction and formalization of vision.<sup>17</sup> Taking these practices as prototypical forms of mechanical timeshifting, their technological intervention is not necessarily, or merely, an index of a modernist mastery over time; to develop this perception required actual political work of making this mastery seem possible, desirable, effective, and, ultimately, scientific.

In this chapter, I will trace the use of motion picture mediation in sport to its appropriation in military methods of training and automation. The purpose of this study is to describe the insertion of video into the historical rhetoric of scientific management and cybernetic control, on its way to becoming a formalized system of rationalization and automation. Between the final two chapters I am offering two histories, one leading up to the public appearance of instant replay in 1963 and one following its appearance and the crystallization of replay in a series of technologies and practices that spread throughout quotidian and scientific institution in the late 1960s.

Instructional film texts comprise a class of texts that is mostly absent from the history of film and sport because of the ephemerality of its recordings and its institutional applications. These private texts circulate within the institutions that develop them and sometimes filter out to interested parties. The use of film and video as a training tool in American football is an example of textual instrumentalization and a key link between the management of athletes and the wider use of recording media as instruments of rationalization.

#### Grid Films: Football and media at the intersection of training and entertainment

The early use of film in football reveals the overlap of fictional, documentary, and instructional texts. While football programs were early adopters of film as an

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instructional method, so-called "grid films" flooded theatres by 1926, when every Hollywood studio produced a football feature, the most "realistic" of which used actual football players as actors and mixed fictional content with newsreel footage.<sup>18</sup> By November of the same year, the *Chicago Tribune* was lamenting the number of "grid films" produced.<sup>19</sup> The documentary status of grid films was ambiguous: some mixed actuality with fiction; some were purely game recaps; some were purely pedagogical. The affective, instructional, and promotional uses of film by the football industry overlapped, a fact which supported the constructed affinity between film camera and football field. Game films—actuality recordings—added new textuality to the history of film as a persuasive tool. Temporal manipulation turned the documentation of a football game into an analytic event. Timeshifting, in other words, became its own institutionalized form of exhibition, a technological means of overturning the results on the field, and disturbing the dominion of the referee's interpretive command of events.

In October 1915, the Princeton University football team filmed its players' scrimmages to "build up team work as well as individual play by the use of films."<sup>20</sup> In the same week, a didactic football film produced by Universal showed an audience in Atlanta "how to play football."<sup>21</sup> By 1923, Knute Rockne, the Notre Dame football coach, was described as having a "successful system of building football machines."<sup>22</sup> In 1927, Chick Meehan, coach of the New York University Violets, produced a film titled "Football Sense," which showed "in normal and slow motion pictures the running off of various plays."<sup>23</sup> In 1930, Rockne produced a series of pedagogical actualities that were meant for instructing young football players. They had titles like "The Last Yard," The Hidden Ball," and "Two Minutes to Go."<sup>24</sup> By 1939, instructional baseball and football

films were available for purchase from *American Boy* magazine, which coaches supplemented with additional footage in clinics for young players.<sup>25</sup>

Throughout the 1920s and 1930s, the use of film as an instructional medium was well established, along with the familiar use of "slow motion" as an elevated mode of access. Other technologies were also tested and imported into football instruction during this period. At the University of Pennsylvania, Burt Bell used a telautograph—a long-distance writing device and precursor to the telestrator—to communicate opponents' formations from the press box to the sideline.<sup>26</sup> It is during the 1940s, however, that football changes from a sphere of experimentation to a dominant site for the use of recording media in instruction and determinant judgment-making.

In 1941, the New York Giants and Green Bay Packers employed game film "in hopes to correct [each] squad's errors."<sup>27</sup> A year later, the studious use of game films increasingly appeared in press coverage of NFL teams.<sup>28</sup> Also in 1942, the Chicago Cardinals organized a special screening of their own game film from a previous week's matchup against the Green Bay Packers in an attempt to convince the city's newspaper writers that a touchdown was illegitimate, claiming that a referee had signaled an end to the play with a whistle—a fact that was not audible on the film but which they tried to prove through close scrutiny of bodily gestures.<sup>29</sup>

Contemporaneously, Whitney Martin, a syndicated Associated Press sports writer, penned an article on the reified use of the film camera in settling disputes on the football field:

After considerable gumshoe work we finally have uncovered football's 12<sup>th</sup> man. He's the movie cameraman, and how they ever determined who won games before he appeared on the scene is more than we can figure out.
This mechanical umpire perches precariously on top of press coops or in special little dens, and by simply turning a crank not only creates more arguments than a tax bill, but actually wins and loses games.<sup>30</sup>

Martin's article is not remarkable because it was singular for the time (it's not) but because of the banality with which it treats the use of the "mechanical umpire." Martin catalogues the many cases in which films were used to reverse referees' decisions and teams' victories during the week following the game. Martin also foresees the effects the camera could have on the profession of the referee, joking,

[The coaches] have the films run backwards and forwards and crossways in an effort to pick out flaws in the play, or in the officials. Some day the officials are going to get together and draw up a bill of complaint, or picket the 12<sup>th</sup> man who has made their jobs a happy hunting grounds for second guessers.<sup>31</sup>

In fact, Martin's least accurate observation is the presumption that referee job action could lead to the banning of film cameras from the stadium. Quite the opposite, in the early 1960s, the use of video replay was widely imagined to confirm that both referees and sports reporters would soon be out of employment. Video recorders, like film cameras, were immediately imagined as replacements for the role of human arbiters and raconteurs.<sup>32</sup>

By the early 1940s, game films as hybrid public-private texts had taken on the authority of final arbiters of truth; textual techniques associated with the analytic potentials of video were already a part of the public legibility and legitimacy of game films. "Backwards, forwards, and crossways" does not tell us a great deal about the normal use of film, yet it does suggest a high level of interaction with the medium as an accessible text, and indicates a prototypical kind of random access to non-serial events. It also speaks to an ideological inclination toward a bountifulness of recorded media,

permitting a circumstance in which the desired *piece* of information is available with precise manipulation of time and material. "Truth" determination in this case resides somewhere between recording material, operator, judge, and original performance. The negotiation of these parties is subsequently subject to the normal relations of power and authority: the referee's power over the field, the coach's appeal to technological redetermination, and the newspaper reporter's channels of persuasion, are all implicated in the dispute over what *actually* happened. Outside of the playing field, the authority attributed to the measurement of efficiency replaces determining the veracity of events. Collapsing the measurement of efficiency and the determinant truth of the football game film was only a matter of tying one use of motion pictures to another.

## Military Replay

There is a well-weathered dictum that "sport is war:" a shorthand that succeeds in both elevating the stakes of sport and trivializing the consequences of military action, leading to widespread finger wagging at the prospect that the opposite could also be held as true, that "war is sport." Instant replay fits into the discursive construction of the sportwar nexus as well. In a recital of the possible comparisons of sport and war, Samantha King suggests one similarity is in the televisual production of war, which comes to resemble instant replay-laden football broadcasts.<sup>33</sup> When Paul Nitze, the Secretary of the Navy, introduced satellite broadcasting of the Viet Nam war in 1966, he expressed fears that the technology, and more particularly, the liveness of the images, would be too shocking for home viewers. In much the same way telegraphed, simultaneous events could collapse spatial boundaries in the 19<sup>th</sup> century, but carried a charge of potential violence, Nitze imagined that it might not be in the public's interest to know exactly what was happening *now*:

Today it is technically feasible to provide live television coverage of a strike against the Communists in Viet Name from a 7<sup>th</sup> fleet carrier in the South China sea," he said, "It is also technically feasible that some missions can be covered live." "But, significant and necessary to balanced reporting is whether or not society is ready for it [on-the-scene coverage]," Nitze told the group. Nitze praised the progress of radio and television news coverage and said that the navy has adopted some electronic techniques, such as instant replays, for its own use.<sup>34</sup>

Nitze's comments were widely reported and the fear of sports-style war coverage was skewered by Art Buchwald a week after Nitze's comments: "Look at those huts go up in flames. Now let's see that on the stop action instant replay camera again."<sup>35</sup> Already, broadcasting, replay technology, liveness, and at-home viewership all converged around ideological fears of simultaneity, repetition, and domesticity in the face of violence. In the same breath, instant replay was identified as a germane technology for naval training.

Much has already been written on exactly how sport and war coverage came to sound and look alike, and how they now co-constitute one and the same synergistic enterprise.<sup>36</sup> My intention here is to build on this discursive analysis by describing the historical, social, and practical use of replay as a dominant means of judging people and events. The link between mediated football training and army training became explicit in 1940, when the *New York Times* published the article, "Army Uses Football Idea, Guides Trainees by Films." The article was published 364 days before the attack on Pearl Harbor, and is mostly remarkable for the observation highlighted in its title: that the concept of training by film moved *from* football *to* the army. This causal path is supported by the assertion that film instruction was a "a training method long used by advanced football coaches to facilitate the drilling of its growing forces."<sup>37</sup> Although this article is

concerned only with instructional films—and not analytic film use—it speaks to the overlapping flows of mediated training methods during this period. Sound motion pictures made using football training methods showed "every phase of training" and were "available to all units."<sup>38</sup> Thus, not only were the techniques used in the army attributed to a genesis in football, they signaled a widespread audiovisual standardization of training methodology across the army. One article is perhaps not enough to prove that the army drew its film techniques from football, but the sheer volume of overlapping practices supports the claim that the two were inextricably linked in their instructional methods by the end of the Second World War.

In 1944, Paul Witty documented the success of film training in the army in the *Journal of Educational Sociology*:

The use of visual aids has greatly accelerated the learning process in Special Training Units. Illiterate and non-English-speaking men now attain academic proficiency sufficient to proceed in the Army in the surprisingly short period of eight weeks. Over 90 per cent of the trainees succeed in making the critical scores required on objective tests in this period of time.<sup>39</sup>

Witty goes on to describe the successful use of the filmstrip as a reversible and repeatable conveyance and its compatibility with instructional films. Between the beginning and the end of the war, film media were applied as solutions to bureaucratic problems; namely, of providing standardized training to a heterogeneous selection of the population for whom literacy or a common language was not a given. The filmstrip, a temporally flexible way of projecting still frames, successfully prefigures the use of videotape and video disc recorders in the years to come.

