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Liveness Formats: A Historical Perspective on Live Sports Broadcasting

Florian Hoof

No Radio, No Home TV

In 2015, the English Premier League sold its television broadcasting rights for the next three seasons to the pay-TV company Sky and the telecommunications company BT Group for \$8 billion. This record-breaking deal is only a recent reminder that sports, as an intrinsic part of Western modernity, have always been deeply intertwined with film and media history on a global scale. In particular, live sports have been a driving force in developing, standardizing, and stabilizing pay TV practices and technology for delivering and securing live broadcasting events (Sies, 2008). An early advertising slogan for pay-per-view boxing fights, “No Radio, No Home TV,” sums up the vital purpose—to restrict access to live sports broadcasts—of such attempts: It includes transmission and projection technologies that have the capacity to grant access to the live broadcasting signal for people who have paid for the event and at the same time deny access to anyone else. My case study investigates the media history of strategies of fortification and control in the context of pay TV for live sports. A business model that depends on controlling the circulation of moving images by either restricting access to the broadcasting signal or controlling the infrastructure needed to circulate the broadcasting signal.

In recent decades, there have been decisive shifts in critical understandings of circulation in the emerging global cultural economy. Such cultural flows and transactions have been explained more broadly by an interplay between ideologies, cultures, technologies, and economies

(Appadurai 1990). The boundary-expanding dynamics unleashed by media convergence and digital-network markets have been described as the dissemination of moving images and information goods beyond existing media *dispositifs* (e.g., Jenkins 2006). How this affects media circulation was researched by focusing on media infrastructures that would enable and restrict the circulation of moving images (Parks and Starosielski 2015; Starosielski 2015; Schabacher 2013). Those perspectives have recently been accompanied by approaches that are more cautious about associating such boundary-expanding capacities with digital media. Instead, they focus on technologies and politics of control to understand decentralized media networks (Galloway 2006; O'Neil 2016).

These are different lenses for looking at media culture, but they also hint at a methodological challenge for film and media studies. Media convergence, the digitization of film and media culture, and the advent of media ecosystems make it increasingly difficult to distinguish between single media *dispositifs* and media networks. Even entities such as “film” and “television” seem no longer to be stable (Wasson 2015; Sterne 2012). Streaming container formats, such as MPEG and QuickTime, show that the boundaries between media that store moving images (celluloid film, DVD), the infrastructures that distribute them (postal system, video store), and the media *dispositifs* that exhibit them (cinema, television) have become almost irrelevant. As Jonathan Sterne explains, streaming container formats that encapsulate media technologies and aesthetics “carry the traces of other infrastructures” (2012, 2). What then comes to the center of attention are “architectures of control” (Lessig 2006) embedded in media standards, containers, and data formats that structure the circulation of moving images. I specifically look at strategies of control that emerge out of economic necessities to standardize and control the distribution and logistics of goods (Rossiter 2016), and how these concepts and architectures become “sources of order in underorganized systems” (Weick 1985, 106). From this angle, I look at the history of sports broadcasting as “a series of small crises of cultural control” (Hilmes 1997, xiii) that arise when economic interests temporarily fail to control the circulation of their product. Looking at the materiality of historically emerging forms of cultural control offers a more precise perspective “than the concept of an ahistorical, unchanging, and thus rather expansive, concept of a medium” (Wasson 2015, 58). To account for the changing politics of cultural control (Winner 1980; Gillespie 2010; Warnke 2013; Vonderau 2014), I define and lay out two concepts of control. The first, “fortifying,” tries to control live broadcasts by protecting the medium that stores the signal; the second, “infrastructuring,” tries

to dominate the distribution network used to circulate or distribute live broadcasts.

Bifurcated Concept of Format Control: Fortifying-Infrastructuring

Live sports broadcasting is a specifically suitable example to look at shifting concepts of control. Sports events are extremely valuable resources for content providers. But because a program's economic value diminishes greatly after the event has taken place, it is essential for rights holders to protect and secure such broadcasts. By definition, the practice of pay-TV live broadcasting is a compromise between easy and fast circulation of live sports events and the protection of those signals from illegal duplication and bootlegging. The priority is to precisely manage and control access to the live signal, while storing the event for later distribution or providing for the "best" possible image quality are subordinate aspects. Live broadcasting is optimized toward immediate circulation and is thus closely linked to distribution. Therefore, broadcasting signals rely on physical infrastructure that is embedded into social arrangements and technologies, such as standardized practices, norms, and protocols. This is not unique to media infrastructure but the basis of any logistical system. As Susan Leigh Star and Karen Ruhleder explain, such "infrastructure is transparent to use, in the sense that it does not have to be reinvented each time or assembled for each task, but invisibly supports those tasks" (1996, 113). In the case of media infrastructures this specifically concerns the interoperability between media event, storage or broadcasting medium, and projection device. Interoperability is guaranteed by standardized norms that cover these requirements. Media formats such as 35mm film, Betamax, or MPEG incorporate certain standards that make them compatible with certain film projectors or software decoders. This facilitates circulation and distribution of audiovisual signals because of the standardized and modularized infrastructure arrangements. While such technological standards fulfill basic technological specifications, they seem to be an insufficient explanation to account for the sociomaterial aspects of media culture. Furthermore, such an explanation downplays the role of culture and social practices that stabilize such norms and standards. To open a broader perspective on media distribution, Sterne suggests the need for a more comprehensive definition of the term "format" to account for the question of interoperability. He argues that formats are "attempt[s] to solve the problem of exchangeable formats across segments of the media industry" but also "artifact[s]

shaped by several practices” (Sterne 2006, 826). Using this basic definition of formats, I look at live broadcasting as an arrangement of formats that guarantees the interoperability of technological specifications, such as norms and standards, with the cultural and economic sphere. Here, interoperability is particularly important because live broadcasting formats depend on immediate distribution and circulation, making them loosely coupled and only weakly determined structures. As piracy has always been a driving force for media history (Johns 2009; Dommann 2019) this openness has resulted in continuous negotiations between the industry, the consumers, and the state about format control.

