Film Sound
THEORY AND PRACTICE

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INTRODUCTION

es, and sound recording techniques relates technology to industry practice and illustrates that relationship with specific examples from individual films.

Introducing an issue of Yale French Studies devoted to cinema sound, Rick Altman examines both the way in which criticism and theory has privileged image over sound and the extent that illusionism plays in the evolution of sound technology. Altman, technology and practice seek to create the impression that sound and image are one and that sound is produced by image when, in fact, they are separate from one another. At the same time, technological innovation is seen as motivated by a desire “to reduce all traces of the sound-work from the sound track.”

Similarly, in “Ideology and the Practice of Sound Editing and Mixing,” Mary Ann Doane relates the development of editing and mixing techniques to the attempts of bourgeois ideology to efface all signs of work. The “marriage” of sound and image, seen in various practices such as blooping and the use of unedited bridge cuts, conceals the fact that the sound track is inscribed, thus naturalizing the artifice that has gone into its production.

In “Technology and Aesthetics of Film Sound,” however, John Belton argues that this artifice can never be quite concealed. The work of effacement is never totally successful; it reveals itself, in a somewhat transformed state, in the aesthetics and stylistic practices that grow out of that work. For Belton, sound technology, no matter how transparent it becomes, inevitably reveals its own presence in the form of a consciousness that interrelates between the spectator and the original sound.

The Coming of Sound: Technological Change in the American Film Industry  DOUGLAS GOMERY

The coming of sound during the late 1920s climaxed a decade of significant change within the American industry. Following the lead of the innovators—Warner Bros. Pictures, Inc. and the Fox Film Corporation—all companies moved, virtually en masse, to convert to sound. By the autumn of 1930, Hollywood produced only talkies. The speed of conversion surprised almost everyone. Within twenty-four months a myriad of technical problems were surmounted, stages soundproofed, and theaters wired. Engineers invaded studios to coordinate sight with sound. Playwrights (from the East) replaced title writers; actors without stage experience rushed to sign up for voice lessons. At the time chaos seemed to reign supreme. However, with some historical distance, we know that, although the switchover to talkies seemed to come “overnight,” no major company toppled. Indeed the coming of sound produced one of the more lucrative eras in U.S. movie history. Speed of transformation must not be mistaken for disorder or confusion. On the contrary, the major film corporations—Paramount and Loew’s (MGM)—were joined by Fox, Warner Bros., and RKO in a surge of profits, instituting a grip on the marketplace which continues to the present day.

Moreover, sound film did not arrive Minerva-like on the movie screens of twenties America. Its antecedent reached back to the founding of the industry. We need a framework to structure this important thirty-year transformation. Here the neoclassical-economic theory of technical change proves very useful. An enterprise introduces a new product (or process of production) in order to increase profits. Simplified somewhat, three distinct phases are involved: invention, innovation, and diffusion. Although many small inventor/entrepreneurs attempted to many motion pictures and sound, it took two corporate giants, the American Telephone & Telegraph Corporation (AT&T) and the Radio Corporation of America (RCA), to develop the necessary technology. AT&T desired to make better phone equipment; RCA sought to improve its radio capabilities. As a secondary effect of such research, each perfected sound recording and reproduction equipment. With the inventions ready two movie companies, Warner Bros. and Fox, adapted telephone and radio research for practical use. That is, they innovated sound
movies. Each developed techniques to produce, distribute, and exhibit sound motion pictures. The final phase, diffusion, occurs when the product or process is adopted for widespread use. Initially, the movie industry giants hesitated to follow the lead of Warners and Fox but, after elaborate planning, decided to convert. All others followed. Because of the enormous economic power of the major firms, the diffusion proceeded quickly and smoothly. During each of the three phases, the movie studios and their suppliers of sound equipment formulated business decisions with a view toward maximizing long-run profit. This motivation propelled the American motion picture industry (as it had other industries) into a new era of growth and prosperity.

Attempts to link sound to motion pictures originated in the 1890s. Entrepreneurs experimented with mechanical means to combine phonograph and motion pictures. For example, in 1895, Thomas Alva Edison introduced such a device, his Kinetophone. He did not try to synchronize sound and image; the Kinetophone merely supplied a musical companion to which a customer listened as he or she viewed a "peep show." Edison’s crude novelty met with public indifference. Yet, at the same time, many other inventors attempted to better Edison's effort. One of these, Léon Gaumont, demonstrated his Chronophone before the French Photographic Society in 1902. Gaumont's system linked a single projector to two phonographs by means of a series of cables. A dial adjustment synchronized the phonograph and motion picture. In an attempt to profit by his system, Gaumont filmed variety (vaudeville) acts. The premiere came in 1907 at the London Hippodrome. Impressed, the American monopoly, the Motion Picture Patents Company, licensed Chronophone for the United States. Within one year Gaumont’s repertoire included opera, recitations, and even dramatic sketches. Despite initially bright prospects, Chronophone failed to secure a niche in the marketplace because the system, relatively expensive to install, produced only coarse sounds, lacked the necessary amplification, and rarely remained synchronized for long periods of time. In 1913, Gaumont returned to the United States for a second try with what he claimed was an improved synchronizing mechanism and an advanced compressed air system for amplification. Exhibitors remembered Chronophone's earlier lackluster performance, ignored all "advertised" claims, and Gaumont moved on to other projects.

Gaumont and Edison did not represent the only phonograph sound systems on the market. More than a dozen others, all introduced between 1909 and 1913, shared common systems and problems. Their only major rival was the Cameraphone, the invention of E. E. Norton, a former mechanical engineer with the American Gramophone Company. Even though in design the Cameraphone nearly replicated Gaumont’s apparatus, Norton succeeded in installing his system in a handful of theaters. But like others who preceded him, he never solved three fundamental problems: (1) the apparatus was expensive, (2) amplification could not reach all persons in a large hall, and (3) synchronization could not be maintained for long periods of time. In addition, since the Cameraphone system required a porous screen, the image retained a dingy gray quality. Therefore it was not surprising that Cameraphone (or Cinethea, Vivaphone, Synchroscope) could never be successfully innovated.