Edging closer to the advent of practical video recorders, a 1953 report developed by the joint committee of the U.S. Office of Education and the Radio-Television Manufacturers Association on the use of communications equipment in education reports the results of television training in the armed forces. The report concludes that a narrated telecast improved the retention of information learned by Army reservists and that a closed-circuit television system was a preferable means of instruction. "The conclusions are that television instruction is effective; television instruction is remembered; television instruction was liked by the reservists; and the method of teaching used on television is important."<sup>40</sup> The report also recommends and diagrams the installation of closed-circuit television as a teaching tool; this is the technological, bureaucratic, and psycho-educational environment into which video recording is inserted in 1956.

## Enter Video

The entry of video into the commercial, military, and management atmosphere of the late 1950s accelerated and extended existing practices of standardized education. In this section, I am contextualizing Navy Secretary Nitze's comments on the adoption of instant replay as a training tool. The first documented use of replay as a feedback system occurred in 1957, less than a year after the public demonstration of video. The National Football League's Los Angeles Rams experimented with video replay in a game against the San Francisco 49ers, with equipment provided by Ampex.<sup>41</sup> The system was used to make live adjustments and was consulted by coaches and players alike. Some college football teams adopted the same systems but they were quickly banned, as officials believed they gave too great an advantage to large schools with the funding to support expensive video equipment and analysis.<sup>42</sup>

The U.S. Navy and Ampex developed the Pilot Landing Aid Television (PLAT) system in the late 1950s, installed it on the USS Ticonderoga in 1961 and on every battle

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cruiser in the Navy by 1963.43 The PLAT system-still in use today-records every plane landing for immediate review. The PLAT is one of the first crystallizations of video recording as an instant feedback system. Widely viewed as a success, a report from the Third Armed Forces Television Conference in October of 1962 states that PLAT had reduced pilot error, the misattribution of mechanical failure to human failure, and allowed for the comprehensive monitoring of landings on the flight deck, the captain's bridge, and the pilots' ready room. The report also describes the standardized set of cameras, angles, and CCTV equipment necessary to operate a PLAT system.<sup>44</sup> An operator sits in a booth and chooses the different angles for the approach and the landing, records them to tape, and replays them to the pilots in the ready room. In short, the flight deck of the battle cruiser comes to operate homologously to the football field, broadcast to the living room of home viewers. Finally, the armed forces were quick to recognize the economic and bureaucratic pragmatism of using replay television. Dismissing the cumbersome use of kinescope recordings, the report summarizes: "video tape offers probably the most striking new way of achieving the goal of providing *economical, standardized, effective* instruction within and among the three services."45

During the height of the Vietnam War, the usefulness of video replay was once again the focus of the armed forces' methods for economical instruction. During appropriations hearings in 1969, Dr. William Lehmann, head of the Air Force laboratories, responded to a query on the amount spent on the Behavioral and Social Sciences Program with this justification:

For example, we have done a simple little thing like putting a TV camera in a cockpit looking down on a pilot and his instruments so the TV camera sees what the pilot sees while he is going through pilot training. After he has gone through a maneuver he comes back on the ground and he gets instant replay. He sits down

with his instructor and the instructor, in a calmer environment says, "Here is what you did. That was wrong. That was right."<sup>46</sup>

Between 1961 and 1969, instant replay went from a technique for evaluating landings to a fully incorporated part of the cockpit, while camera placement went from multiple perspectives to the perspective of the pilot. The trend is thus from the establishment of a standardized system of instruction (the PLAT), to an atomized, personalized form of instant error correction.

### Machine methods in the postwar period

The early 20th century boom in industrial development was propelled by the allocation of human resources and massive funding for behavioural, psychological, and physiological research during the wartime and postwar periods. The first half of the 20<sup>th</sup> century spans from scientific management, time-motion studies, and streamlined production methods, to the psychological study of worker "satisfaction." By the time video recording appeared, efficiency and productivity studies had become a common sense paradigm for the justification of investment in new technology, and the reshaping, reconfiguring, and outright dismissal of existing occupations. In the same calendar year that replay was tested on the football field as a team-based error correction and strategy tool, B.F. Skinner was advocating for the use of his teaching machines in the pages of *Science* using the same language and logic of replay systems:

Lastly, of course, the machine, like the private tutor, reinforces the student for every correct response, *using this immediate feedback not only to shape his behavior most efficiently* but to maintain it in strength in a manner which the layman would describe as "holding the student's interest.<sup>47</sup>

Outside of television broadcasting, the most common use of video replay was its application to instructional problems. Ampex spread a widely cited figure in 1968,

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estimating that 60 per cent of all VTRs were being used in formal education,<sup>48</sup> most notably, as a personalized form of self-instruction whereby the camera-recorder-monitor assemblage replaced or extended the purview of the instructor.

By the 1940s, research into the means and effects of automation had extended from the factory floor to the affective dimensions of labour. A 1944 study published in the *Journal of Marketing* titled, "The Talking Picture: An Example of the Machine Method Applied to Selling," written by L. Mercer Francisco, outlines the challenges for marketers in the postwar period:

The enormous expansion of the productive capacity of the country as a result of the war effort presents a challenge of the first order to marketing men for it will be the responsibility of marketing to keep the industrial plant busy and its operatives earning a livelihood. Marketing men are faced with the question: How can more goods be distributed, at decreasing expense, to our own people?<sup>49</sup>

Mercer then offers, as a solution, his "machine method for selling" which is designed to reflect the standardized, routinized, and specialized use of equipment in the streamlined production of goods. For Francisco, the "machine method" will be accomplished through the use of motion pictures. The military, as I have described, was always a part of the experimentation and establishment of protocols for the use of new media technologies. Francisco identifies this same trend:

One of the most significant features of the military training program of the armed forces of the United States in the present war is the extent to which reliance has been placed upon the talking picture as a training instrument ... The adaptation of the talking picture as the machine method applied to politics, education, and military affairs suggest its practicability in the field of marketing.<sup>50</sup>

Salespeople, lawyers, and student teachers are all some of the early targets for the use of video as a self-improvement device. Francisco's statements stand at the nexus between the development of automated systems and the study of machine-mediated productivity

on one end, and the bureaucratic and industrial adoption of media technologies as *both* self- and institutional-improvement systems on the other.

As a final element of the postwar conjuncture, time-motion studies, as Lynn Spigel describes, were a part of feminist discourses and domestic science dating from the Progressive era. With the introduction of television to the home, time and efficiency infiltrated domestic life through the spatiality of viewership and the use of the television appliance: "All unnecessary human movement that the television set might demand had to be minimized."<sup>51</sup> The reworking of space and domesticity around the new appliance produced new kinds of food, furniture, and etiquette, while more acutely changing the temporal and spatial configuration of the work day and family life. "Women's magazines suggested intricately balanced spatial arrangements that would mediate the tensions between female integration and isolation. Television viewing became a special topic of consideration."52 Feminist histories of leisure and the reorganization of family life around the television lay the groundwork for work like Ann Gray's on the functional role of VCR timeshifting for women.<sup>53</sup> As Gray argues, time is as valuable a commodity in the home as it is in out-of-home workplaces, "What is striking overall... is the felt need for the women to utilize their spare time, that is, not to waste time. The times when they had some 'space' in order that they could do something for themselves were not to be squandered on valueless or unproductive activities."54 Gray and Spigel's observations reflect Francisco's grounds for the machine method of retailing: bringing the productivity and efficiency of the factory into the home allows-even seems to require-for the repurposing of putative leisure technologies to counteract domestic "passivity."

Compare this to the description of VTRs made for home use, "Typical uses of the

equipment in the home...are picture and sound recordings of a children's birthday party, father practicing his putting on the front lawn and analyzing his technique on the screen, an executive practicing a speech and, though instant replay, checking his effectiveness."<sup>55</sup> No references to efficiency or timesaving, though the feedback mechanism is highlighted as the central feature in the figures of the unmistakably upper class golfer and executive. The topic of early accounts of video recording's potential is normally confined to the workplace and the playing field as closed environments in which the logic of productivity, efficiency, and automation have great purchase. Spigel and Gray remind us that the process of adopting media technologies in work, leisure, and home life is more ambivalent and granular than the history represented in business and professional discourses.

<sup>&</sup>lt;sup>1</sup> Orrin Elmer Dunlap, *The Outlook for Television* (New York; London: Harper & brothers, 1932), 244.

<sup>&</sup>lt;sup>2</sup> Ibid., 264.

<sup>&</sup>lt;sup>3</sup> Josef Maria Eder, *History of Photography* (New York: Dover Publications, 1978), 524-28.

<sup>&</sup>lt;sup>4</sup> Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry* 21, no. 1 (1994): 256.

<sup>&</sup>lt;sup>5</sup> Paul E. Ceruzzi, *A History of Modern Computing* (London; Cambridge, MA: MIT Press, 2003).

<sup>&</sup>lt;sup>6</sup> "Ampex audio recorders were the first instrumentation recorders employed for flight testing and telemetry (measurement of distant phenomena by radio signals) early in the 1950s. Today, highly specialized Ampex instrumentation recorders are used in the collection and processing of data radioed to earth from missiles and satellites and are standard equipment in every US tracking station around the globe." Ampex Corporation, *Annual Report, 1963*, Series 2: Box 16 (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, 1963).

<sup>&</sup>lt;sup>7</sup> Friedrich Kittler is fond of noting the cooperative development of media and war technologies. In the case of television, see Friedrich A. Kittler, *Optical Media: Berlin Lectures 1999* (Cambridge, UK; Malden, MA: Polity, 2010), 217. I would also include the films of aboveground nuclear tests in this list; though they are not explicitly concerned with telemetry and calculation, they are important texts that have shaped understandings of nuclear weaponry and the public circulation of military documentation. See: Joseph Masco, "Target Audience," *Bulletin of Atomic Scientists* 64, no. 3 (2008).

<sup>8</sup> Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive*; "Temporality, Storage, Legibility: Freud, Marey, and the Cinema," *Critical Inquiry* 22, no. 2 (1996); Kittler, *Optical Media: Berlin Lectures 1999*; *Gramophone, Film, Typewriter* (Stanford, CA: Stanford University Press, 1999); Braun, *Picturing Time: The Work of Etienne-Jules Marey (1830-1904)*.