To better understand these negotiations, I devise a bifurcated concept of control that includes two ideal typical strategies of format control. The first branch focuses on “fortifying” and securing the broadcasting signal. The second branch focuses on controlling the infrastructure that facilitates the circulation of live broadcasts. I understand these two ideal types of control as a “unified analytical construct” that “is formed by the one-sided *accentuation* of one or more points of view” (Weber 1949, 90, emphasis in original). Thus, while the two ideal types, “fortifying” and “infrastructuring,” are analytically separate, concepts of control cut across these ideal-typical branches and thus do not fall neatly into only one particular branch.

Firstly, “control through fortification” can be executed by securing and controlling the boundaries of a storage medium, such as celluloid film, videotape, or a digital data format. The architecture of such a “fortified” storage medium clearly distinguishes between two spaces, the space within the storage medium and the space that surrounds the medium. To be able to maintain this boundary, measures have to be taken to stabilize and fortify a format either by restricting access to the storage medium or by making it inaccessible. An exemplary case is contemporary digital rights management (DRM) systems. DRM systems, a compound of hardware and encrypted software code, try to control how digital media formats can be used, duplicated, and circulated. Examples are Apple’s so-called “FairPlay Streaming DRM” and Microsoft’s “Windows Media Digital Rights Management System” (see Diehl 2012, 120–32). The data container itself is a useless black box unless one is provided with the encryption key necessary to decode the data container.

Secondly, “control through infrastructuring” can be executed by dominating the “material forms that allow for the possibility of exchange over space” (Larkin 2013, 327). Here, the infrastructure where those formats can be circulated and the devices on which those formats can be viewed are

used to control market and user behavior. Exemplary cases are media ecosystems established by companies such as Apple and Amazon. Infra-structuring relies on dominating architectures, norms, and standards to make it more difficult to circulate any given storage medium inside such a proprietary system. Infrastructure control is executed by an interplay between media formats and digital infrastructures. Examples are the ever-changing standards and protocols in media ecosystems to prevent work-arounds implemented by third party providers.

I argue that these two ideal typical forms of control are not unique to digital network markets but can be traced back throughout the twentieth century. Together they form “multiple, overlapping and perhaps contradictory infra-structural arrangements” (Bowker and Star 2010, 230). I trace the history of liveness format control starting at the end of the 19th century from early “sports bulletin boards” and “fighting films” to “theatre television,” to pay TV and pay-per-view, and finally to contemporary forms of over-the-top (OTT) streaming services. Hereby, I rely partly on existing accounts on the media history of live broadcasting (Gomery 1985; Schubin 2018; Sies 2008; Streible 2008), complement them with new archival material, and rearrange and discuss them under my overall perspective on a history of strategies of media fortification.

A Media History of Live Broadcasting

Live broadcasting encompasses not only a technological and economical dimension it is also a media cultural phenomenon with strong ties to media history. Starting with early radio and television stations, where live broadcasting was the only technological option available the possibilities of media to synchronize time and space resulted in certain cultural conceptions of live broadcasting. Jane Feuer describes these established conventions to perceive a broadcast as a constructed form of participating at an event from a distance as “liveness” (1983). Conventions that address and stabilize the idea of immediacy and direct access are not restricted to broadcasting but can also be found in context of documentary film. Here it echoes in concepts such as “direct cinema” and “cinéma vérité” (Comolli 1969) when filmmakers argue to use the film camera as a technology of “mechanical objectivity” (Daston and Galison 2007) that would guarantee an unaltered direct mode of observation or perception of the world. But because technology and culture are always intertwined practices, the mediated “feeling of being here” (Leacock 2011) is always a constructed format that relies on practices such as montage and narration.

Consequently, diverse media networks, including radio, television, and film, can provide for liveness experiences even if such media are not capable of delivering live and direct access to a given event. Thus, it is possible to trace the history of liveness not so much as the history of a technological paradigm but as a media cultural history of certain media cultural formats to connect and synchronize different spaces. If we take this perspective as a point of departure, we see that quite a wide array of different concepts were capable of delivering or creating the experience of liveness, even before the advent of the mass-media broadcasting systems of radio and live TV.