It remained for one significant failure to eradicate any further commercial attempt to marry the motion picture and the phonograph. In 1913, Thomas Edison announced the second coming of the Kinetophone. This time, the Magician of Menlo Park argued, he had perfected talking motion picture! Edison’s demonstration on January 4, 1913, impressed all present. The press noted this system seemed more advanced than all predecessors. Its sensitive microphone obviated traditional lip-sync difficulties for actors. An oversized phonograph supplied the maximum mechanical amplification. Finally an intricate system of belts and pulleys erected between the projection booth and the stage could precisely coordinate the speed of the phonograph with the motion picture projector.

Because of the success of the demonstration, Edison was able to persuade vaudeville magnates John J. Murdock and Martin Beck to install the Kinetophone in four Keith-Orpheum theaters in New York. The commercial premiere took place on February 13, 1913, at Keith’s Colonial. A curious audience first viewed and listened to a lecturer who praised Edison’s latest marvel. To provide dramatic evidence for his glowing tribute, the lecturer then smashed a plate, played the violin, and had his dog bark.

After several music acts (recorded on the Kinetophone), a chorale rendition of “The Star-Spangled Banner” stirringly closed the show. An enthusiastic audience stood and applauded for ten minutes. The wizard, Tom Edison, had done it again!

Unfortunately, this initial performance would rank as the zenith for Kinetophone. For a majority of later presentations, the system functioned badly—for a variety of technical reasons. For example, at Keith’s Union Square theater, the sound lost synchronization by as much as ten to twelve seconds. The audience booed the picture off the screen. By 1914, the Kinetophone had established a record so spotty that Murdock and Beck paid off their contract with Edison. Moreover, during that same year, fire destroyed Edison’s West Orange factory. Although he quickly rebuilt, Edison chose not to reactivate the Kinetophone operation. The West Orange fire not only marked the end of the Kinetophone but signaled the demise of all serious efforts to unite mechanically the phonograph with motion pictures. (The later disc system would use electronic connections.)
DOUGLAS GOMERY

American moviegoers had to wait nine years for another workable sound system to emerge—and when it did, it was based on the principle of sound on film, not on discs. On April 4, 1923, noted electronics inventor Lee De Forest successfully exhibited his Phonofilm system to the New York Electrical Society. De Forest asserted that his system simply photographed the voice onto an ordinary film. In truth, Phonofilm’s highly sophisticated design represented a major advance in electronics. But when De Forest patented the audion amplifier tube in 1907, two weeks later Phonofilm reached the public at large at New York’s Rivoli theater. The program consisted of three shorts: a ballerina performing a “swan dance,” a string quartet, and another dance number. Since the musical accomplishment for each was nonsynchronous, De Forest, whose brilliance shone in the laboratory rather than in showmanship or business, generated little interest. A New York Times reporter described a lukewarm audience response. No movie mogul saw enough of an advancement, given the repeated previous failures, to express more than a mild curiosity.

In fact, De Forest never wanted to work directly through a going motion picture concern, but instead to go it alone. Consequently legal and financial roadblocks continuously hindered substantial progress. De Forest tried, but he could not establish anywhere near an adequate organization to market films or apparatus. Movie entrepreneurs feared, correctly, that the Phonofilm Corporation controlled too few patents ever to guarantee indemnity. Still De Forest’s greatest difficulties came when he attempted to generate financial backing. This brilliant individualist failed to master the intricacies of the world of modern finance. Between 1923 and 1925, Phonofilm, Inc. wired only thirty-four theaters in the United States, Europe, South Africa, Australia, and Japan. De Forest struggled on, but in September 1928, when he sold out to a group of South African businessmen, only three Phonofilm installations remained, all in the United States.

It took American Telephone & Telegraph (AT&T), the world’s largest company, to succeed where others had failed. In 1912, AT&T’s manufacturing subsidiary, Western Electric, secured the rights to De Forest’s audion tube to construct amplification repeaters for long-distance telephone transmission. In order to test such equipment the Western Electric Engineering Department, under Frank Jewett, needed a better method to test sound quality. After a brief interruption because of World War I, Jewett and his scientists plunged ahead, concentrating on improving the disc method. Within three months of the armistice, one essential element for a sound system was ready, the loudspeaker. First used in the “Victory Day” parade on Park Avenue in 1919, national notoriety came during the 1920 Republican and Democratic national conventions. A year later, by connecting this technology to its long-distance telephone network AT&T broadcast President HARD-
sing agreement of 1926 AT&T and RCA contracted to exchange information on sound motion pictures, if and when required. Thus by 1926 AT&T had control over its own patents, as well as any RCA created.

Using its economic power and patent position, Western Electric moved to reap large rewards for its sound recording technology. As early as 1925 it had aroused enough interest to license the key phonograph and record manufacturers, Victor and Columbia. Movie executives proved more stubborn, so Western Electric hired an intermediary, Walter J. Rich. On May 27, 1925, Rich inked an agreement under which he agreed to exploit commercially the AT&T system for nine months.

Warner Bros. Pictures, Inc. would eventually be the company to innovate sound motion pictures. However, in 1925 Warners ranked low in the economic pecking order in the American film industry. Certainly brothers Harry, Albert, Sam, and Jack had come a long way since their days as nickelodeon operators in Ohio some two decades earlier. Yet in the mid-1920s their future seemed severely constrained. Warners neither controlled an international system for distribution nor owned a chain of first-run theaters. The brothers' most formidable rivals, Famous-Players (soon to be renamed Paramount), Loew's, and First National, did. Eldest brother Harry Warner remained optimistic and sought help.