<sup>9</sup> Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive*: 3-4. <sup>10</sup> For Rabinbach, the cultural domain is separable from the social domain as an entity with discrete, identifiable practices. Although this is easy to disagree with, Rabinbach's larger, more agreeable purpose is drawing together practices in formal science with practices in what would have been called the "high arts" of the late 19<sup>th</sup> century. Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992).

<sup>11</sup> Stephen Kern, *The Culture of Time and Space 1880-1918* (Cambridge, MA: Harvard University Press, 1983); Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*.

<sup>12</sup> The Human Motor: Energy, Fatigue, and the Origins of Modernity: 87-88.

<sup>13</sup> Sarah S. Lochlann Jain, *Injury: The Politics of Product Design and Safety Law in the United States* (Princeton, NJ: Princeton University Press, 2006), 109.

<sup>14</sup> Much has been written about the comprehensiveness of Marey's inscription technologies. Marey's inventions and research began in physiology and the movement of blood, in which he sought to inscribe circulatory events, and eventually branched out into the study of the movement of living things, the locomotion of animals and humans. See: H. A. Snellen, *E.J. Marey and Cardiology: Physiologist and Pioneer of Technology*,

1830-1904 (Rotterdam: Kooyker, 1980); Dagognet, Etienne-Jules Marey: A Passion for the Trace.

<sup>15</sup> Snellen, E.J. Marey and Cardiology: Physiologist and Pioneer of Technology, 1830-1904: 8.

<sup>16</sup> Kern, *The Culture of Time and Space 1880-1918*: 116-17.

<sup>17</sup> Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), 150.

<sup>18</sup> Dyer Braven, "Deluge of Football Films Ito Hit Public This Fall," *Los Angeles Times*, July 25, 1926. In fact, by 1937, the film industry had become a top destination for out-ofwork and retired football players. Harold Heffernan, "Grid Heroes Rounded up for Movies," *Hartford Courant*, September 25, 1937.

<sup>19</sup> Tinee Mae, "Here's Another of the College Football Films," *Chicago Daily Tribune*, November 4, 1926.

<sup>20</sup> "Films to Aid Coach Rush," New York Times, October 15, 1915.

<sup>21</sup> "Brickley, of Harvard, in Football Film," *The Atlanta Constitution*, October 10, 1915.

<sup>22</sup> "Knute Rockne Will Open Coaching School," *The Washington Post*, January 28, 1923.

<sup>23</sup> "Football Film Praised," New York Times, September 29, 1927.

<sup>24</sup> "Before the Cameras and the Microphones," *New York Times*, Aug 31, 1930.

<sup>25</sup> "Iowa State Plans for Baseball and Football Clinics," *Christian Science Monitor*, March 10, 1939.

<sup>26</sup> Michael MacCambridge, *America's Game: The Epic Story of How Pro Football Captured a Nation* (New York: Random House, 2004).

<sup>27</sup> "End of Fumbling Sought by Owen," New York Times, October 15, 1941, 1.

<sup>28</sup> Edward Prell, "Bears Go into Movie Huddle for Redskins," *Chicago Daily Tribune*, December 8, 1942.

<sup>29</sup> Whitney Martin, "Football Films Cause Arguments and Often Win or Lose Battles," *Hartford Courant*, November 17, 1941.

<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> Joseph Durso, "Sports of the Times," New York Times, August 3, 1965.

<sup>33</sup> Samantha King, "Offensive Lines: Sport-State Synergy in an Era of Perpetual War," *Cultural Studies* <=> *Critical Methodologies* 8, no. 4 (2008).

<sup>34</sup> "Navy's Chief Hails TV Aim: Instant News," *Chicago Tribune*, September 30, 1966.
<sup>35</sup> Art Buchwald, "Capitol Punishment: Live and in Color," *The Washington Post*, October 6, 1966.

<sup>36</sup> Jansen and Sabo argue, for instance, that the mixing of sport and war metaphors during the 1991 Gulf War played a "historically unique" role in understanding the events. "Sport/war tropes are crucial rhetorical resources," they write, "for mobilizing the patriarchal values that construct, mediate, maintain, and, when necessary, reform or repair hegemonic forms of masculinity and femininity." Sue Curry Jansen and Don Sabo, "The Sport/War Metaphor: Hegemonic Masculinity, the Persian Gulf War, and the New World Order," *Sociology of Sport Journal* 11, no. 1 (1994): 1.

<sup>37</sup> "Army Uses Football Idea, Guides Trainees by Films," *The New York Times*, Dec 8, 1940.

<sup>38</sup> Ibid.

<sup>39</sup> Paul A. Witty, "Some Uses of Visual Aids in the Army," *Journal of Educational Sociology* 18, no. 4 (1944): 242.

<sup>40</sup> Joint Committee of the U.S. Office of Education and the Radio-Television Manufacturers Association on the Use of Communications in Education, "Teaching with Radio Audio Recording and Television Equipment," (Library of American Broadcasting, University of Maryland, College Park, MD, 1953), 37-39.

<sup>41</sup> "Videotape Replay: Football's New Brain-Picker," *New York Times*, December 26, 1965; MacCambridge, *America's Game: The Epic Story of How Pro Football Captured a Nation*: 204.

<sup>42</sup> "NCAA Bans Electronic Coaching Aids," *Hartford Courant*, January 19, 1967.

<sup>43</sup> Ampex Corporation, Annual Report, 1963.

<sup>44</sup> Office of the Chief Signal Officer: Audio-Visual Communications Directorate, "Report of the Third Armed Forces Television Conference," (October, 1962).

<sup>45</sup> Ibid., 15. Emphasis added.

<sup>46</sup> U.S. Congress. House of Representatives. Committee on Appropriations;

Subcommittee on Department of Defense. Department of Defense Appropriations for

1970; Part 4: Research, Development, Test, and Evaluation. 91st Cong., 1st sess., 1969.

<sup>47</sup> B.F. Skinner, "Teaching Machines," *Science* 128, no. 3330 (1958): 971. Emphasis added.

<sup>48</sup> See, for example: "Fast Growth Shown by Videotape Market," *Chicago Tribune*, September 23, 1968.

<sup>49</sup> L. Mercer Francisco, "The Talking Picture: An Example of the Machine Method Applied to Selling," *The Journal of Marketing* 9, no. 2 (1944): 119.

<sup>53</sup> Ann Gray, Video Playtime: The Gendering of a Leisure Technology (London; New York: Routledge, 1992). <sup>54</sup> Ibid., 74.

<sup>55</sup> "Video Recorder Can Be Home's Leisure Center," *Los Angeles Times*, September 25, 1969.

<sup>&</sup>lt;sup>50</sup> Ibid., 123. <sup>51</sup> Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America*: 90.

Chapter 4 - The emergence of a bureaucratic technology: video replay in the 1960s In one of his lesser-known platitudes, Marshall McLuhan names the 1960s, the "Age of the instant replay,"<sup>1</sup> a technology he describes as "perhaps, the most remarkable development of our time, and one of the most profound and metaphysical."<sup>2</sup> "You don't have to watch the game, [because] you can have the meaning of the game minus the experience."<sup>3</sup> Elsewhere, McLuhan describes this replay as offering "not just cognition, but re-cognition, [leading] the mind to the world of pattern recognition, to aftersight and foresight."<sup>4</sup> McLuhan's branding aside, these comments are nonetheless of a piece with what I describe as the "idiomatic reaction" to the adoption of instant replay within the broadcasting regime. The idiomatic reaction to instant replay frequently appeals to McLuhan's "meaning without experience" description of the technology-a description that characteristically elevates the mechanics of a device over the controversies of the mechanism's use. As the 1960s progressed, "instant replay" became a more concrete trope, a shorthand way to describe any number of phenomena, from the Six-Day War<sup>5</sup> to weather updates.<sup>6</sup>

By the late 1960s, video replay timeshifting was an established instrument for the management of people and a preferred analytic tool. *Pace* McLuhan, it was the very experience of instant replay that was relied upon, as subjects everywhere were asked to re-embody the repetition of images. Local practices of timeshifting capitalized upon the "instant" as information and the "replay" as a means of recursive improvement. As video infrastructure spread, new systems, protocols, and norms developed to support its use as both a training and analytic instrument. As with the advent of video recording at the end of the 1950s, instantaneous recording reorganized social, economic, and personal

relationships. Ranging from uses in familiar factory settings to drug addiction counseling, video replay promised to bring the hermeneutic certainty of the sports replay to every domain of daily life.

Lisa Gitelman describes the imagined potential of the phonograph and its incorporation into the late 19<sup>th</sup> century development of capitalism: "The same parameters of economy and durability that characterize 'storing up' sound for later mechanical reproduction helped animate such contemporary phenomena as the tensile bureaucracy of managerial capital, the ideal of objectivity in the professions and media, and the success of new popular cultural forms."<sup>7</sup> These same animating concerns were still at the heart of recording media use and development in the postwar era. Video technology, like sound recording technology, is not necessarily tied to any one set of cultural politics or applications. Instead, its uses, figurations, and cultural forms float between spheres of activity and are only temporarily articulated with any given economic or political ideal. At certain moments, as with video in the late 1960s, the cultural currency of a technology's use unites several otherwise unattached spheres of activity under one regime.

Thus, this is as much about the history of management and technology in late capitalist society as it is a study in the development and adoption of new media. In this sense, it follows on recent work that considers media artifacts as emergent practices: "The crisis of a new medium will be resolved when the perceptions of the medium, as well as its practical uses, are somehow adapted to existing categories of public understanding about what that medium does for whom and why."<sup>8</sup> Instant replay was born in the crisis of an assassinated president. Developed and popularized through the

fixed universe of the sports field, video playback offered access and analytic certainty, and, above all, an abundance of images and sounds. Throughout the 1960s, the practical approaches to dealing with and instrumentalizing the access to this abundance shaped the ideological assumptions about video's usefulness and conditioned its use as a solution to a wide range of problems in instructional, evidentiary, and personal applications.

In conjunction with closed-circuit television systems, workplace video accessibility and replay was always primarily represented as a cost savings mechanism. Labour is at the centre of the structural reconfiguration tendered by the adoption of video as a management technology. Based on archival research from the Ampex archives and the Library of American Broadcasting, a survey of trade publications, and newspaper and magazine coverage, this section seeks to establish the common protocols, standards, and ideals ascribed to video replay use. Through this analysis, I offer a picture of the conjuncture of social, political, and commercial interests in the 1960s, in which media technologies played a vital role.