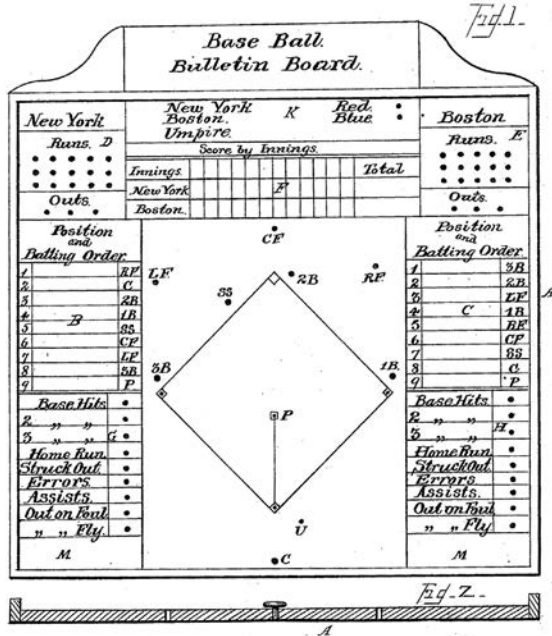
Moving Picture Sports Boards, 1889–1930

In the last quarter of the 19th century, newspapers started to report on sports events on a regular basis. By 1900 urban newspapers included daily sports sections that were vital to boost the sales figures of the papers and made spectator sports a popular pastime within society (Oriard, 2004, 25). Not only did this draw huge crowds to sports venues to watch events; it also opened up all sorts of considerations on how to make available the experience of an event at a distance. To be broadcast or reported on, sports events first had to be turned into serialized and standardized formats (see Stauff in this volume). Spectator sports formats then could be disseminated by relying on the media technology available at that time. Among the early concepts for providing a live experience of sports were scoreboards and bulletin boards that would display the results of baseball games to distant audiences. Mostly, they were used by newspaper companies to attract large crowds in front of their buildings (Schubin 2018) and to promote their own newspaper sports sections. In 1889 Edward Sims van Zile was granted a patent for his “Bulletin-Board and Base-Ball Indicator” (fig. 1). According to the patent description, the “invention relates to display or bulletin boards or tables, and is intended to show the progress of a base-ball game at some place distant from the playground. The invention consists in the construction of the board and the arrangements of its parts whereby the exact conditions of the game may be indicated at any time” (Van Zile 1889, 1). Furthermore, the patent specifies where to use the invention: “The board is to be posted in some conspicuous place, as in a pool-room or, as it has been used, in front of a newspaper-office, communication being had by telephone or telegraph with the base-ball ground” (Van Zile 1889, 1). One person would operate the scoreboard according to the information given to him by an announcer who would track the game by phone or over the wire. As the operators publicly displayed such bulletin

boards to promote newspaper sales, access was not restricted. But the "quality" of the liveness experience was poor due to the tiny score board, which displayed only the game statistics with little information about the event. Thus, the scoreboard captured the dynamics of the game only partially.

(No Model.)

E. S. VAN ZILE.
BULLETIN BOARD AND BASE BALL INDICATOR.
No. 402,700. Patented May 7, 1889.



WITNESSES:
L. B. Bartlett
P. Jullien

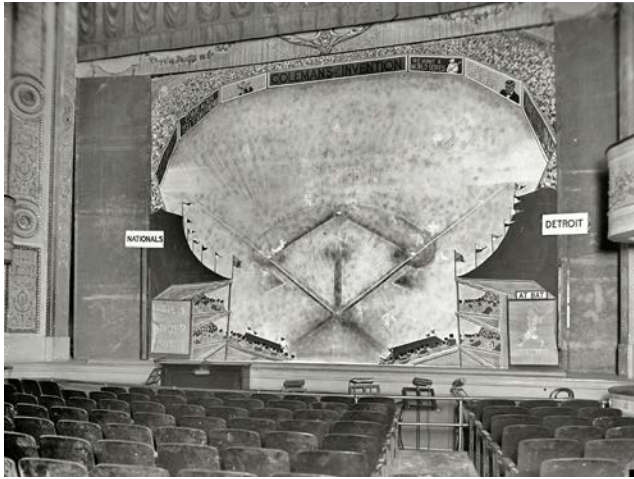
INVENTOR:
Edward S. Van Zile
By W. A. Bartlett
Atty.

[Figure 1] Bulletin Board and Base Ball Indicator. Source: Van Zile 1889.

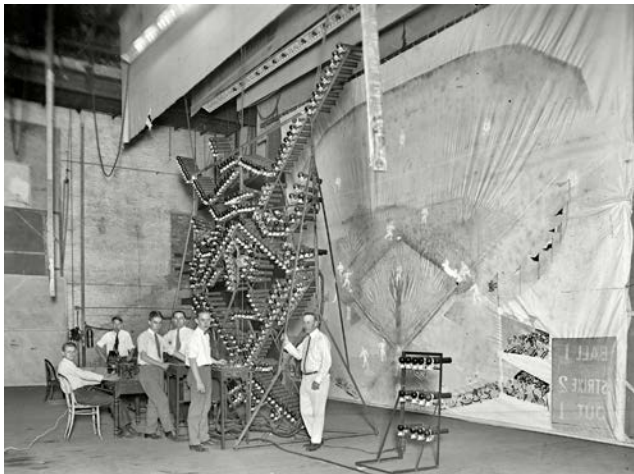
Alongside public bulletin boards, more advanced systems existed as well. The so-called Coleman Lifelike Scoreboard (fig. 2, fig. 3) was used in 1914 for the first time and connected the concept of live broadcasting or live displaying to the cinematic space. It was a technically complex system that would be placed in front of a cinema screen or on a theater stage. The system consisted of “nineteen thousand feet of wire and 400 electric bulbs” (Popular Science Monthly 1924, 78) and was operated by a group of up to five people. One person was in charge of the teletype machine that would communicate the changes on the baseball ground. The other people would then operate the electric system to indicate the game play by switching on and off light bulbs. The system not only promised to show statistics but also the dynamics of the game. Consequently, the patent that was filed in 1924 was entitled “Moving Picture Baseball Board” (Coleman 1924). It should provide “a novel form of multiple projection apparatus whereby pictures representing the players executing the plays, or executing any acts incidental to the playing of the game, or the actions of others such as umpires or coaches, may be shown on a board, screen, or other surface marked off to represent a baseball field” (Coleman 1927, 1). To be able to project the dynamics of the game, the system depended on a semi-dark environment, such as a theater or movie venue. This made it into “virtually a motion picture machine without film or projector” (Popular Mechanics 1924, 966). The bulletin board, albeit a sturdy structure made of wood, metal, and fabric, turned into a transparent medium for live broadcasting as a baseball game unfolded in the distance (Heider 1926).

While the newspaper scoreboards were part of the already existing news gathering infrastructure of the newspaper company, the “moving picture” baseball boards depended on a more complex infrastructure and a different business model. As with the cinema or theater, Coleman Lifelike broadcasts were financed through entrance fees, making it an early pay-per-view broadcast concept. The elaborate, sturdy technological construction and infrastructure that was needed to set up and deliver this kind of liveness experience—the actual transmission of the event to the cinema space via the teletype machine—was controlled by the operators of the system. The encapsulated cinematic space set a clear and stable boundary that surrounded the media device, in this case the bulletin board allowing for restricted access through the box office. One might infringe the patent and plagiarize the technology, but there would be no option to simply duplicate the live broadcast by interfering with the system installed in the cinema venues. The liveness experience was deeply intertwined with the infrastructure that provided for the transmission of this

temporal experience. Consequently, the Coleman system was at the same time a system of fortification and of infrastructure control. The setup was a unique system, as it did not rely on standardized devices that could be easily repurposed.