In time Harry Warner met Waddill Catchings, a financier with Wall Street's Goldman Sachs. Catchings, boldest of the "New Era" Wall Street investors, agreed to take a flyer with this fledgling enterprise in the most speculative of entertainment fields. Catchings correctly reasoned the consumer-oriented 1920s economy would provide a fertile atmosphere for boundless growth in the movie field. And Warner Bros. seemed more progressive than other companies. The four brothers maintained strict cost accounting and budget controls, and seemed to have attracted more than competent managerial talent. Catchings agreed to finance Warners, only if it followed his master plan. The four brothers, sensing they would find no better alternative, readily agreed.

During the spring of 1925, Harry Warner, president of Warner Bros., formally appointed Waddill Catchings to the board of directors, and elevated him to chairman of the board's finance committee. Catchings immediately established a $3 million revolving credit account through New York's National Bank of Commerce. Although this bank had never loaned a dollar to a motion picture company, not even the mighty Paramount, Catchings possessed enough clout to convince president James S. Alexander that Warners would be a good risk. Overnight Warner Bros. had acquired a permanent source for financing future productions. Simultaneously Warners took over the struggling Vitagraph Corporation, complete with its network of fifty distribution exchanges throughout the world. In this deal Warners also gained the pioneer company's two small studios, processing laboratory, and extensive film library. Finally, with another $4 million that Catchings raised through bonds, Warner Bros. strengthened its distribution system, and even launched a ten-theater chain. Certainly by mid-1925, Warners was becoming a force to be reckoned with in the American movie business.

Warner's expansionary activities set the stage for the coming of sound. At the urging of Sam Warner, who was an electronics enthusiast, the company established radio station KFWB in Hollywood to promote Warner Bros. films. The equipment was secured from Western Electric. Soon Sam Warner and Nathan Levinson, Western's Los Angeles representative, became fast friends. Until then, Walter J. Rich had located no takers for Western Electric's sound inventions. Past failures had made a lasting and negative impression on the industry leaders, a belief shared by Harry Warner. Consequently, Sam had to trick his older brother into even attending a demonstration. That screening, in May 1925, included a recording of a five-piece jazz band. Quickly Harry and other Warner Bros. executives reasoned as follows. If Warner Bros. could equip its newly acquired theaters with sound and present vaudeville acts as part of their programs, it could successfully challenge the Big Three. Then, even Warners' smallest house could offer (1) famous vaudeville acts (on film), (2) silent features, and (3) the finest orchestral accompaniments (on disc). Warners, at this point, never considered feature-length talking pictures, only singing and musical films.

Catchings endorsed such reasoning and gave the go-ahead to open negotiations with Walter J. Rich. On June 25, 1925, Warner Bros. signed a letter of agreement with Western Electric calling for a period of joint experimentation. Western Electric would supply the engineers and sound equipment; Warner Bros. the camera operators, the editors, and the supervisory talent of Sam Warner. Work commenced in September 1925 at the old Vitagraph studio in Brooklyn. Meanwhile, Warner Bros. continued to expand under Waddill Catching's careful guidance. Although feature film output was reduced, more money was spent on each picture. In the spring of 1926, Warner Bros. opened a second radio station and an additional film-processing laboratory, and further expanded its foreign operations. As a result of this rapid growth, the firm expected the $1 million loss on its annual income statement issued in March 1926.

By December 1925, experiments were going so well that Rich proposed forming a permanent sound motion picture corporation. The contracts were prepared and the parties readied to sign, but negotiations ground to a halt as Western Electric underwent a management shuffle. Western placed John E. Otterson, an Annapolis graduate and career Navy officer, in charge of exploiting nontechnical inventions. Otterson possessed nothing but contempt for Warner Bros. He wanted to secure contracts with industry giants
Paramount and Loew's, and then take direct control himself. Hitherto, Western Electric seemed content to function as a supplier of equipment. Catchings saw this dictatorial stance as typical of a man with a military background unable to adjust to the world of give-and-take in modern business and finance. Unfortunately for Warner Bros., AT&T's corporate muscle backed Otterson's demands.

Only by going over Otterson's head to Western Electric's president, Edgar S. Bloom, was Catchings able to protect the interests of Warner Bros. and secure a reasonable contract. In April 1926, Warner Bros., Walter J. Rich, and Western Electric formed the Vitaphone Corporation to develop sound motion pictures further. Warners and Rich furnished the capital. Western Electric granted Vitaphone an exclusive license to record and reproduce sound movies on its equipment. In return, Vitaphone agreed to lease a minimum number of sound systems each year and pay a royalty fee of 8 percent of gross revenues from sound motion pictures. Vitaphone's total equipment commitment became twenty-four hundred systems in four years.

As Variety and the other trade papers announced the formation of the alliance, Vitaphone began its assault on the marketplace. Its first goal was to acquire talent. Vitaphone contracted with the Victor Talking Machine Company for the right to bargain with its popular musical artists. A similar agreement was reached with the Metropolitan Opera Company. Vitaphone dealt directly with vaudeville stars. In a few short months it had contracted for the talent to produce the musical short subjects Harry Warner had envisioned. So confident was Vitaphone's management that the firm engaged the services of the New York Philharmonic orchestra. Throughout the summer of 1926, Sam Warner and his crew labored feverishly to ready a Vitaphone program for a fall premiere, while the Warner publicity apparatus cranked out thousands of column inches for the nation's press.

Vitaphone unveiled its marvel on August 6, 1926, at the Warner theater in New York. The first-nighters who packed the house paid up to $10 for tickets. The program began with eight "Vitaphone Preludes." In the first, Will Hays congratulated the brothers Warner and Western Electric for their pioneering efforts. At the end, to create the illusion of a stage appearance, Hays bowed to the audience, anticipating their applause. Next conductor Henry Hadley led the New York Philharmonic in the overture to Tannhäuser. He too bowed. The acts that followed consisted primarily of operatic and concert performances: tenor Giovanni Martinelli offered an aria from Pagliacci, violinist Mischa Elman played "Humoresque," and soprano Anna Case sang, supported by the Metropolitan Opera Chorus. Only one "prelude" broke the serious tone of the evening and that featured Roy Smeck, a popular vaudeville comic-musician. Warners, playing it close to the vest, sought approval from all bodies of respectable critical opinion. The silent feature Don Juan followed a brief intermission. The musical accompaniment (sound-on-disc) caused no great stir because it "simply replaced" an absent live orchestra. All in all, Vitaphone, properly marketed, seemed to have a bright future.