As a moniker, "instant replay" did not appear until 1966, though "immediate replay" and other formulations date from much earlier. "Immediate playback," for instance was used as a selling feature of Ampex videotape recorders from the start;<sup>9</sup> a 1960 pamphlet for 3M Scotch Brand videotape lists "instant playback" for "critical appraisal," its "live look," and "multiplying magic" as the key selling features of the material.<sup>10</sup> If immediacy was part of the design and promotion of videotape technologies in the 1950s it had not yet reached the stage of "instant replay" as it was understood after December 7, 1963. Yet, the accessibility of instantaneous recording and relative immediacy of playback were already exploited in training applications by the late 1950s.

It is necessary to distinguish what instant replay meant in an instructional context. Even after it is established as the ordinary shorthand for video playback, the precise meaning of "instant replay" remained fluid into the 1970s, used to describe phenomena that are neither instant (a year or more apart) nor replays (e.g., weather, newspaper corrections). Instant replay video in the context of mid-1960s instructional culture almost always followed a predictable, patterned use of the technology involving the playback of recently recorded material. The technics of improvement were normally described in succession as 1) Action, 2) Replay, 3) Reaction, and 4) Repetition. In this simplification, the camera-recorder-monitor was mobilized as a cybernetic mechanism, directing the apprentice with the help of the instructor toward an ideal of standardized, "error-free" performance. In fact, this process is nearly identical to that described by Miller, Galanter, and Pribram in *Plans and the Structure of Behavior*, in which the authors use computer processes to describe human behaviour: "The central theoretical concept in PSB was that of the TOTE unit, and acronym for 'test-operate-test-exit.' This is a basic feedback loop in which a system performs an operation, then tests the results for congruity to a goal until the goal is reached."<sup>11</sup> This is to say that concomitant with the popularization of interpretations of human behaviour as computational feedback loops, video technology was promoted and implemented in nearly identical, cybernetic terms.

Cybernetics is the study of communication and control. The originator of the field, Norbert Wiener, defined cybernetics as an animal, machine, or organization process based in the recursive reincorporation of new information—the use, in other words, of feedback:

Feedback is a method of controlling a system by reinserting into it the results of its of its past performance...[If] the information which proceeds backward from

the performance is able to change the general method and pattern of performance, we have a process which may well be called learning.<sup>12</sup>

Instant feedback was both an optimal condition of the properly functioning cybernetic organism and a selling feature of video technology. The emergence of small-scale video technology was fully embedded in the discourse of self-improving individuals and organizations. Muddied by its use as an entertainment and television-broadcasting device, the cybernetic repurposing of video was left unidentified as such.

Video playback as a performance improvement tool for politicians, actors, teachers, and salespeople was one of the earliest and most common attributions of video's potential. Use of video in this regard followed the same pattern as other instructional contexts, though evaluation was more concerned with affective performance than with bodily efficiency and precision. Indeed, in marketing their first portable video recorder (VR-7000) meant for personal and organization uses, Ampex provided the equipment to traveling politicians, salespeople, athletes, police units, and military pilots, thereby uniting the applications of video's instructional potential in one artifact.

In the contexts of police work and the legal system, the meaning of the "instant" in instant replay was much looser and videotape developed more conventionally as a recording tool for long-term storage: replacing court reporters, recording depositions, protecting persons in custody, protecting police officers from wrongful claims of brutality, and documenting accidents and crime scenes. In this context, however, the "instant" moniker applied less to the capacity for instantaneous recording but to the potential of *indefinite* and *ready* access to evidence. Legal content also had the burden of a greater need for demonstrable proof. As such, the codes and protocols for producing video for law enforcement and legal applications were much more circumscribed. Video art debuted between 1963 and 1965 (there is some dispute) and fully formed around the 1967 commercial release of the Portopak, Sony's commercial video camera/recorder. As in sports broadcasting, the slow motion, freeze frame, and reverse motion replay were employed as modes of aesthetic reflection that depended on the disruption of the linear flow of images.<sup>13</sup> Video art was slower to take up the "reflexivity" of the video mechanism for a simple reason: the Portopak lacked a rewind function, while commercial broadcasting equipment, as well as business oriented recording equipment, was neither affordable nor as portable as the Portopak. Once playback features became available, they were quickly incorporated into the work of artists in the early 1970s. Works in the early 1970s incorporated both instant replay and live feedback as ways of addressing the medium specificity of video.<sup>14</sup> In this way, the reflexive use of video in video art stands out against the instrumental use of playback in other ventures.

This chapter is concerned with the first two contexts of replay exploitation: training through repetition and judgement through mechanical witnessing. Both involve intervention of human actors, and both rely on the storage and ready access of video-based information. Artifacts like Ampex's VR-303 (1965) made this modularity of video applications explicit by offering both "immediate analysis" of mechanical human functions and "For surveillance applications . . . a low-cost, reliable source of information."<sup>15</sup>

### Video replay as new media

By the late 1960s, replay-specific technologies and the mainstreaming of video-based instruction were made practical by reduced costs and a lower threshold of expertise. In *Broadcast Engineering*, Lee Stratton reviewed the principles of slow motion disc

engineering while presenting the case that disc recorders were an accessible technology for groups outside of broadcast television. He concludes,

The success of disc recording for sports coverage has opened the way for the application of disc recording techniques in other fields outside of broadcasting. As smaller, less complex and less expensive disc systems reach the marketplace, the advantages of this recording technique will be expanded into education, industry, government, medicine and sports.<sup>16</sup>

The HS-100 was Ampex's first purpose-built replay video disc recorder, and was adapted from its putative use in sports broadcasting to military and medical uses in a lower fidelity version, the DR-10.<sup>17</sup> When the HS-100 was eventually adapted to record x-rays, it created recordings that were for circulation among a small number of specialists (doctors, nurses, x-ray operators).<sup>18</sup> Derived from the embodied, mutable habitus as conceived by Pierre Bourdieu, <sup>19</sup> Jonathan Sterne describes technologies as the distillations of social process:

At a basic level, a technology is a repeatable social, cultural and material process (which is to say that it is all three at once) crystallized into a mechanism or set of related mechanisms. A technology may perform labour once done by a person, which is to say that people design and use technologies to enhance or promote certain activities and discourage others. A technology embodies a particular form of practical reason...<sup>20</sup>

In developing both high- and low-fidelity disc recorders, Ampex attempted to build social processes into the equipment. Whereas the Sunday afternoon replay is a public document, the different uses of video disc recording can be said to share more than common technics: each points to an supposition that the spatialization of memory appears to offer total access to events. This ideological view of subject knowledge-formation implies an ontology of replay techniques in the late 1960s, a view that is fostered in a larger focus on processes of automation, error-correction, and cost-savings. Video systems were promoted as solutions to each of these problematizations, but the impact was forcefully

felt in the reconfiguration of *human* relationships to machines, through the development of bureaucratic management techniques that treated human beings as parts of larger automatic systems. If we consider technologies to be the crystallizations of social process, then by looking at the development of the disc recorder—a machine with the single purpose of instant, slow motion replay—we can discern which processes were being imagined as integral and the practical reasons for their incorporation.

In March of 1968, Westinghouse approached Ampex to develop "an Ampex disc recorder for use with their proposed new x-ray product." <sup>21</sup> The request from Westinghouse reads "The essential idea of our system is to make it possible to store television camera images which are made available to the system by intermittent pulsation of the x-rays." Internal memoranda at Ampex show that the turnaround on the production of the "XR-10," the temporary name given to the x-ray replay device, was expected to be about 6 months. However, the XR-10 project either accelerated or added to the development of another device that replaced the XR-10, the DR-10. The DR-10 is a low band version of the HS-100, Ampex's high quality disc recorder meant for broadcast applications. In most applications, the DR-10 would be capable of storing the most recent 30 seconds of a video stream—pausing the recorder would "hold" that half-minute for replay. In sports broadcasting, 30 seconds was a generous amount of time to replay a key event—say, a touchdown. When the DR-10 was developed to take on the role of the HS-100 in smaller scale operations, it imported this standard.

As was normal for the promotion of high-end technology in the period, Ampex's management saw the demonstration of the DR-10 at the Armed Forces Show as a necessity. While large, institutional customers (Westinghouse, GE, Picker, Stanford

Research Institute, Ford, the armed forces) were the targets of early marketing, the mass produced machine was meant to bring all of the capabilities of the HS-100 to the multiple spheres of everyday life. A design and marketing guide for the DR-10 written by Erhard Kietz spells out this plan quite plainly. The DR-10 came in two models, one with a fixed head (it cost \$7000) and one capable of slow motion (\$55000). Under "Markets and Applications" the following industries and applications are listed:

Broadcasting Industry:

- 1. NTSC color or monochrome slow-motion recorder
- 2. Video slide projector—random or sequential up to 1200 slides
- 3. Video tape editing
- 4. Video delay system, field or frame increments

Industrial

- 1. X-ray image recorder for inspection
- 2. Time and motion studies
- 3. Slow motion playback of scientific testing
- 4. Instrumentation recorder—airport approach, radar testing for daily check-out; geological exploration, data analysis in slow motion
- 5. Document storage and facility

# Medical

- 1. X-ray image recorder, one, two or more frames
- 2. Slow motion playback device for radiologists

Education and Military

- 1. Slide Projector for programmed learning courses
- 2. CCTV

Sports (in addition to broadcasting Industry)

- 1. Coin operated sports recorder for golf clinics, skiing bowling, tennis clubs
- 2. Athletic teams (for practice) NFL, hockey, AFL, basketball, track, college football, baseball, etc.

Other

- 1. Bandwidth compression and expansion
- 2. Scan conversion
- 3. Time-sharing of video communication channels
- 4. Lapse time weather data analysis.<sup>22</sup>

Kietz's outlook is at the nexus of the use of recorded video in the 1960s. First, as a disc storage device, it bridges analog tape and digital disc formats; this bridging is evident in the list above, as its potential uses as a training tool in sports, education, and industrial applications, for instance, are placed adjacent to its potential application as a document storage device and as a data recorder. Eventually, both these potentials would be realized and the DR-10 was incorporated within institutional applications and into systems like Videofile, where it acted as a video buffer for files stored on tape in insurance companies, police forces, and the CIA.