[Figure 2] Coleman Lifelike Scoreboard installation in the National Theatre, Washington, D.C., August 2, 1924. Source: Shorpy.com, <https://www.shorpy.com/node/8283>.



[Figure 3] Behind the screen of the Coleman Lifelike Scoreboard. Source: Shorpy.com, <https://www.shorpy.com/node/8285>.

Celluloid Film, 1894–1947

A different situation could be found in the context of boxing, another popular sport at this time. Besides boxing reports in newspaper sports sections, and until the advent of radio in the 1920s, celluloid film was the preferred medium for providing quasi-live experiences of boxing. Moreover, as Streible (2008) has shown in his study of early “fight pictures,” the popularity of boxing sports in the 1890s is closely connected with the moving image. Film companies started to produce boxing films, especially films that were shot on location and showed a non-staged boxing match turned out to be successful (Streible 2008, 43). While baseball depended on game play that strongly relied on statistics to make sense of a baseball event, boxing drew its fascination from the unexpected moments that characterized a fight between two boxers. Only film was capable of capturing the knockout, the decisive moment of a boxing match. Even an official ban on boxing films between 1915 and 1927 issued by state authorities did not stop the production of boxing films. The circulation of boxing films and, by the late 1920s, boxing broadcasts via radio turned boxing matches into major public events.



[Figure 4] Still from the boxing film *Jack Dempsey vs. Georges Carpentier*. July 2, 1921. Author unknown. Source: Archive.org, <https://archive.org/details/JackDempseyVsGeorgesCarpentier>.

In the 1920s, boxing promoters organized boxing matches such as the 1921 fight between Jack Dempsey and Georges Carpentier in Jersey City

in front of 90,000 people (fig. 4) and the 1927 fight between Dempsey and Gene Tunney where an audience of 105,000 gathered at Soldier Field in Chicago. Besides being popular events, boxing matches became significant testing grounds for new media broadcasting technologies. For Dempsey versus Carpentier, the Radio Corporation of America (RCA), the US Navy, and the National Wireless Amateur Association cooperated for the first large-scale experiment in radio boxing broadcasting. Using a telephone line, a “blow-by-blow” description from the arena was sent to the Hoboken terminal of the Lackawanna Railroad company where the RCA set up a temporary radio station. Here, a technician listened to the comments and spoke his own version of the description into a microphone that would then be broadcast (Barnouw 1966, 80–81). Across a 200-mile radius, the signal was picked up by radio amateurs and transmitted to theaters and other venues. Approximately 300,000 people listened to the broadcast, paying an admission fee as part of a fundraising campaign for the benefit of the American Committee for Devastated France (White 1921, 2). But besides early experimental forms of radio broadcasting, film remained the key medium of the boxing sports business. Not least because early radio relied on a different business strategy. Radio stations were either owned by radio manufacturers or by newspapers. In this context, sportscasts were used to sell radio devices, so-called “Radio Music Boxes” (Hagen 2005, 185–86), or to boost newspaper sales in a way similar to the purpose of baseball bulletin boards. Radio became a medium that used sportscasts to maximize potential audiences. But at this time, there was no need to control the circulation of live broadcasts, for example, by developing methods of encryption for commercial radio.

In the context of film, the situation was different as the economic model was based on selling access to fight pictures. For the 1921 fight between Dempsey and Carpentier, the film company Pathé bought the international film rights and produced a boxing film to be distributed throughout the world. The company sent among others a salesman to London to market the film in the United Kingdom. But on his arrival, he realized that the boxing film produced for this occasion had already been screened in the London cinemas. One of the Pathé cameramen had stolen an incomplete, raw version of the film from the film laboratory in Chicago, shipped it to London immediately, and sold copies to the local cinema operators (Streible 2008, 273). This incident was no exception. The producers of boxing films were heavily affected by piracy, against which they were unable to take legal action because the production and circulation of boxing films was—depending on the state jurisdiction—partly illegal. Distributing

on-location recordings of boxing matches on film, and in this way providing a kind of delayed liveness experience, turned out to be a rather weak and unprotected means of delivery. It was quite easy to duplicate and distribute such films, not least because of the standardized celluloid formats, which could be projected by any standardized projection device. In this respect, the contradiction between two strategies of control—fortifying and infrastructuring—becomes visible. In July 1916, right after the US Supreme Court ruled against the patent trust of the Motion Picture Patents Company (MPPC), which had controlled film infrastructure through monopoly for nearly a decade, the standardization group within the Society of Motion Picture Engineers (SMPE) declared that “of prime importance, and of immediate necessity for the welfare of the industry, was the standardization of materials, mechanisms, and practices” (Jones 1933, 280). To be able to improve the capability of the film industry to circulate celluloid film, four committees were founded that would focus on the standardization of “‘Cameras and Perforations,’ ‘Motion Picture Electrical Devices,’ ‘Picture Theater Equipment,’ and ‘Optics’” (Jones 1933, 281). The aim of the committees that were dissolved only in 1932 was to create a cinema infrastructure that would allow for interchangeability of the devices needed to produce, circulate, and screen moving images. Or as the SMPE put it, “The way to standardize is to standardize” (Jones 1933, 282). This included the 35mm film standard for theaters and from 1918 on a “new size of narrow width, slow burning film as the standard for all portable projectors” (Jones 1933, 285). The standardized infrastructure for the moving images industry as envisioned by the SMPE consisted of 35mm, 28mm, and 16mm film gauges, interoperable cameras, and projector devices. The standardization efforts of the SMPE aimed toward securing the growth of the film industry. But after the end of the MPPC trust, the cinema infrastructure could no longer be controlled by legal measures. Without legal protection, it became obvious that the different parts of the infrastructure were only loosely coupled and could be easily repurposed, for example, to establish informal ways of duplicating, distributing, and screening moving images. In contrast to the baseball scoreboards mentioned above, where the liveness experience provided to the audience was deeply intertwined with the transmission infrastructure and thus bound to a specific place, boxing film was prone to piracy. While the scoreboards were unique constructions that could not be easily duplicated, the standardized film infrastructure made it easy to repurpose the medium for an informal film economy.