That autumn the Don Juan package played in Atlantic City, Chicago, and St. Louis. Quickly Vitaphone organized a second program, but this time aimed at popular palates. The feature, The Better 'Ole, starred Charlie Chaplin's brother, Sydney. The shorts featured vaudeville "headliners" George Jessel, Irving Berlin, Elsie Janis, and Al Jolson. These performers would have charged more than any single theater owner could have afforded, if presented live. The trade press now began to see bright prospects for the invention that could place so much high-priced talent in towns like Akron, Ohio, and Richmond, Virginia. By the time Vitaphone's third program opened in February 1927, Warners had recorded fifty more acts.

As a result of the growing popularity of Vitaphone presentations, the company succeeded in installing nearly a hundred systems by the end of 1926. Most of these were located in the East. The installation in March 1927 of apparatus in the new Roxy theater and the attendant publicity served to spur business even more. Consequently, the financial health of Warner Bros. showed signs of improvement. The corporation had invested over $3 million in Vitaphone alone, yet its quarterly losses had declined from about $334,000 in 1925 to less than $110,000 in 1926. It appeared that Catchings's master plan was working.

John Otterson remained unsatisfied. He sought to take control of Vitaphone so that Western Electric could deal directly with Paramount and Loew's. To accomplish this he initiated a harassment campaign by raising prices on Vitaphone equipment fourfold, and demanding a greater share of the revenues. By December 1926, Western Electric and Warner Bros. had broken off relations. Simultaneously, Otterson organized a special Western Electric subsidiary called Electrical Research Products, Inc. (ERP), to conduct the company's nontelephone business—over 90 percent of which concerned motion picture sound equipment.

Realistically Warners, even with Catchings's assistance, could not prevent Otterson from talking with other companies—even though exclusive rights were contractually held by Warners. However, only Fox would initiate an agreement. The majors adopted a wait-and-see stance. In fact, the five most important companies—Loew's (MGM), Universal, First National, Paramount, and Producers Distributing Corporation—signed an accord in February 1927 to act together in regard to sound. The "Big Five Agreement," as it was called, recognized that since there were several sound systems on the market, inability to interchange this equipment could hinder wide distribution of pictures and therefore limit potential profits. These companies agreed
to adopt jointly only the system that their specially appointed committee would certify, after one year of study, was the “best” for the industry. As further protection, they would employ no system unless it was made available to all producers, distributors, and exhibitors on “reasonable” terms.

Otterson needed to wrest away Warners’ exclusive rights if he ever hoped to strike a deal with the Big Five. To this end, he threatened to declare Warners in default of its contractual obligations. Catchings, knowing such public statements would undermine his relations with the banks, persuaded Warner Bros. to accede to Otterson’s wishes. In April 1927, ERPI paid Vitaphone $1,322,306 to terminate the old agreement. In May, after the two signed the so-called New License Agreement, Vitaphone, like Fox, became merely a licensee of ERPI. Warner Bros. had given up the exclusive franchise to exploit ERPI sound equipment and lost its share of a potential fortune in licensing fees.

Now on its own, Warners immediately moved all production to several new sound stages in Hollywood. While the parent company continued with its production program of silent features, Vitaphone regularly turned out five shorts a week, which became known in the industry as “canned vaudeville.” Bryan Foy, an ex-vaudeville and silent film director, now worked under Sam Warner to supervise the sound short subject unit. At this juncture, Vitaphone’s most significant problem lay in a dearth of exhibition outlets for movies with sound. By the fall of 1927, ERPI had installed only forty-four sound systems in the six months since the signing of the New License Agreement. ERPI was holding back on its sales campaign until the majors made a decision. Warner Bros. would later charge that ERPI had not used its best efforts to market the equipment and had itself defaulted. This accusation and others were brought to arbitration and, in a 1934 settlement, ERPI was forced to pay Vitaphone $5 million.

As the 1927–28 season opened, Vitaphone began to add new forms of sound films to its program. Though The Jazz Singer premiered on October 6, 1927, to lukewarm reviews, its four Vitaphoned segments of Al Jolson’s songs proved very popular. Vitaphone contracted with Jolson immediately to make three more films for $100,000. (The four Warner brothers did not attend The Jazz Singer’s New York premiere because Sam Warner died in Los Angeles on October 5. Jack Warner took over Sam’s position as head of Vitaphone production.) Bryan Foy pushed his unit to create four new shorts each week, becoming more bold in programming strategies. On December 4, 1928, Vitaphone released the short My Wife’s Gone Away, a 10-minute, all-talking comedy based on a vaudeville playlet developed by William Demarest. Critics praised this short; audiences flocked to it. Thus Foy, under Jack Warner’s supervision, began to borrow even more from available vaudeville acts and “playlets” to create all-talking shorts. During Christmas week, 1927, Vitaphone released a 20-minute, all-talking drama, Solomon’s Children. Again revenues were high, and in January 1928 Foy moved to schedule production of two all-talking shorts per week.

Warner Bros. had begun to experiment with alternative types of shorts as a cheap way to maintain the novelty value of Vitaphone entertainment. Moreover, with such shorts it could develop talent, innovate new equipment, and create an audience for feature-length, all-sound films. In the spring of 1928, with the increased popularity of these shorts, Warner Bros. began to change its feature film offerings. On March 14, 1928, it released Tenderloin—an ordinary mystery that contained five segments in which the actors spoke all their lines (for 12 of the film’s 85 minutes). More part-talkies soon followed that spring.