## Instructional uses of video replay

By 1958, Ampex was already promoting videotape's "numerous potential uses in industrial, educational, medical, and military applications."<sup>23</sup> Citing the demonstration of CCTV surgical instruction at the American Medical Association Convention in June of 1958, the copy reads, "Used as a training device, a single Videotape Recorder can program a number of closed circuit repeaters, exposing large groups of trainees to identical situations for simultaneous analysis and evaluation."<sup>24</sup> These applications seem obvious now but it is in this period that the closed circuit and instant access features of video recording developed into common sense attributes of the technology, through an appeal to standardization (nodal instruction), streamlining, and cost savings. In a later passage from the same annual report, Ampex suggests,

It is also useful in monitoring closed-circuit television in industrial applications. Where long-term monitoring is desirable, as in obtaining a record of unexpected disasters or random occurrences, the reusability of Videotape makes this system economically superior to other techniques.<sup>25</sup>

The videotape recorder, from the earliest days, was thus positioned as the ever-vigilant mechanical witness, prepared to recount the disastrous and the unexpected.

The uses of magnetic tape that lead to the crystallization of management technique in video technologies span North American workplaces in the 1960s. Accounts commonly read like "Videotape recording assists in employee indoctrination and evaluation...The faithful visual documentation and "instant replay" attributes enable each employee to see his own performance-good or bad-immediately."<sup>26</sup> Articles appear in publications as wide as Savings and Loan News ("Instant Replay' Slashes Bank Training Costs"), 27 Contact Point ("Dental Training Robot Developed), 28 Pulp and Paper Magazine of Canada (Quote: "Instant replay is equally effective in training as in hockey"),<sup>29</sup> Constructor ("Video Tape: A New Tool With Educational Possibilities"),<sup>30</sup> Building Maintenance and Modernization ("Cleaning Company Uses Videotape Recording to Train Employees"),<sup>31</sup> Industrial Canada, ("'Instant Replay,' Anyone?"),<sup>32</sup> Canadian Forest Industries, ("Train Supervisors with Videotape Instant Replay"),<sup>33</sup> Paper Trade Journal ("How West Virginia Uses Videotape for Employee Training),<sup>34</sup> and The Foundry Trade Journal ("Instant Replay Technique Locates Foundry Plant Fault").35

This last example is part of a subset of replay uses in which video recording and slow motion replay were used to detect flaws in machinery that were otherwise undetectable. The article describes a jam-up at a Chrysler factory that a vigilant VTR unit was able to detect. Under the sub-headline "Human eye inadequate" there is a description of how it was not feasible to leave a worker to watch the machine for a long period of time;<sup>36</sup> this is one of many examples where the cost advantages of a video recorder—including its lack of an hourly wage—were confused for a physiological shortcoming of the human worker. Two other examples collapse human and machine

capabilities in different ways: the journal *Administrative Management* described the use of instant replay for monitoring Munsingwear sewers, noting that they, and the machines, moved too quickly to be monitored; VTRs and slow-motion playback allowed managers to "train and upgrade" the operators.<sup>37</sup> An earlier example in *American Machinist*, in which "instant replay unit records difficult machine tool rebuilding jobs," quickly transitions to describe how the same technology was used to train salesmen, collapsing the two into one consistent regime of organizational standardization and improvement.<sup>38</sup>

Four separate articles on the uses, protocols, and standards of video training were published in the *Training and Development Journal* between 1967 and 1968.<sup>39</sup> This series condenses the wide array of video applications and the state of video use in the management atmosphere of the late 1960s. Beginning in February of 1967, the journal reviewed video use in the Peace Corps, high schools, the instruction of student teachers, engineering, dentistry, sales, and machine operation.<sup>40</sup> By 1968, however, the journal shifted its focus to the limitations of video equipment, observing that perhaps the 10000 recorders sold in the United States since 1956 were not all put to use in the most efficient ways.<sup>41</sup> In the November 1968 issue, Joseph Robinson looked critically at the then-extensive adoption of video in training programs. In diminishing the use of video recording for reflective judgment, Robinson reifies the capacities of the camera to capture observable content:

[Videotape] can give us immediately a dispassionate, objective, two-dimensional (usually black and white) abstraction of light and sound. It cannot tell us right, wrong, good, bad, too loud, too long, or anything else.<sup>42</sup>

This blindness to the contingency of "objectivity" and "dispassion" is axiomatic in coverage of the uses of video recording in this period. In film and television history, it is

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customary to trace the end of this axiom to the reception of the Rodney King assault video; in the political, economic, and cultural milieu of the 1960s, however, the self-evidence of videotape objectivity is still a pragmatic way of articulating automation, feedback, and mechanical mediation with the capitalist goals of efficiency, productivity, and self-improvement.

If the *Training and Development Journal* approaches video as just one of many instructional technologies, the coverage in *Educational & Industrial Television* is more concerned with the protocols of use and novel applications of television technology. Although most of the content of *EIT* focuses on didactic media, both CCTV systems and replay techniques feature heavily in the coverage of technological artifacts. *EIT*'s coverage in the early 1970s highlights videotape's use as an information gathering system, stressing its cost-friendly archival potential. *EIT* also serves as one of the only gathering points for inter-industry coverage of video use. Whole issues are devoted to video and television use in medicine, law enforcement, and security applications, for instance.

By the early 1970s several books and handbooks addressed video as an ordinary way of training employees.<sup>43</sup> In *Employee Training and Development in the Public Sector*, John Kapost writes,

Videotape, while very similar to film in some aspects, does have some advantages all its own. The main one, of course, is the instant replay facility which is commonly seen in most sports telecasting today. This instant replay works just as well for a trainee in personnel interviewing as a halfback darting through a line.<sup>44</sup>

Training books necessarily come well after the widespread adoption of a technology. And Kapost's example, above all, speaks to the normalization of both the video training rubric and the imported logic of its application in sport.

From the training literature several trends appear. First, video use tended to couch an implicit understanding that video technology is a handy way of observing workers. This is key, since video was often introduced under the banner of "efficiency"standardized training-but quickly slid into another form of increasing the value of labour time: the constant monitoring and disciplining of workers: a fact of technological intervention of which both Marx and Frederick Taylor were aware. Second, there is a widespread assumption that video replay is superior to other kinds of feedback. Again, this view is not separable from an association of videotape with sports replay, and the early 60s construction of the video camera as an impartial witness and potential mechanical umpire. Third, replay, and video storage more broadly, are always championed foremost for their cost-saving potential. Despite the onerous cost of investing, running, and maintaining video equipment, the potential to automate and standardize training and improvement through audiovisual feedback outweighed the expenditure. This view evokes the ideological presupposition that through the machine mediation of labour, the worker need only provide the motive power, while-in this case—the video assemblage provides feedback and control.<sup>45</sup> Video replay promised the idealized labour of other time-motion media, but did so in a live, local environment. While video storage allows for the creation of ideal-type recordings, each person, in confronting the replay, was positioned as a self-correcting and improving organism.

A separate genre of video feedback training developed within the formal education sector. Video technology was used to train student teachers as well as young students. While the 1960s saw a massive investment in educational television infrastructure as well as the building of CCTV systems for the centralized distribution of

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lecture content to multiple, satellite sites, the applications of replay ran the normal course of applications outside of school: used widely in physical education, speech making, and for monitoring student teachers, the emphasis on cost savings was especially acute in the school management literature of the 1960s. Throughout this period, video performed as a streamlining tool for teacher and student monitoring, and increasingly as an instrument in physical education.<sup>46</sup>



Figure 3 - Advertisement for Concord Electronics' VTR-600, published in *School Management*, 1967

Outside of the unique features of the classroom environment, formal educational uses largely reflected uses in other training environments. Beginning in 1966, "microteaching" became a common focus of the literature on media use in education.<sup>47</sup> Microteaching uses video recordings to review the success or failure of a lesson. In *Instructor*, it was suggested that video monitoring could show a teacher the exact moment that they lost a class's attention:

Following a taping session—or class period—the teacher can see, via a video tape "instant replay," how he handled the teaching experience …. Mobilab is thus a mirror that honestly reflects teacher attitudes and techniques and encourages change where necessary. By tuning in to the classroom the teacher can see just where the class turned him off.<sup>48</sup>

Thus some formal education uses kept in line with techniques for judging other kinds of interpersonal training via video, such as those practiced by lawyers, politicians, and salespeople. More broadly, such uses work to connect media use across the multiple

registers of school experience. Teachers move from the users of instructional media to the subjects of instructional media, creating a continuity where both the educational material and milieu are enclosed in communication feedback loops.

Video assemblages thus became forerunners to what Marc Andrejevic calls "digital enclosures": "the creation of an interactive realm wherein every action and transaction generates information about itself."<sup>49</sup> Video's enclosures were makeshift, without the management of streams of information with which we associate digital realms. Yet, as the illustrative *Instructor* example indicates, the cost, accessibility, and modularity of video systems helped to create local environments in which visible and audible actions and reactions became the potential grist for analysis. In the same year that *Instructor* described the Mobilab system, a Yale sociology professor turned the cameras on his own classroom as subject matter for analysis: "a TV camera records every word, glance and gesture of anyone in the classroom. The 'instant replay' then allows the group to see themselves "as a small, almost complete social system," Professor Mills said.<sup>50</sup>

#### At-home improvement, therapy, and medical diagnosis

Though still explicitly tied to self-improvement, instant replay was also widely adopted as a personal, leisure technology. Expensive, its promotion and suggested uses were directed decidedly at the affluent. Near daily ads ran in newspapers across the United States offering lessons, summer camps for children, country club memberships, and cruises equipped with video replay, promising to improve golf swings and tennis strokes. These were also the focus of a rebranded version of Ampex's VR-7000, called the "SporTrainer." The SporTrainer was a camera-recorder-monitor assemblage on wheels, resembling an ice cream cart, with a large sun umbrella (Figure 4).



# Figure 4 – SporTrainer, 1966, from Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA

Early in the adoption of video (1966), Art Seidenbaum wrote a column for the *Los Angeles Times* espousing the possibility that video replay could improve one's personality. Titled, "Instant Replay Designed to Make Jack Less Dull," the piece recounted several anecdotes about the use of in improving charisma and alleviating shyness.<sup>51</sup> Consistent with this personal use, video replay was enthusiastically adopted in therapeutic practices. Television, more broadly, was adopted as a supervisory and therapeutic technology but several applications were developed specifically for the familiar uses of video replay:

During a psychotherapeutic session in which a videotape recording is being made it is *sine qua non* to inform all participants that each has the right to request an *instant replay* at any time during the session. This availability of videotape replay is one of its most unique assets and distinguishes it thoroughly from the use of sound movies of a psychotherapy session.<sup>52</sup>

This passage is from Milton Berger's edited volume on the use of videotape across private, couple, and group therapy. Berger continues, expressing familiar values attached to replay in other venues:

During a playback individuals or members of a group may be more open to experiencing compassion for themselves or others than during the regular session.