As a result, the producers of boxing films adopted other strategies to make it more difficult to produce and circulate pirated copies. Or to put

it differently, they tried to regain control of the infrastructure that would facilitate the circulation of their weakly protected celluloid films. One of these measures was to exploit the “live” aspect of fight pictures and avoid long distribution channels in order to reduce the risk of police detection and piracy of film copies. Speeding up distribution meant that in 1923 a boxing match staged in New York was shown in theaters and cinemas on Broadway only 48 hours later (Streible 2008, 275). This not only contributed to an almost-live effect but also made piracy more difficult. Just a few copies were in circulation, and the films were not shipped throughout the United States but distributed only in New York. New film formats for 16mm home projection further increased the speed of film distribution. In 1927, the producers of boxing films were able to start to sell their films to cinemas but also for home projection only 18 hours after the fight (Streible 2008, 277). After the ban on boxing films was lifted later that year, the popularity of the films rose, as did the illegal duplication and bootlegging of boxing films.

It was impossible to fortify boxing films because they were standardized and thus interchangeable parts of a larger film infrastructure. Celluloid film could easily be stolen, duplicated, and illegally distributed by reusing the standardized devices of the film infrastructure. Consequently, film producers tried to protect their films by speeding up circulation and concentrating it locally, taking measures to control the film infrastructure.

Theater Television and Closed-Circuit Television, 1948–1977

This situation changed with the advent of “real-time” live broadcasting systems for moving images. In the 1920s and 1930s, film ceased to be the only audiovisual medium capable of showing boxing fights due to the first experiments of live television broadcasting. The CBS television networks relied on live sports events and boxing matches in particular. In 1928, J. Andrew White, the president of the company at that time argued that “the first and most logical application of television apparatus would be for events such as championship boxing matches” (quoted in Streible 2008, 287). In England, the first television broadcast of a boxing match took place in 1938, followed by a broadcast in the United States one year later. In 1941, the Radio Corporation of America (RCA) organized a live broadcast of a boxing match from Madison Square Garden to the New Yorker Theatre in New York on a 15-by-20-foot screen promising the 1,200 attendees “a better-than-ringside view of the battle” (Radio News 1941). In this case, a mobile

television unit transmitted the signals of television cameras and parabolic microphones via a stabilized telephone wire to the NBC studios in Radio City where they were relayed to the New Yorker Theatre. Here, the signal was split and the light impulses were fed into a second projection device that had to be installed inside the cinemas to screen theater television. The second signal distributed the sound to 16 loudspeakers that were set up inside the auditorium (Popular Mechanics 1941, 6).



[Figure 5] Screenshot, live broadcast of the boxing match Jersey Joe Walcott vs. Rocky Marciano, September 23, 1952. Source: YouTube.com, <https://www.youtube.com/watch?v=ZaKPg7gXtW4>.

This system became known as Theatre Television and made it possible to directly broadcast sports events, such as boxing, horse racing, wrestling, or the baseball World Series, on a screen in a film theater. Cinemas were sold out, for example, during the 1948 broadcast of the heavyweight fight between Joe Louis and Jersey Joe Walcott. Warner Bros. film studio, at that time still possessing its cinema chain, used this sports event to showcase the advantages of the RCA broadcasting system (Gomery 1985, 57). The diverse systems of Theatre Television developed by the media industry were originally intended to transmit different TV shows and events to the cinemas. In no small part, these systems were introduced by the film industry to compete with the new medium television. But only live sports events, especially American football, baseball and boxing, turned out to be successful content for Theatre Television (Gomery 1985, 58).

In 1952, Theatre Television reached its first peak when 50 cinemas in 30 different cities across the United States were interconnected using AT&T's cable network to broadcast the heavyweight boxing match between Jersey Joe Walcott and Rocky Marciano (fig. 5). However, Theatre Television turned out to be an economic failure, except for boxing (Gomery 1985, 59). The only profitable events that attracted a large number of viewers to the cinemas were live broadcasts of Rocky Marciano's heavyweight boxing matches and, from the 1960s onward, those of Muhammad Ali. Events such as the 1974 "Rumble in the Jungle" heavyweight fight between George Foreman and Muhammad Ali in Kinshasa, were broadcasted by Theatre Television. This system, later also described as closed-circuit television, was the basis for pay-per-view live broadcasts of boxing events until the 1970s. While the signal itself was not protected, the infrastructure to distribute, convert, and screen these signals remained under centralized control. This included the spatial concept of the movie theater, a protected room only accessible through the box office. Like the Coleman Lifelike baseball board, this gave the operators a robust position against piracy.

Satellite Networks, 1975–2006

This situation only changed in the 1970s. New providers with a modified transmission technology established themselves after the US Federal Communications Commission (FCC) changed the broadcasting regulatory policy toward satellite signal transmission in 1972. In this very year, the pay-TV company HBO (Home Box Office) was founded and used satellite-supported signal transmission for the first time. Now, a program signal could be synchronously fed into previously unconnected local cable networks. The concept of theater television that was previously restricted to venues such as cinemas, hotels, and opera houses could be extended to a large number of private households, creating a completely new market for live sports broadcasts. The first live sporting event to be broadcast via satellite technology was a boxing match, the Thrilla in Manila between Muhammad Ali and Joe Frazier in 1975 (fig. 6).

Ted Turner's WTCG, the second broadcasting company that used satellite transmission, also focused on live sports broadcasts, including baseball and basketball. After a further deregulatory decision, the Cable Act of 1984, live sports, in particular boxing, became an integral part of the now-common pay-TV and pay-per-view packages (Miller and Kim 2013). HBO, for example, concluded exclusive contracts with organizers and individual athletes for the pay-per-view rights (Roberts and Smith 2014).