Harry Warner and Waddill Catchings knew the investment in sound was a success by April 1928. By then it had become clear that The Jazz Singer show had become the most popular entertainment offering of the 1927–28 season. In cities that rarely held films for more than one week The Jazz Singer package set records for length of run: for example, five-week runs in Charlotte, North Carolina; Reading, Pennsylvania; Seattle, Washington; and Baltimore. By mid-February 1928 The Jazz Singer and the shorts were in a (record) eighth week in Columbus, Ohio, St. Louis, and Detroit, and in a (record) seventh week in Seattle, Portland, Oregon, and Los Angeles. The Roxy even booked The Jazz Singer package for an unprecedented second run in April 1928, where it grossed in excess of $100,000 each week, among that theater’s best grosses for that season. Perhaps more important, all these first-run showings did not demand the usual expenses for a stage show and orchestra. It took Warner Bros. only until the fall of 1928 to convert to the complete production of talkies—both features and shorts. Catchings and Harry Warner had laid the foundation for this maximum exploitation of profit with their slow, steady expansion in production and distribution. In 1929 Warner Bros. would become the most profitable of any American motion picture company.

As noted above, only the Fox Film Corporation had also shown any interest in sound movies. Its chief, William Fox, had investigated the sound-on-film system developed by Theodore W. Case and Earl I. Sponable and found it to be potentially a great improvement over the cumbersome Western Electric disc system. Theodore Case and Earl Sponable, two recluse scientists, worked in a private laboratory in upstate New York. In 1913 the independently wealthy, Yale-trained physicist Case established a private laboratory in his hometown of Auburn, New York, a small city near Syracuse. Spurred on by recent breakthroughs in the telephone and radio fields, Case, and his assistant Sponable, sought to better the audion tube. In 1917 they perfected the Thalofide Cell, a highly improved vacuum tube, and be-
gan to integrate this invention into a system for recording sounds. As part of this work, Case met Lee De Forest. For personal reasons—envy perhaps—Case turned all his laboratory's efforts to besting De Forest. Within eighteen months Case Labs produced an improved sound-on-film system, based on the Thalofide Cell. Naively, De Forest had openly shared with Case all his knowledge of sound-on-film technology. So as De Forest unsuccessfully attempted to market his Phonofilm system, Case quietly constructed—with his own funds—a complete sound studio and projection room adjacent to his laboratory.

In 1925 Case determined he was ready to try to market his invention. Edward Craft of Western Electric journeyed to Auburn, and saw and heard a demonstration film. Craft left quite impressed. But after careful consideration, he and Frank Jewett decided that Case's patent did not add any substantial improvement to the Western Electric sound-on-disc system, then under exclusive contract to Warner Bros. Rebuffed, Case decided to solicit a show business entrepreneur directly. He first approached John J. Murdock, the long-time general manager of the Keith-Albee vaudeville circuit. Case argued that his sound system could be used to record musical and comedy acts—the same idea Harry Warner had conceived of six months earlier. Murdock blanched. He had been burned by Edison's hyperbole only a decade earlier, and by De Forest a mere twenty-four months before. Keith-Albee would never be interested in talking movies! Executives from all the “Big Three” motion picture corporations, Paramount, Loew's (MGM), and First National, echoed Murdock's response. None saw the slightest benefit in this latest version of sight and sound.

Case moved to the second tier of the U.S. film industry—Producers Distributing Company (PDC), Film Booking Office (FBO), Warner Bros., Fox, and Universal. In 1926 Case signed with Fox because Courtland Smith, president of Fox Newsreel, reasoned that sound newsreels could push that branch of Fox Film to the forefront of the industry. In June 1926 Smith arranged a demonstration for company owner, founder, and president William Fox. The boss was pleased, and within a month helped create the Fox-Case Corporation to produce sound motion pictures. Case turned all patents over to the new corporation, and retired to his laboratory in upstate New York.

Initially, William Fox's approval of experiments with the Case technology constituted only a small portion of a comprehensive plan to thrust Fox Film into a preeminent position in the motion picture industry. Fox and his advisers had initiated an expansion campaign in 1925. By floating $6 million of common stock, they increased budgets for feature films and enlarged the newsreel division. (Courtland Smith was hired at this point.) Simultaneously Fox began building a chain of motion picture theaters. At that time Fox Film controlled only twenty small neighborhood houses in the New York City environs. By 1927 the Fox chain included houses in Philadelphia, Washington, D.C., Brooklyn, New York City, St. Louis, Detroit, Newark, Milwaukee, and a score of cities west of the Rockies. To finance these sizable investments, William Fox developed close ties to Harold Stuart, president of the Chicago investment house of Halsey Stuart. Meanwhile, Courtland Smith had assumed control of Fox-Case, and, in 1926, initiated the innovation of the Case sound-on-film technology. At first all he could oversee were defensive actions designed to protect Fox-Case's patent position. In September 1926, exactly two months after incorporation, Fox-Case successfully thwarted claims by Lee De Forest and a German concern, Tri-Ergon. For the latter, Fox-Case advanced $50,000 to check the potential of future court action.

At last Fox-Case could assault the marketplace. Although Smith pushed for immediate experimentation with sound newsreels, William Fox, conservatively, ordered Fox-Case to imitate the innovation strategy of Warners and film popular vaudeville acts. On February 24, 1927, Fox executives felt confident enough to stage a widely publicized demonstration of the newly christened Movietone system. At 10:00 in the morning fifty reporters entered the Fox studio near Times Square, and were filmed using the miracle of Movietone. Four hours later these representatives of the press corps saw and heard themselves as part of a private screening. In addition, Fox-Case presented several vaudeville sound shorts: a banjo and piano act, a comedy sketch, and three songs by the then popular cabaret performer, Raquel Meller. The strategy worked. Unanimous favorable commentary issued forth; the future seemed bright. Consequently, William Fox ordered sound systems for twenty-six of Fox's largest, first-run theaters, including the recently acquired Roxy.