The playback allows for a reflective, feeling experience untarnished by the usual defensive interactional patterns of patients with their therapist or group.<sup>53</sup>

And

Another method of utilizing either instant or later replay is to play back the picture without the sound so that patient can more objectively experience the impact on others of his nonverbal behaviors and posturings as he sees himself for the first time from others' point of view. He can perceive and begin to understand how his nonverbals influence and help bring about the reaction of others to him.<sup>54</sup>

Prior to Berger's handbook, these methods had penetrated the therapeutic atmosphere of the late 1960s. During the rise of the Synanon center and the "Synanon game," replay epitomized the group's philosophy of radical confrontation with the truth, citing videotaped replay as the root for curing addiction to amphetamines.<sup>55</sup> The therapeutic use of video replay appears homologous with the factory use of time-motion media meant to uncover "a science of the economy of the body," where the video recording becomes not only more palatable and trustworthy than the therapist but is presented as offering the evidence of unseen disorders, frozen in physical mannerisms, like a disputed touchdown call.

Relying on the same reasoning of feedback and communication control, the therapeutic use of video replay indicates both the scope of replay's take-up and the depth of the discourse of improvement. Physical movements, machine operation, personality conflicts, and physical addiction were all represented as susceptible to the manipulations of machine mediation. In each of the examples above, the ideological and logical underpinnings of video replay's usefulness relied on an understanding of the reintegration and embodiment of audiovisual information.

The psychiatric use of video replay relied on the interface of patient and recording, while other medical uses relied on repetitive playback of video images to build new

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diagnostic and analytic frameworks. As I described above, the DR-10 developed out of a need to playback x-rays in a dynamic fashion. Harkening back to Marey's studies of circulation, similar uses were developed to track the flow of fluoroscopic fluid through the circulatory systems of infants.

The same type of device that lets you see how the swivel-hipped halfback scored is especially valuable in diagnosing ailments of the heart, where action happens faster than in any other organ.<sup>56</sup>

Video replay was preferred over normal x-rays and film recordings because it was cheaper, required no development time, and could be played on a loop. While looped motion pictures date back as far as Marey, Muybridge, and Edison, Scott Curtis notes that as early as 1912, doctors were using "medical loops" as a means of picturing rhythmic motion.<sup>57</sup> The loop, as Curtis and Manovich both note, is not only the original form of cinema, it is also the undergirding structure of cybernetics.<sup>58</sup> The loop also subtends the media interface of contemporary medical semiotics. Along with the building of medical databases, and catalogues of audio, visual, and instrument readings, the loop becomes the basis for the late 1960s development of facial analysis systems.<sup>59</sup> The use of video recording is often ignored in histories of medical hermeneutics. But it is clear that "the loop" is a genre of the replay. In fact, by accelerating and concentrating the replay of physiological processes, loops make otherwise fleeting phenomena visible, and turn ongoing processes into discrete medicalized events. Video extends and expands the phenomena that are objectified, catalogued, analyzed, and reified in this way.

#### Law and Order on Video

In the first section I explored the various ways that replay systems were incorporated into training regimes, educational contexts, and medical and therapeutic applications. Even

where replays were fleeting, video recordings were thought to perform in ways that relied on a functional notion that they exposed unseen truths: a lack of efficiency, a deficit of personality, a fleeting heart problem, etc. In the adoption of video technology in law enforcement and the legal system, the protocols of proof were necessarily more strict and systematized but the applications were just as widespread.

As with the phonograph,<sup>60</sup> one of the first applications imagined for video recording is a replacement for the court reporter. The first printed use of "instant replay" was in a Chicago Tribune article reporting on the potential use of videotape as a costeffective way of recording trials.<sup>61</sup> The suggestion comes as a solution to a 1964 reform making all courts in Illinois courts of record (requiring that they produce transcripts). While the video camera never fully replaced the court reporter, videotape did become the standard way of documenting depositions. For this, protocols were determined dictating the angles and tape continuity required for depositions to be legally admissible.<sup>62</sup> For insurance companies, replacing the reporter was not only cost-effective, but videotape was believed to hold the deposed witness to a higher level of scrutiny.<sup>63</sup> One advocate for video use went as far as to claim that recording by videotape would prevent lawyers from being dishonest, knowing that they could be shown to have acted deceitfully during pre-trial hearings.<sup>64</sup>

The court reporters' profession is an indexical example of the restructuring effect of videotape's association with streamlining endeavours in the 1960s. Reporters were paid \$100 per hour, the same price as one hour of reusable videotape. The equivalency is thus laid bare between human labour and reusable material. Second, the use of videotape offered the opportunity to streamline the deposition process, thereby clearing a backlog of cases. Yet, by 1966, a new professional outlet appeared for stenographers in the form of closed captioning for television, made newly possible by the development of cheap video recorders.<sup>65</sup> Therefore, put out of work by a technology developed for TV, stenographers soon found themselves newly employed by token of the same medium. This is one example of the disruption caused by the use of videotape as a more consistent, cheap, and standardized method of recording in the 1960s.

More generally, video was embraced by the courts quicker than anywhere else partly because of its ease of incorporation into the courtroom.<sup>66</sup>

Celluloid had a reputation for being expensive, difficult to produce, and inconvenient to exhibit...[The primers] write that the advantages of videotape over motion picture film include portability, resistance to environmental extremes, the ability to provide immediate feedback, and the physical integrity of the master tape, which remains uncut.<sup>67</sup>

The replacement of film by video, as in other spheres of activity, meant that instant replay, freeze frame, and slow-motion analysis also entered the courtroom as hermeneutic tools at lawyers' disposal. Video appeared at a time when scientific evidence was increasingly relied upon to deliver convictions and used to close cases quickly, helping to streamline the justice system and reduce delays.

The analytic use also corresponded with the use of video evidence in police forces, meaning that instant replay video could run the length of the investigation and litigation of a crime.<sup>68</sup> The acceptance of video evidence and video systems in court had direct ramifications for law enforcement, since police were expected to have video evidence to corroborate other forms of evidence and testimony. Throughout the 1960s, police forces and their attendant professionals (district attorneys, forensic investigators) increasingly found themselves in the position of producers of video content. This coincided with the

first wave of closed-circuit television security systems, and the Bank Protection Act, which required more stringent, standardized security systems be in place in every bank branch by 1970 (See Figure 5).

Early police uses of video replay fall into three categories: traffic monitoring, suspect interviewing, and evidence documentation. By 1974, a "federally financed project to try to cut down the time and cost of pretrial hearings" led to a pilot program in the Bronx that put confessions and police line-ups on videotape.<sup>69</sup> Between 1967 and 1969, large cities throughout the United States adopted video as a cost-saving measure, and later, as a means of accumulating evidence. In Chicago in 1967, a CCTV and replay system was used to both monitor drunken drivers and train new officers; <sup>70</sup> within a year, Chicago police were using a similar system for monitoring "riots and civil disturbances" and, experimentally, identifying suspects.<sup>71</sup> In the latter case, the equipment was provided on loan from Sony. This is an example of the corporate investment in government technology that often coincides with its commercial release to the public; normally, the new technology quickly replaces work done by people and becomes financially indispensible. In Los Angeles, replay equipment was used to monitor fires and traffic from a helicopter, to record large crowds, and to train police officers, "The real application," says Capt. Hoffman, "is in audiovisual training. We simulate problems then let trainees see what they've done and pick out their own mistakes."<sup>72</sup> In the Journal for the National Association of Counties, George Toles describes the Los Angeles Sherriff explaining the usefulness of video: "As simple to use as a home movie camera, the lightweight VTR system has proven to be an invaluable aid in training activities and offers great potential for the purpose of documenting evidence leading to convictions."<sup>73</sup>

Traffic monitoring was almost always the first use of video recording equipment. Investment in traffic systems came from two separate federal grant programs meant to reduce the costs of policing highways, one from a highway administration program and one from the U.S. Department of Justice. One video system incorporated a microphone for detecting extremely high decibel levels, which cued a video recorder—meant to capture what is assumed to be a traffic accident.<sup>74</sup> Traffic is also a site of supposedly obvious malfeasance. In Hartford, the police reported a woman stunned yet convinced when she was pulled over and shown a recording of her erratic driving;<sup>75</sup> and back in Los Angeles, a "Candid Camera" video system was imagined to have the same effect:

Instant replay of the tapes is possible.

There was general agreement that the evidence gathered on tape could lead to fewer "not guilty" pleas by defendants after being confronted by the "candid camera" evidence.

One county police official commented: "Two minutes of this tape is equal to 40 hours of work on drunken driving cases."<sup>76</sup>

Such "candid camera" moments are also potentially subjected to a cybernetic reading, as the new information that one is on camera rescripts the event and creates a new feedback loop to condition further behaviour.

Video use in police forces was pervasive and video monitoring was used to both protect police officers and those in custody from abuse. Video replay entered into the judicial system as a polyvalent practice—in the same manner it entered into any somewhat enclosed sector. Its use spanned the police and judicial systems and was applied to both recording and playing back evidence, training police officers and lawyers, and replacing a class of manual human labourers in the form of displaced stenographers. Here we see the full manifestation of video's articulation with multiple cost-saving, streamlining, and automated processes. It incorporated fully with needed solutions to
legislation (e.g. the Bank Protection Act and newly classified "courts of record") and centralized administration of grant funding for the automation of police work.