With the expansion of the customer base to potentially all private households, the broadcast signal became non-excludable, and piracy was back. The architecture of the venues and the enclosed distribution channels of Theatre Television provided for some protection against piracy. This situation changed when pay-TV and pay-per-view providers started to introduce smart-card systems to decode satellite signals at home. Encryption systems had to be introduced to retain control of the now-decentralized infrastructure necessary to broadcast live events (Diehl 2012, 98–102). Every single household with a pay-TV subscription had to be secured by an encryption system that consisted of hardware and software components and relied on concepts such as the analog scrambling principle (Diehl 2012, 99). The early scrambling algorithms were rather simplistic, and the 11-bit encryption keys could easily be reengineered, so that hackers managed to decipher and disable the security technology on a regular basis and within minutes (Diehl 2012, 100). This gave rise to an informal market in which plagiarism tools and valid monthly access codes were traded. For the pay-TV industry, this became an unresolvable, permanent issue of their decentralized distribution systems.



[Figure 6] Screenshot, HBO live broadcast of the boxing match *Thrilla in Manila*, Muhammad Ali vs. Joe Frazier, October 1, 1975. Source: YouTube.com, <https://www.youtube.com/watch?v=oNEfN2R4oRc>.

An exemplary case is the hacking of the widely used Nagravision encryption system in 2008. Pay-TV companies that relied on this system, such as the German-based Premiere, were now easily accessible without a valid

subscription. The problem became so severe that Premiere decided to switch to the then-secure NDS Videoguard system (Premiere 2008). To this day, Premiere's successor, Sky, is still struggling with an informal market that offers solutions to circumvent encryption technologies. In response, Sky and the suppliers of encryption solutions are constantly changing their encryption algorithms, most recently in May 2016, when Sky totally blocked access via unlicensed hardware (Digitalfernsehen 2016). After the concept of theater television based on centralized infrastructure was replaced by satellite networks, pay-TV companies were no longer able to control the infrastructure. The logical step of the content providers was to turn their signals into highly protected and encrypted formats that would serve as fortresses to try to regain control in a decentralized digital network market (Galloway 2004).

Over-the-Top Live Streaming Services, 2006–Present

The situation of a decentralized infrastructure prevailed through the transition from satellite to internet-based streaming infrastructure. The technological process of streaming, the segmentation and then continuous transmission of electric signals, had already been described in a patent from 1927 (Squier et al.). Initially, streaming was used to transmit audio signals for internet radio services through internet-based network structures. Improved compression and network expansion allowed for the transmission of larger amounts of data and made it possible for streaming to become the new standard of moving image distribution as early as 2006 when Google acquired YouTube. The pay-TV companies were gradually forced to abandon their card-based systems, which required a lengthy process of shipping and installing technological equipment on the consumer side, and turn their service into streaming platforms, not least due to economic considerations to extend the range of potential customers.

As with the standardization of celluloid film in the 1910s and 1920s, streaming widened the options for pay-TV companies to reach out to new customers but at the same time further weakened their options for protecting live broadcasts. Significantly, streaming is not confined to a specific technology but can run on standard computer equipment. To circumvent the encryption technologies used in hardware-based decoder smart-card systems, one at least needed some technological knowledge to hack the system. Today, streaming platforms offer illegal live streams

that are easily available. Streaming software solutions such as Periscope allow illegal streams to be set up without any specialist knowledge. To find and access such streams one needs only to be able to operate a common search engine. OTT streaming no longer relies on exclusive distribution infrastructure but utilizes the same openly available digital infrastructure that is used to circulate illegal live streams (Hoof 2015).



[Figure 7] Screenshot, HBO/Showtime live broadcast of the boxing match Floyd Mayweather Jr. vs. Manny Pacquiao, May 2, 2015. Source: YouTube.com, <https://www.youtube.com/watch?v=6lJkUcPjvzMe>.

How this changed the situation of live sports broadcasting shows up in the Mayweather versus Pacquiao fight from 2015 (fig. 7). It was promoted by HBO and Showtime as the fight of the century. Prices for this pay-per-view event ranged from \$89.95 for standard resolution to \$99.95 for the high-definition stream. Before the fight took place, the streaming platforms Sportship.org and Boxinghd.net already advertised their illegal services as follows: “[I]f you can’t afford to buy tickets then simply watch Mayweather vs Pacquiao here. We will provide with nothing but the freshest and the most reliable high quality live links” (United States District Court 2015, 5). *The New Yorker* even ran an article with the title “Pirates Crash the Mayweather–Pacquiao Fight” (Thompson 2015). HBO, the owner of the broadcasting rights, handed in a copyright infringement lawsuit against the operators of these streaming portals, even before the actual boxing match took place. Furthermore, they issued a takedown notice against the company Periscope to prevent the allocation of illegal live streams on their platform. This “pre-crime” scheme is not restricted to this case but seems to characterize the new approach to how pay-TV and pay-per-view companies attempt to prevent the illegal circulation of live sports streams. By using legal measures, they try to reduce the options available

to the consumer to use streaming technology and thereby regain control of the distribution infrastructure. The key players are tech companies that provide encryption systems, such as the Kudelski Group that offers the Nagravision smart-card system for pay-TV operators. The company no longer focuses on encryption technology alone but has turned into a full-service anti-piracy provider. According to its service description, in digital network markets,

the entire media value chain is at stake and content piracy is more than ever a moving target fueled by ubiquitous broadband networks. This calls for a much more holistic approach to content protection than technology alone can deliver. . . . Our end-to-end solution combats all forms of piracy, such as key sharing, web streaming and IPTV piracy, among others, and leverages a full range of intelligence building, monitoring, technical, forensic and legal capabilities. (Kudelski 2017)

As even encrypted, fortified formats are no longer capable of preventing piracy, Kudelski adopted an approach to “defeat piracy through active security” (Kudelski 2018). Players such as Kudelski and its customers, the pay-TV providers, are trying to extend the strategy of fortifying content by encrypting formats to a bifurcated strategy with an infrastructuring surveillance approach to society. Their approach is comparable to the contemporary concept of proprietary media ecosystems, such as the Apple and Amazon device families, but with the small but decisive difference that they are targeting, surveilling, and policing potentially every user in digital culture. This makes the ongoing conflict between liveness formats, piracy, and infrastructure a highly political issue. While HBO uses legal action as a kind of pre-crime procedure to try to prevent copyright infringements before they actually happen, providers for cybersecurity no longer simply provide technical solutions, such as encrypted “fortress formats,” but also offer so-called forensic and intelligence services to hunt down piracy and secure the value chain. This includes measures like infiltrating private internet forums and other “intelligence services.” Instead of controlling the devices that enable the circulation of media formats, “active security” aims at policing culture and social processes as they are suspected to harbor potential criminal energy.