However, by this time Warners had signed nearly all popular entertainers to exclusive contracts. Smith pressed William Fox again to consider newsreels with sound. Then, Smith argued, Fox Film could offer a unique, economically viable alternative to Warner Bros. presentations, and move into a heretofore unoccupied portion of the market for motion picture entertainment. Furthermore, sound newsreels would provide a logical method by which Fox-Case could gradually perfect necessary new techniques of camerawork and editing. Convinced, William Fox ordered Smith to adopt this course for technological innovation. This decision would prove more successful for Fox Film's overall goal of corporate growth than either William Fox or Courtland Smith imagined at the time.

Smith moved quickly. The sound newsreel premiere came on April 30, 1927, at the Roxy in the form of a four-minute record of marching West Point cadets. And despite the lack of any buildup, this newsreel elicited
an enthusiastic response from the trade press and New York-based motion picture reviewers. Quickly Smith seized upon one of the most important symbolic news events of the 1920s. At 8:00 A.M. on May 20, 1927, Charles Lindbergh departed for Paris. That evening Fox Movietone News presented footage of the takeoff—with sound—to a packed house at the Roxy theater. Six thousand persons stood and cheered for nearly ten minutes. The press saluted this new motion picture marvel and noted how it had brought alive the heroics of the “Lone Eagle.” In June, when Lindbergh returned to a tumultuous welcome in New York City and Washington, D.C., Movietone News cameramen also recorded portions of those celebrations. Both William Fox and Courtland Smith were now satisfied that the Fox-Case system had been launched onto a propitious path.

That summer Smith dispatched camera operators to all parts of the globe. They recorded the further heroics of aviators, beauty contests, and sporting events, as well as the earliest filmic records of statements by Benito Mussolini and Alfred Smith. Newspaper columnists, educators, and other opinion leaders lauded these latter short subjects for their didactic value. Fox Film’s principal constraint now became a paucity of exhibition outlets. During the fall of 1927, Fox Film did make Movietone newsreels the standard in all Fox-owned theaters, but that represented less than 3 percent of the potential market. More extensive profits would come as Fox Film formed a larger chain of first-run theaters. In the meantime Courtland Smith established a regular pattern for release of Movietone newsreels, one ten-minute reel per week. He also increased the permanent staff and established a worldwide network of stringers.

In addition Smith and William Fox decided again to try to produce vaudeville shorts, as well as silent features filmed by synchronized music on disc. Before 1928, Fox-Case released only one scored feature, Sunrise. (Two earlier features, Seventh Heaven and What Price Glory?, were rereleased with synchronized musical scores.) The two executives moved quickly. By January 1928 Fox had filmed ten vaudeville shorts and a part-talkie feature, Blossom Time. During the spring of 1928 these efforts, Fox’s newsreels, and Warners’ shorts and part-talkies proved to be the hits of the season. Thus in May 1928 William Fox declared that 100 percent of the upcoming production schedule would be “Movietoned.” Simultaneously Fox Film continued to wire, as quickly as possible, all the houses in its ever-expanding chain, and draw up plans for an all-sound Hollywood-based studio. Fox’s innovation of sound neared completion; colossal profits loomed on the horizon.

Only the Radio Corporation of America (RCA) offered Warner Bros., Western Electric, or Fox any serious competition. In 1919 General Electric and Westinghouse had created RCA to control America’s patents for radio broadcasting. Like rival AT&T, GE conducted fundamental research in radio technology. The necessary inventions for what would become RCA’s Photophone sound-on-film system originated when, during World War I, the U.S. Navy sought a high-speed recorder of radio signals. GE scientist Charles A. Hoxie perfected such a device. After the war, Hoxie pressed to extend his work. Within three years, having incorporated a photoelectric cell and a vibrating mirror, he could record a wide variety of complex sounds. In December 1921 GE executives labeled the new invention the Pallo-Photophone.

To test it, Willis R. Whitney, head of the GE Research Laboratory, successfully recorded speeches by Vice-President Calvin Coolidge and several Harding Administration Cabinet members. At this point GE executives conceived of the Pallo-Photophone as a marketable substitute for the phonograph. During 1922 and 1923, Hoxie and his assistants continued to perfect the invention. For example, they discovered that the recording band need not be 35mm wide. A track as narrow as 1.5mm proved sufficient, and thus freed sound to accompany a motion picture image. Simultaneously other GE scientists, Chester W. Rice and Edward W. Kellogg, developed a new type of loudspeaker to improve reception for the radio sets General Electric manufactured for RCA. Late in 1922, Whitney learned of Lee De Forest’s efforts to record sound on film. Not to be outdone, Whitney ordered Hoxie and his research team to develop a sound reproducer that could be attached to a standard motion picture projector. In November 1923 Hoxie demonstrated such a system for GE’s top executives in an almost perfect state. However by that time Whitney and his superiors sensed that De Forest’s failure to innovate sound motion pictures proved no market existed for Hoxie’s invention. Whitney promptly transferred all efforts toward the development of a marketable all-electric phonograph. GE successfully placed its new phonograph before the public during the summer of 1925.

One year later, because of Warners’ success, Whitney reactivated the sound movie experiments. At this point he christened the system “Photophone.” By the end of that year, 1926, GE’s publicity department had created several experimental short subjects. Quickly GE executives pondered how to approach a sales campaign. However, before they could institute any action, Fox sought a license in order to utilize GE’s amplification patents. Contemplating the request, David Sarnoff, RCA’s general manager, convinced his superiors at GE that RCA should go out on its own, sign up the large movie producers, Paramount and Loew’s, and not worry about Fox. The GE high brass agreed and assigned Sarnoff the task of commercially exploiting GE’s sound movie patents.