Figure 5 – 1969 advertisement for Panasonic Time Lapse Recorder

## Conclusion

This chapter has traced the machine-human co-production of images and sounds by users and subjects of video assemblages in the 1960s. The users of video in these cases rarely questioned the "objectivity" and "dispassion" of the video apparatus, instead ascribing anthropomorphic titles and capabilities to video technologies. As this chapter has shown, the imagined possibilities of video feedback had very few limitations in the 1960s, a period in which it was video's proponents claimed that it was at the root of solutions to social, legal, interpersonal, and physiological problems. The ideals surrounding video, of feedback and control, of evidence production, and of accessibility, all suggest that video is a technology that structures contingent social relationships of communication around the self-evident truth of audiovisual content. Such ideals rely on a view of video content as static and human beings, relationships, and organizations as mutable and receptive to the intervention of video proof. Today, we can recognize this view of video evidence as the most idealistic of possible positions. Yet, in the 1960s, video feedback was still a "new medium" and its crisis of meaning not yet decided. This chapter has traced the stabilization of this crisis into a public understanding that functioned across social scenarios.

<sup>&</sup>lt;sup>1</sup> Marshall McLuhan, "Art as Survival in the Electric Age," in *Understanding Me: Lectures and Interviews*, ed. Stephanie McLuhan and David Staines (Toronto: McClelland & Stewart, 2003), 218.

 <sup>&</sup>lt;sup>2</sup> "Man and Media," in *Understanding Me: Lectures and Interviews*, ed. Stephanie McLuhan and David Staines (Toronto: McClelland & Stewart, 2003), 288.
 <sup>3</sup> "Art as Survival in the Electric Age," 218.

<sup>&</sup>lt;sup>4</sup> "The Implications of Cultural Uniformity," in *Superculture: American Popular Culture and Europe*, ed. C.W.E. Bigsby (Bowling Green, OH: Bowling Green University Popular Press, 1975), 44.

<sup>&</sup>lt;sup>5</sup> "Suez Canal a Graveyard for Ships and Soldiers," *Los Angeles Times*, March 16, 1969.
<sup>6</sup> "City's Luck on Snowfall Due to Hold," *The Washington Post, Times Herald*, December 29, 1967; "Packers Cool It; Limbering in Green Bay," *Chicago Tribune*, January 5, 1968; "Weather to Be Instant Replay," *The Hartford Courant*, July 23, 1969; David Condon, "Purdue, Irish to Settle Who's No. 1," *Chicago Tribune*, September 28, 1968.

<sup>&</sup>lt;sup>7</sup> Lisa Gitelman, *Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era* (Stanford, CA: Stanford University Press, 1999), 3.

<sup>&</sup>lt;sup>8</sup> Lisa Gitelman and Geoffrey B. Pingree, "Introduction: What's New About New Media," in *New Media*, *1740-1915*, ed. Lisa Gitelman and Geoffrey B. Pingree (Cambridge, MA: The MIT Press, 2003), xii.

<sup>&</sup>lt;sup>9</sup> Ampex Corporation, VR1000 Instruction Manual.

<sup>&</sup>lt;sup>10</sup> 3M Company, *To Multiply Your Candidate "Pull"* (Library of American Broadcasting, University of Maryland, College Park, MD, 1960).

<sup>&</sup>lt;sup>11</sup> Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996), 230; George A. Miller, *Plans and the Structure of Behavior* (New York: Holt, 1960).

<sup>&</sup>lt;sup>12</sup> Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Garden City, New York: Doubleday, 1954), 61.

<sup>13</sup> There are a number of other uses of video in the late 1960s and early 1970s, including home videos, activist videos and documentary video movements. I do not have the space to properly address each one of these; moreover, replay techniques are less central in their development.

<sup>14</sup> *Noise*, by Lynda Benglis, 1972 and *Locating* #2, by Nany Holt, 1972, used instant replay and live feedback, respectively. James M. Moran, *There's No Place Like Home Video* (Minneapolis: University of Minnesota Press, 2002), 9.

<sup>15</sup> Ampex Corporation, *VR303 Operator's Manual*, Series 2: Box 15 (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, 1965), xi-xii.

<sup>16</sup> Lee Stratton, "Reviewing Slow-Motion Disc Principles," *Broadcast Engineering* 11, no. 2 (February, 1969): 18.

<sup>17</sup> Corporate mythos says it was requested by ABC's *Wide World of Sports*.

<sup>18</sup> Disc recording was also employed as a video buffer in the Ampex Videofile system, a computerized data storage and retrieval system that stored photographs, fingerprints, and other documentary materials as video content.

<sup>19</sup> On the incorporation of machine, expertise, and technique in the body and habits of the vocational worker, see Pierre Bourdieu, "Men and Machines," in *Advances in Social Theory and Methodology: Toward an Integration of Micro- and Macro-Sociologies*, ed. Karen Knorr-Cetina and Aaron V. Cicourel (Boston; London; Henley: Routledge & Kegan Paul, 1981).

<sup>20</sup> Jonathan Sterne, "Bourdieu, Technique and Technology," *Cultural Studies* 17, no. 3 (2003): 376; Joseph A. Robinson, "Videotape in Training," *Training and Development Journal* 22, no. 11 (November, 1968).

<sup>21</sup> Ampex Corporation Internal Memo, *DR-10*, Series 2: Box 82 (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, 1968).

<sup>22</sup> Erhard Kietz, *Video Disc Recorder: DR-10; Design Plan*, Series 2: Box 82 (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, June 19, 1968).

<sup>23</sup> Ampex Corporation, *Annual Report: 1958*, Series 2: Box 16 (Ampex Corporation records, M1230. Dept. of Special Collections, Stanford University Libraries, Stanford, CA, 1958), 26.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> "Cleaning Company Uses Videotape Recording to Train Employees," *Building Maintenance and Modernization* 16, no. 1 (January, 1969): 52.

<sup>27</sup> United States Savings and Loan League, "Instant Replay Slashes Bank Training Costs," *Savings and Ioan News* 90, no. 2 (February, 1969).

<sup>28</sup> "Dental Training Robot Developed," Contact Point 48, no. 1 (1969/1970).

<sup>29</sup> W.G. Cleaveley, "A Practical Approach to a Provincial Training Program," *Pulp and Paper Magazine of Canada* (August 15, 1969).

<sup>30</sup> Associated General Contractors of America, "Video Tape: A New Tool with Educational Possibilities," *Constructor* (January, 1969).

<sup>31</sup> "Cleaning Company Uses Videotape Recording to Train Employees."

<sup>32</sup> ""Instant Replay," Anyone?," Industrial Canada (April, 1968).

<sup>33</sup> "Train Supervisors with Videotape Instant Replay," *Canadian Forest Industries* 87, no. 9 (September, 1967).

<sup>34</sup> "How West Virginia Uses Videotape for Employee Training," *Paper Trade Journal* 150, no. 45 (November 7, 1966).

<sup>35</sup> Institute of British Foundrymen, ""Instant Repaly" Technique Locates Foundry Plant Fault," *Foundry Trade Journal* 122, no. 2615 (January 19, 1967).
 <sup>36</sup> Ibid.

<sup>37</sup> "Videotape: Modern Way to 'Show and Tell'," *Administrative Management* 30, no. 8 (August, 1969): 23.
<sup>38</sup> "Videotape Aids Tool Rebuilding," *American Machinist* 110, no. 25 (December 1966).

<sup>38</sup> "Videotape Aids Tool Rebuilding," *American Machinist* 110, no. 25 (December 1966).
 <sup>39</sup> "The Widening World of Videotape Recording," *Training and Development Journal*

21, no. 2 (February, 1967); "Videotape Used at Western Electric," *Training and Development Journal* 21, no. 9 (September, 1967); P. Kevin O'Sullivan, "Small Closed-Circuit Videotape Recorders," *Training and Development Journal* 22, no. 6 (June, 1968); Robinson, "Videotape in Training."

<sup>40</sup> "The Widening World of Videotape Recording."

<sup>41</sup> O'Sullivan, "Small Closed-Circuit Videotape Recorders."

<sup>42</sup> Robinson, "Videotape in Training," 15.

<sup>43</sup> For example: Council National Safety, *Handbook of Occupational Safety and Health* (Chicago: National Safety Council, 1975); Thomas F. Stroh, *Training and Developing the Professional Salesman* (New York: AMACOM, 1973); Kenneth T. Byers, ed. *Audio-Visual Aids and Facilities for Training*, Employee Training and Development in the Public Sector (Chicago, IL: Internation Personnel Management Association, 1970, 1974).
 <sup>44</sup> John A. Kapost, "Audio-Visual Aids and Facilities for Training," in *Employee Training and Development in the Public Sector*, ed. Kenneth T. Byers (Chicago, IL: Internation Personnel Management Association, Personnel Management Association, 1970, 1974), 196.

<sup>45</sup> This view is, of course, offered by Karl Marx in Chapter 15 of *Capital*. Marx, *Capital*: *A Critique of Political Economy, Volume 1*: 492-639.

<sup>46</sup> Bruce J. Biddle and Peter H. Rossi, "Educational Media, Education, and Society," in *The New Media and Education: Their Impact on Society*, ed. Peter H. Rossi and Bruce J. Biddle (New York: Anchor Books, 1967); "The Versatile Videotape Recorder," *Educational Technology* 7, no. 1 (January 14, 1967); John Russell Lloyd, "The Effect of Audio and Visual Feedback on the Learning of a Gross Motor Skill When Imposed at Selected Stages of a Learning Period" (Louisiana State University and Agricultural & Mechanical College, 1968); "Teacher in-Service Programs," *Instructor* 77, no. 3 (March, 1968); Kenneth Penman, "Relative Effectiveness of Teaching Beginning Tumbling with and without and Instant Replay Videotape Recorder," *Perceptual and Motor Skills*, no. 28 (1969); Howard R. Bradley, "Video-Tape Recordings in Student Teaching," *Agricultural Education Magazine* 41, no. 7 (January, 1969); Delwin B. Dusenbury, "The Art of Television Performance," *Dramatics: An Educational Magazine for*

Directors/Teachers/and Students of Theatre Arts May, 1969; Marlin M. Mackenzie, Toward a New Curriculum in Physical Education (New York: McGraw-Hill, 1969); Carol Janice Ramsay, "Learning a Gross Motor Skill under Two Conditions of Visual Feedback" (The University of Western Ontario (Canada), 1970); Wayne Gilbert Taylor, "The Effectiveness of Instant Videotape Replay as a Source of Immediate Visual Feedback Upon Learning or Improving Performance of a Gross Motor Skill" (The University of Tennessee, 1971); Wayne Jackson Jr Armstrong, "The Effects of Videotape Instant Visual Feedback on Learning Specific Gross Motor Skills in Tennis" (The University of Southern Mississippi, 1971).