Conclusion: The Politics of Format Control

I have shown how perspectives change when film and media history is approached from an angle that looks at concepts of control that emerge on the level of standards, norms, and formats that facilitate and administer the circulation of media culture. This enables us to distinguish more precisely between different phases in film and media history with regard to the circulation and dissemination of media culture. Thus, it allows us to establish a broader perspective on how different concepts of control relate to and have an impact on culture and society. I have suggested thinking about cultural control not in an essential way but as a relational, ever-shifting concept that revolves around (a) the fortification of storage media and (b) attempts to control the infrastructure and distribution logistics necessary for media industries to thrive. These two ideal typical forms of control relate to the materiality and practices of media.

Harold Innis, who understood media as anything that enables communication or the logistics of goods, introduced a helpful concept to better understand the politics and administrative power of this bifurcated system of control. Innis argued that the capability of a medium to control time and space is determined by its form and materiality (Innis 1950). On a basic level he distinguishes between different media such as stone and paper, and how these media affect the abilities to exert administrative power over time and space. He argues that the materiality of each medium structures the process of circulation and the stability of the meaning engraved in that medium. This effects the way administrative power can be exerted over time and space. Here, he distinguishes between “time-biased” and “space-biased” media. The character of “time-biased” media, such as stone tablets, is linked to a sturdy materiality that remains stable over time (Innis 1951). While the meaning engraved into a stone tablet endures over time, its materiality hinders its circulation over distances. In contrast, “space-biased” media, such as paper or papyrus, are easy to circulate but lack the sturdy inner structure necessary to function as a storage medium that can transcend time.

In line with this distinction between “time-biased” and “space-biased” media, strategies of “fortification” can be understood as “time-biased” for their strong and durable character. These are centralized and proprietary media networks, such as early sports bulletin boards, theater television, and closed-circuit television, whose rigidly defined structures can be easily controlled. On the other hand, there are decentralized and weakly protected liveness formats, such as boxing films, encrypted pay-TV

systems, and streaming services. Here, control focuses on the distribution infrastructure. This latter strategy tends to dominate space, reaching beyond distinct formats and thus deeper into society and culture.

The contemporary situation seems to fall into the latter category. Durable, sturdy, and stable storage media are not the dominant structures of the digital network society; instead, approaches to contain and control uncertainty, which derive from an increasingly elusive digital infrastructure, are on the rise. The consequences for culture and society are severe, as such approaches are no longer bound to identifiable formats but abet strategies of control and legal frameworks that pathologize digital culture beyond commercial interests.

References

- Appadurai, Arjun. 1990. "Disjuncture and Difference in the Global Cultural Economy." *Theory, Culture, and Society* 7: 295–310.
- Barnouw, Erik. A. 1966. *Tower in Babel: A History of Broadcasting in the United States Volume 1 – to 1933*. New York: Oxford University Press.
- Coleman, G. S. 1927. Moving Picture Baseball Scoreboard. US Patent 1,616,304, filed December 1, 1924, and issued February 1, 1927.
- . 1924. Moving Picture Baseball Scoreboard. US Patent 1,507,583, filed October 27, 1922, and issued September 9, 1924.
- Comolli, Jean-Louis. 1969. "Le Détour par le Directe." *Cahiers du Cinéma* 209: 48–53; 211: 40–45.
- Daston, Lorraine J., and Peter Galison. 2007. *Objectivity*. New York: Zone Books.
- Diehl, Eric. 2012. *Securing Digital Video: Techniques for DRM and Content Protection*. Dordrecht: Springer.
- Digitalfernsehen. 2016. "Sky optimiert Verschlüsselungssystem." *Digitalfernsehen*. Accessed October 20, 2016. <http://www.digitalfernsehen.de/Sky-optimiert-Verschlüsselungssystem.139829.o.html>.
- Dommann, Monika. 2019. *Authors and Apparatus: A Media History of Copyright*. Ithaca, NY: Cornell University Press.
- Feuer, Jane. 1983. "The Concept of Live Television: Ontology as Ideology." In *Regarding Television: Critical Approaches—An Anthology*, edited by Anne E. Kaplan, 12–21. Los Angeles: University Publications of America.
- Galloway, Alexander R. 2004. *Protocol: How Control Exists after Decentralization*. Cambridge, MA: MIT Press.
- Gillespie, Tarleton. 2010. "The Politics of 'Platforms.'" *New Media and Society* 3 (12): 347–64.
- Gomery, Douglas. 1985. "Theatre Television: The Missing Link of Technological Change in the US Motion Picture Industry." *The Velvet Light Trap* 21: 54–61.
- Hagen, Wolfgang. 2005. *Das Radio: Zur Theorie und Geschichte des Hörfunks Deutschland/USA*. Munich: Fink 2005.
- Heider, Fritz. 1926. "Ding und Medium." *Symposion, Philosophische Zeitschrift für Forschung und Aussprache* 1: 109–57.
- Hilmes, Michele. 1997. *Radio Voices: American Broadcasting, 1922–1952*. Minneapolis: University of Minnesota Press.