Sarnoff easily convinced Paramount and Loew executives seriously to consider RCA’s alternative to Western Electric’s then monopoly, even
though RCA had yet to demonstrate Photophone publicly. Presently the “Big Five Agreement” was signed. Sarnoff immediately went public. On February 2, 1927, Sarnoff demonstrated Photophone for the press and invited guests at the State theater in GE’s home city of Schenectady, New York. Musical short subjects featuring a 100-piece orchestra impressed all present. Nine days later Sarnoff recreated the event for more reporters at New York’s Roxy theater. Here two reels of MGM’s *Flesh and the Devil* were accompanied by a Photophone recording of the Capitol theater orchestra. Then three shorts featured the Van Curler Hotel Orchestra of Schenectady, an unnamed baritone, and a quartet of singers recruited from General Electric employees. A New York Times reporter praised the synchronization, volume, and tone. Sarnoff, in turn, lauded Photophone’s ease of installation and simplicity of operation.

In private, Sarnoff tried to convince the producers’ committee of his company’s technical and financial advantages. The producers had established three specific criteria for selection: (1) the equipment had to be technically adequate, (2) the manufacturer had to control all required patents, and (3) the manufacturer had to have substantial resources and financial strength. Only two systems qualified: RCA’s Photophone and Western Electric’s Vitaphone. At first, the producers favored RCA because it had not licensed any movie concern, whereas Western Electric had formal links to Warners and Fox. In October 1927 Sarnoff proposed an agreement which called for a holding company, one-half owned by RCA and one-half by the five motion picture producers. All of GE’s sound patents would be vested in this one corporation. Sarnoff demanded 8 percent of all gross revenues from sound movies as a royalty. The producers countered. They sought individual licenses and fees set at $500 per reel. For a typical 8-reel film (90 minutes) with gross revenues of $500,000, the 8 percent royalty would be $40,000; at the new rate the amount came to $4,000, a savings of $36,000.

Sarnoff reluctantly acceded to the per reel method of royalty calculation, but stubbornly refused to grant individual licenses. On the other hand, the motion picture corporations held fast to their belief that they should have no role in the manufacture of the apparatus. Each wanted only a license to produce and distribute sound films. For two months the two parties stalemated over this issue. Late in November 1927 John Otterson of Western Electric stepped forward and offered individual licenses. Western Electric’s engineers had made great progress with their sound-on-film system, and there no longer existed exclusive ties to Warner Bros. Consequently, in March 1928 the movie producers, with all the relevant information in hand, selected Western Electric. Each producer—Paramount, United Artists, Loew’s, and First National—secured an individual license and would pay $500 per reel of negative footage. All four signed on May 11, 1928. Universal, Columbia, and other companies quickly followed. The movie producers had adroitly played the two electrical giants against each other and secured reasonably favorable terms.

Sarnoff reacted quickly as the tide turned toward Western Electric. First General Electric purchased (for nearly one-half million dollars) 14,000 shares of stock of the Film Booking Office (FBO) from a syndicate headed by Joseph P. Kennedy. This acquisition guaranteed Photophone a studio outlet. FBO was the only producer with national distribution which was not linked in talks with Western Electric. Next Sarnoff formed RCA Photophone, Inc. Sarnoff now controlled production facilities and the necessary sound technology. To generate significant profits, RCA needed a chain of theaters.

In 1928, the Keith-Albee vaudeville circuit controlled such a chain. Faced with declining business in vaudeville, Keith-Albee executives developed two approaches. First, they took over the Orpheum vaudeville chain, and thus merged all major American vaudeville under one umbrella. The new Keith-Albee-Orpheum controlled two hundred large downtown theaters. Second, Keith-Albee acquired a small movie company, Pathé, just to hedge its bets. When Sarnoff approached the owners of the new Keith-Albee-Orpheum they were more than ready to sell. Sarnoff quickly moved to consolidate his empire. FBO and Pathé formally acquired licenses for Photophone. FBO and Pathé executives supervised the addition of music-on-film to three features, *King of Kings*, *The Godless Girl*, and *The Perfect Crime*. Upcoming sound newsreels and vaudeville shorts were promised. However, these films would be useless unless Sarnoff could wire the Keith-Albee-Orpheum theaters with Photophone equipment. Warner Bros., Fox, and Western Electric had taken almost two years to eliminate all the problems of presenting clear sounds of sufficient volume in large movie palaces. As of this point Photophone had yet to be tested in a commercial situation. And Sarnoff and his staff would need at least six months to iron out technological problems. Promised first in April, then July, commercial installations commenced in October 1928. In the meantime, Sarnoff used a low installation price and sweeping prognostications of future greatness to persuade a shrinking number of prospective clients to wait for Photophone equipment.

That October Sarnoff legally consolidated RCA’s motion picture interests by creating a holding company, Radio-Keith-Orpheum (RKO). Sarnoff became president of the film industry’s newest vertically integrated combine. The merger united theaters (Keith-Albee-Orpheum), radio (NBC), and motion pictures (FBO and Pathé, subsequently renamed Radio Pictures in May 1929). Although late on the scene, RCA had established a secure place in the motion picture industry. RKO released its first talkies in the spring
of 1929, and Photophone could battle Western Electric for contracts with the remaining unwired houses. Gradually during the 1930s RCA Photophone would become as widely accepted as Western Electric's system.

The widespread adoption of sound—the diffusion—took place quickly and smoothly, principally because of the extensive planning of the producers' committee. Since an enormous potential for profits existed, it was incumbent on the majors to make the switchover as rapidly as possible. Paramount released its first films with musical accompaniment in August 1928; by September its pictures contained talking sequences; and by January 1929 it sent out its first all-talking production. By May, one year after signing with ERPI, Paramount produced talkies exclusively and was operating on a level with Warners and Fox. In September 1929, MGM, Fox, RKO, Universal, and United Artists completed their transitions. Those independent production companies which survived took, on average, one year longer.

Elaborate plans had been laid by the industry to facilitate diffusion. In Hollywood, the Academy of Motion Picture Arts and Sciences was designated as a clearinghouse for information relating to production problems. The local film boards of trade handled changes in distribution trade practices. And a special lawyers' committee representing the major producers was appointed to handle disputes and contractual matters with equipment manufacturers. For example, when ERPI announced a royalty hike, the committee initiated a protest, seeking lower rates. Unions presented no difficulties. The American Federation of Musicians unsuccessfully tried to prevent the wholesale firing of theatrical musicians; Actors' Equity, now that professionals from the Broadway stage began to flock West, failed to establish a union shop in the studios. All problems were resolved within a single year; the industry never left an even keel.