<sup>47</sup> Bob Ferguson and Roger Stephens, "Media Studies and Media Usage in an Institute of Education," *Screen Education* Winter 1976/77, no. 21 (1976).

<sup>48</sup> "Teacher in-Service Programs," 140.

<sup>49</sup> Mark Andrejevic, *iSpy: Surveillance and Power in the Interactive Era* (Lawrence: University Press of Kansas, 2007), 2.

<sup>50</sup> "TV Camera Studies Classroom Society," *The Hartford Courant*, February 13, 1968. This experiment is happening contemporaneously with Stanley Milgram's work (also at Yale) and at the height of *Candid Camera*'s popularity. For an analysis of the overlap of the two, see: Anna McCarthy, ""Stanley Milgram, Allen Funt and Me": Postwar Social Science and the "First Wave" of Reality TV," in *Reality TV: Remaking Television Culture*, ed. Laurie Ouellette and Susan Murray (New York; London: New York University Press, 2009).

<sup>51</sup> Art Seidenbaum, "Instant Replay Designed to Make Jack Less Dull," *Los Angeles Times*, December 8, 1966.

<sup>52</sup> Milton M. Berger, "The Use of Videotape in the Integrated Treatment of Individuals, Souples Families and Groups in Private Practice," in *Videotape Techniques in Psychiatric Training and Treatment*, ed. Milton M. Berger (New York: Brunner/Mazel, 1970), 142.
 <sup>53</sup> Ibid., 143.

<sup>54</sup> Ibid., 149.

<sup>55</sup> Donna Scheibe, "Drug Programs Prescribe Truth as Best Antidote," *Los Angeles Times*, April 13, 1969.

<sup>56</sup> Frank Carey, "Instant TV Replay Becoming Lifesaving Aid in Hospital " *Vancouver Sun*, Aprill 22, 1969.

<sup>57</sup> Scott Curtis, "Still/Moving: Digital Imaging and Medical Hermenutics," in *Memory Bytes: History, Technology, and Digital Culture*, ed. Lauren Rabinovitz and Abraham Geil (Durham: Duke University Press, 2004), 242.

<sup>58</sup> Lev Manovich, "What Is Digital Cinema," in *The Digital Dialectic: New Essays on New Media*, ed. Peter Lunenfeld (Cambridge, MA: MIT Press, 1999).

<sup>59</sup> Paul Ekman, Wallace V. Friesen, and Thomas G. Taussig, "VID-R and SCAN: Tools and Methods for the Automated Analysis of Visual Records," in *Content Analysis* ed. G. Gerbner, et al. (New York: John Wiley & Sons, 1969 [1967]).

<sup>60</sup> Stenographers opposed the use of the phonograph, obviously, and were never really threatened by it. Emily Thompson, "Machines, Music, and the Quest for Fidelity:

Marketing the Edison Phonograph in America, 1877-1925," *The Musical Quarterly* 79, no. 1 (1995). For an original account of the possibility of replacing stenographers and other professions with the phonograph see: Frederic J. Haskin, "Possibilities of the Phonograph," *Washington Herald*, March 15, 1907.

<sup>61</sup> John Oswald, "Suggest Plan for Court Use of Video Tape," *Chicago Tribune*, October 22, 1965.

<sup>62</sup> Louis Georges Schwartz, *Mechanical Witness: A History of Motion Picture Evidence in U.S. Courts* (Oxford; New York: Oxford University Press, 2009).

<sup>63</sup> "Aspects of Claims Handling by Video Tape," *Federation of Insurance Counsel* 20, no. 4 (1970).

<sup>64</sup> Ibid.

<sup>65</sup> Closed captioning for television did not fully develop until the 1970s, but early tests began in 1966. In fact, the earliest systems used a similar audio cueing method for synchronizing text with images as Tony Verna had used to cue the first video replay in 1963. Gregory John Downey, *Closed Captioning: Subtitling, Stenography, and the Digital Convergence of Text with Television* (Baltimore: Johns Hopkins University Press, 2008), 53-102.

<sup>66</sup> Gerald R. Miller and Norman E. Fontes, *Videotape on Trial: A View from the Jury Box* (Beverly Hills, CA: Sage Publications, 1979); Ellen J. Miller, *Video, a Guide for Lawyers* (Santa Monica, Calif.: Law-Arts Publishers, 1983).

<sup>67</sup> Schwartz, *Mechanical Witness: A History of Motion Picture Evidence in U.S. Courts:* 102.

<sup>68</sup> See, for instance, "Forest Park Police Set 'Instant Replay' for Drunk Drivers," *Chicago Tribune*, October 26, 1969; "Two Freeway Foes Convicted in Fracas," *Washington Post*, December 20, 1969.

<sup>69</sup> David A. Andelman, "Videotapes to Be Used in Courts in Bronx in U.S. Pilot Program," *New York Times*, December 9, 1974.

<sup>70</sup> "Forest Park Police Set 'Instant Replay' for Drunk Drivers."

<sup>71</sup> "City Police Try out Video Replay Unit," *Chicago Tribune*, February 17, 1968.

<sup>72</sup> Ray Ripton, "'Instant Replay' Aids Lawmen," Los Angeles Times, June 30, 1968.

<sup>73</sup> George Toles, "Police Television," American County Government 34, no. 11 (1969).

<sup>74</sup> "Test TV System to Offer 'Replay' of Auto Accidents," *New York Times*, October 17, 1967.

<sup>75</sup> Edward Rudd, "Erratic Drivers to View TV Replay of Antics," *The Hartford Courant*, March 2, 1968.

<sup>76</sup> "Candid Camera' May Spy on Lawbreakers," *Los Angeles Times*, January 15, 1967.

## Epilogue

While researching this project it was reported that several high profile sports teams were using a new system called the "MindRoom" (*sic*). Athletes enter the MindRoom

Where electrodes are fitted to their heads, chest and hands to measure brain activity, muscle response and anxiety. Guided into a meditative state, players are shown soothing images and short video clips from matches. They are trained to remain in a calm, relaxed state regardless of what they see and hear.<sup>1</sup>

As we have seen, video-based aversion therapy was first tested in curing addictions in the 1960s and this new iteration merely incorporates new monitoring technology to update the cybernetic appeal of instant video feedback. Video feedback practices are fully incorporated with the habits and technologies of everyday life. While networks and socially maintained structures of communication stretch over generations, new politics of timeshifting, mediated judgment, and human management are always implicated in the ongoing negotiation over the meaning of new media.

Exposing the politics of macro and micro video timeshifting unearths the ways video strengthened the concentration of authority in centralized management and outsourced the responsibility for judgment to time based replay media. In the history presented above, the advent of video was absorbed as an opportunity for the complete reorganization of the labour of television production and smaller recorders were subsequently developed to address the capitalist needs of better-streamlined production across industrial and cultural occupations.

Four symbolic figures emerge from the creation of a demand for video feedback technology: the mechanical umpire, the mechanical judge, the mechanical witness, and the mechanical manager. In each case, the authority for making claims to truth results from an alliance of "mechanical objectivity" and the preexisting social authority of the figure represented. Thus, the mechanical witness, for instance, is presumed to have all the epistemological cachet of the eyewitness without any of the baggage of human fallibility.

But take the mechanical umpire as another example. Professional football cannot exist without the interpretive authority of the referee-without the split-second decisionmaking of referees, each play would be an impossibly long negotiation between the teams and the video record as to what had occurred. Instead, referees are asked to embody a socialized eye—an objective, "pure" gaze that separates them from the affective charge of the game environment. Not coincidentally, this pure gaze is also the basis of the bourgeois appreciation of fine art as a contemplative practice.<sup>2</sup> And just as with the determination of taste in art appreciation, the authority granted to some judges over others is based on a political struggle over both the right to claim an authoritative voice and the categories of judgement themselves. Continuing with the example of the referee, the crop of NFL officials is always made up of predominantly white, all male, higherclass professionals.<sup>3</sup> The fact that a referee has to be independently wealthy---to avoid malfeasance—dates back to 1887, when referees were paid to manage soccer games even before they had whistles or watches. That the class of NFL referees bears a considerable resemblance to the people most often elected to political office should come as no surprise, but it is also not a trivial coincidence. Acts of judgment are political acts and choosing who can perform these acts with socially agreed upon authority is an equally politicized activity. In the process of developing and implementing technologies to replace the human arbiter, video's early adopters reified mechanical objectivity, the value of instant information, and the assumed improvement of replay and repetition.

No work is error free. Suggesting that ideal work is error-free and maximally productive is the founding myth of capitalist labour. Equally in industrial production as postindustrial workplaces, the perfect machine is thrown out of kilter by the weakness and fallibility of human motive power. Modern forms of this argument are predicated on the notion that people are, relative to the digital machines that surround them, imperfect cybernetic organisms.

In the conjuncture of the 1960s, however, the micromanagement of time became the focus of management and teaching philosophies. Accordingly, video was integral to the development and implementation of new methods for instruction. The time-motion media used in the production of goods were repurposed, accelerated, and exaggerated through video media in the social reproduction of new classes of students, athletes, and healthy and law abiding subjects. It was the contextual modularity and flexibility of video that singled out replay techniques as one particularly useful way of importing the rationalization of labour into every zone of work, play, and civil society. In the period of video's new media-ness, proponents of the use of video recording claimed that the material meanings of instant recording-the possibility of repetition, analysis, and improvement through feedback—were ideal for the accelerated production of evidence necessary for the management of increasingly expensive and onerous bureaucracies. In these examples, video replay became a solution to problems in the body, of the body, on the field of play, on the factory floor, and across military operations. Extending the capitalist annexation of space and time, the bureaucratic incorporation of personalized feedback apparatuses united otherwise disconnected phenomena under the rubric of streamlined and cost-effective error correction.

<sup>&</sup>lt;sup>1</sup> Iain Macintyre, "Canucks Work on Secret Mind Room Where They Can Be Programmed to Think Happy Thoughts," *The Vancouver Sun*, December 10, 2009. <sup>2</sup> Pierre Bourdieu, *The Field of Cultural Production* (New York: Columbia University Press, 1993), 36.

<sup>&</sup>lt;sup>3</sup> A large number of football referees serve as law enforcement, prison workers, managers, and schoolteachers. For a full list of their occupations, see National Football League, *2010 NFL Record and Fact Book* (New York: TimeInc. Home Entertainment, 2010).

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