- Hoof, Florian. 2015. "Live Sports, Piracy, and Uncertainty: Understanding Illegal Streaming Aggregation Platforms." In *Geoblocking and Global Video Culture*, edited by Ramon Lobato and Jonathan Meese, 86–93, Amsterdam: Institute of Network Cultures.
- Innis, Harold A. 1951. *The Bias of Communication*. Toronto: University of Toronto Press.
- . 1950. *Empire and Communications*. Oxford: Oxford University Press.
- Jenkins, Henry. 2006. *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press.
- Johns, Adrian. 2009. *Piracy: The Intellectual Property Wars from Gutenberg to Gates*. Chicago: University of Chicago Press.
- Jones, Loyd A. 1933. "A Historical Summary of Standardization in the Society of Motion Picture Engineers." *Journal of the Society of Motion Picture Engineers* 21 (4): 280–93.
- Kudelski Group. 2018. "Anti-Piracy Services." *Nagra Kudelski*, accessed October 12, 2018. <https://dtv.nagra.com/anti-piracy-services/>.
- . 2017. *Nagra Kudelski*, accessed December 4, 2017. <https://www.nagra.com>.
- Larkin, Brian. 2013. "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42: 327–43.
- Leacock, Richard. 2011. *The Feeling of Being There: A Filmmaker's Memoir*. Égreville: Semeion Éditions.
- Lessig, Lawrence. 2006. *Code: And other Laws of Cyberspace*. New York: Basic Books.
- Messner, Holger. 2013. *Pay-TV in Deutschland: Ein schwieriges Geschäftsmodell*. Wiesbaden: Springer VS.
- Miller, Toby, and Linda J. Kim. 2013. "It Isn't TV, It's the 'Real King of the Ring.'" In *The Essential HBO Reader*, edited by Jeffrey P. Johns and Gary R. Edgerton, 217–36. Lexington: The University Press of Kentucky.
- Oriard, Michael. 2004. *King Football: Sport and Spectacle in the Golden Age of Radio and Newsreels, Movies and Magazines, the Weekly and the Daily Press*. Chapel Hill: The University of North Carolina Press.
- O'Neil, Cathy. 2018. *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. New York: Random House.
- Parks, Lisa, and Nicole Starosielski, eds. 2015. *Signal Traffic: Critical Studies of Media Infrastructures*. Urbana: University of Illinois Press.
- Premiere. 2008. "Neue Premiere Verschlüsselung: Kriminelle Hacker sehen schwarz." *Info.sky.de*, accessed October 20, 2016. https://info.sky.de/inhalt/de/medienzentrum_news_uk_15042008.jsp.
- Popular Mechanics. 1941. "Theatre Audience Attends Fight by Television." *Popular Mechanics* 76 (3): 6.
- . 1924. "Every Move in Ball Game Is Shown on Screen." *Popular Mechanics* 59 (12): 966.
- Popular Science Monthly. 1924. "Lifelike Ball Games on the Screen." *Popular Science Monthly* 5 (105): 78.
- Radio News. 1941. "Big Image Television Demonstrated." *Radio News*, July.
- Roberts, Randy, and Andrew R. M. Smith. 2014. "Boxing: The Manly Art." In *Companion to American Sport History*, edited by Steven A. Riess, 271–91. Hoboken, NJ: John Wiley & Sons.
- Rossiter, Ned. 2016. *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares*. New York: Routledge.
- Schabacher, Gabriele. 2013. "Medium Infrastruktur: Trajektorien soziotechnischer Netzwerke in der ANT." *Zeitschrift für Medien- und Kulturforschung* 2: 129–48.
- Schubin, Mark. 2018. "Watching Remote Baseball Games before Television." *Proceedings of the IEEE* 106 (10): 1854–60.
- Sies, Luther F. 2008. "Sports." In *Encyclopedia of American Radio, 1920–1960*, 2nd ed., edited by Luther F. Sies, 633–36. Jefferson, NC: McFarland & Company.

- Squier, Georg O., Joseph O. Mauborgne, and Cohen Louis. 1927. Electric Signaling. US Patent 1,641,608, filed June 12, 1922, and issued September 6, 1927.
- Star, Susan L., and Karen Ruhleder. 1996. "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces." *Information Systems Research* 7: 111–34.
- Starosielski, N. (2015). *The Undersea Network*. Durham, NC: Duke University Press.
- Sterne, Jonathan. 2006. "The MP3 as Cultural Artifact." *New Media and Society* 8 (5): 825–42. doi: 10.1177/1461444806067737.
- . 2012. *MP3: The Meaning of a Format*. Durham, NC: Duke University Press.
- Streible, Dan. 2008. *Fight Pictures: A History of Boxing and Early Cinema*. Berkeley: University of California Press.
- Thompson, Nicolas. 2015. "Pirates Crash the Mayweather–Pacquiao Fight." *The New Yorker*, May 4. Accessed October 20, 2016. <http://www.newyorker.com/business/currency/pirates-crash-the-mayweather-pacquiao-fight>.
- United States District Court for the Central District of California, Case No. 2:15-cv-03147.
- Van Zile, Edward Sims. 1889. Bulletin Board and Base Ball Indicator. US Patent 402,700, filed December 14, 1888, and issued May 7, 1889.
- Vonderau, Patrick. 2014. "The Politics of Content Aggregation." *Television and New Media* 16 (8): 717–33.
- Warnke, Martin. 2013. "Databases as Citadels in the Web 2.0." In *Unlike Us Reader: Social Media Monopolies and their Alternatives*, edited by Geert Lovink and Miriam Rasch, 76–88. Amsterdam: Institute of Network Cultures.
- Wasson, Haidee. 2015. "Formatting Film Studies." *Film Studies* 12: 57–61.
- Weber, Max. 1949. *The Methodology of the Social Sciences*. Glencoe, IL: Free Press.
- Weick, Karl. 1985. "Sources of Order in Underorganized Systems: Themes in Recent Organizational Theory." In *Organizational Theory and Inquiry*, edited by Yvonna. S. Lincoln, 106–36. Beverly Hills, CA: Sage.
- White, J. Andrew. 1921. "Report: First Broadcast, Dempsey–Carpentier Fight," July 2, 1921, Box 1, David Sarnoff Papers (Accession 2464.55), Hagley Museum and Library, Wilmington, DE 19807.
- Winner, Langdon. 1980. "Do Artifacts Have Politics?" *Daedalus* 1 (109): 121–36.