ERPI's task all the while was to keep up with the demand for apparatus. It wired the large, first-run theaters first and then, as equipment became available, subsequent-run houses. Installations were made usually from midnight to nine in the morning. For example, in January 1930, ERPI installed more than nine systems each day. To facilitate the switchover, Western Electric expanded its Hawthorne, Illinois, plant, and ERPI established training schools for projectionists in seventeen cities and opened fifty district offices to service and repair equipment. Many smaller theaters, especially in the South and Southwest, could not afford ERPI's prices and signed with RCA, or De Forest. As late as July 1930, fully 22 percent of all U.S. theaters still presented silent versions of talkies. That figure neared zero two years later.

The public's infatuation with sound ushered in another boom period for the industry. Paramount's profits jumped $7 million between 1928 and 1929, Fox's $3.5 million, and Loew's $3 million. Warner Bros., however, set the record; its profits increased $12 million, from a base of only $2 million. A 600 percent leap! Conditions were ripe for consolidation, and Warner Bros., with its early start in sound, set the pace. It began by acquiring the Stanley Company, which owned a chain of three hundred theaters along the East Coast, and First National. In 1925, when Waddill Catchings joined the Warner Bros. board of directors, the company's assets were valued at a little over $5 million; in 1930 they totaled $230 million. In five short years, Warner Bros. had become one of the largest and most profitable companies in the American film industry.

Not content merely to establish RKO, David Sarnoff of RCA set out to sever all connections with General Electric and Westinghouse and acquire sound manufacturing facilities of his own. The first step in this direction was the acquisition in March 1929 of Victor Talking Machine Company and its huge plant in Camden, New Jersey. In the process, RCA secured Victor's exclusive contracts with many of the biggest stars in the musical world. By December 1929 Sarnoff had reached his goal. RCA was now a powerful independent entertainment giant with holdings in the broadcasting, vaudeville, phonograph, and motion picture industries.

William Fox had the most grandiose plan of all. In March 1929 he acquired controlling interest in Loew's, Inc., the parent company of MGM. Founder Marcus Loew had died in 1927, leaving his widow and sons one-third of the company's stock. Nicholas Schenck, the new president, pooled his stock and that belonging to corporate officers with the family's and sold out to Fox at 25 percent above the market price. The new Fox-Loew's merger created the largest motion picture complex in the world. Its assets totaled more than $200 million and an annual earning potential existed of $20 million. William Fox assumed a substantial short-term debt obligation in the process, but during the bull market of the late twenties he could simply float more stock and bonds to meet his needs.

Adolph Zukor, meanwhile, added more theaters, bringing Paramount's total to almost one thousand. He also acquired a 49 percent interest in the Columbia Broadcasting System. Then, in the fall of 1929, he proposed a merger with Warner Bros. that would create a motion picture and entertainment complex larger than Fox-Loew's and RCA combined. Catchings and Harry Warner were agreeable, but the new U.S. Attorney General, William D. Mitchell, raised the red flag. If that merger went through, the industry would have been dominated by three firms. As it happened, though, it was to be dominated by five. After the stock market crash, William Fox was unable to meet his short-term debts and had to relinquish ownership of Loew's. The oligopolistic structure of the industry, now formed by Warner Bros., Paramount, Fox, Loew's, and RKO, would continue to operate well into the 1950s. The coming of sound had produced important forces for in-
industry consolidation, immediately prior to the motion picture industry's first crisis of retrenchment—the Great Depression.

Bibliographical Note

This article is based on a series of articles I wrote between 1976 and 1980. I refer the reader to the appropriate journal or book.


A complete set of my publications on the coming of sound can be found in Claudia Gorbman, "Bibliography on Sound in Film," Yale French Studies, no. 60 (Winter 1980): 276–77. On other matters, persons should consult my earliest work, "The Coming of Sound to the American Cinema: The Transformation of an Industry," Ph.D. dissertation, University of Wisconsin—Madison, 1975. It should be noted that for nearly all questions the dissertation serves as only a base for the later articles.

Economic Struggle and Hollywood Imperialism: Europe Converts to Sound

DOUGLAS GOMERY

The coming of sound to world cinema has precipitated many important studies of its aesthetic, social, and cultural effects. Surprisingly, there exists very little systematic analysis of the consequences of this technological change for international trade of motion pictures. Film distribution presents few problems within a single nation; international commerce is not nearly so simple. Examining prior work for trade among the United States, United Kingdom, France, and Germany, one finds three types of analysis. First, textbooks tell of world domination (and exploitation) by Hollywood, the success of film production in Britain in 1933, the disastrous effect of the world depression in France, and the rise of Hitler (and Goebbels) in Germany. No connections are made; the coming of sound simply happens. Recent work makes stronger claims. On the one hand Thomas Guback examines the U.S. film industry's expansion into and takeover of European markets after World War I. By 1925 Hollywood products accounted for 95 percent of British movie revenues and 70 percent of French. When the United States film industry exported sound films, it utilized this change to solidify its hegemony, and maintain its dominant position in the world until after World War II. In contrast, Robert Sklar argues that in the late 1920s European countries, particularly Britain, France, and Germany, began to repel Hollywood expansion with a moderate degree of success. The addition of sound helped these countries because of the problems of the troublesome conversion of films for different language audiences.

In this essay I shall argue that the full impact of the worldwide diffusion of sound cannot be understood in the simple terms Guback and Sklar suggest. We need an explicit theory of international exchange by which to structure our analysis. Marxist economics provides the most appropriate theoretical framework. Both Guback and Sklar (implicitly) utilize the neo-classical economic model: how did foreign quotas and tariffs disrupt free distribution of films? Combined with a dramatic narrative structure—how could a poor European country survive the onslaught of the Hollywood monop-