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Dances of the Machine in Early Twentieth-Century America

The worlds of work and dance may appear to be poles apart. Nonetheless, in their common origins, work rhythms and dance rhythms—the cadences by which we “keep together in time”—are older than history itself, and they form some of the most deeply felt elements in a culture.¹ With the emergence of an advanced industrial economy in the early twentieth century, these rhythms and relationships changed immeasurably. Modern machine production drummed irresistible new beats and demanded new patterns of highly coordinated human movement that affected the entire society and became one of the defining elements of modernity. In the realm of work, the paradigm of this transformation was the modern factory, epitomized in the Ford assembly lines developed to produce the Model T; in the realm of dance, it was the theatrical spectacle number that reached its zenith in the mechanically reproduced and distributed Hollywood musical of the early 1930s. This essay focuses on the elusive relationships between these two developments and their key roles as icons and rhythmic embodiments of modernity. I wish to revisit some of the most familiar instances of mass production and mass leisure in order to invite readers to think of them, playfully but seriously, as *dances*, which, whether assuming the form of industrial drills or fantastic pageants, powerfully expressed the new technology and organization of modern life with all of its beauty and alienation, promise and pain. To do so, I believe, allows us to comprehend more deeply how the demands of mechanical production in the early twentieth century stimulated not only profound changes in the workplace but also what may be regarded as varieties of modernism in the popular arts. Here, then, are four ballets mécaniques, four dances of the machine.

The promise of mass production assumed utopian dimensions in the early twentieth century, and its greatest visionary was unquestionably Henry Ford. The development of the moving assembly line at Ford's Highland Park plant outside Detroit beginning in 1913 revolutionized the automobile industry and became a transcendent symbol of the possibilities of synchronized human labor in intimate partnership with machinery (Fig. 1). Granted, the only dance Ford ever self-consciously encouraged was square dancing, and he certainly was not thinking in terms of dance movements at Highland Park. But as he and his associates sought constantly to increase production of the Model T, they became, in effect, choreographers in new dances of the machine, creating some of the most brilliantly innovative and influential patterns of the age. Like many other choreographers, however, they were martinets whose numbers took a devastating human toll. If modernism may be understood, among other things, as a cluster of efforts to find new aesthetic vocabularies to express the innovative terms of industrial life in the twentieth century, then the Ford Motor Company served as one of the great fountainheads of modernism. The forms that it pioneered, following the instrumental logic of mass production, would shape a host of expressive responses in painting, photography, literature, and the fields that especially concern this essay, film and dance.

Large-scale factory production in the United States was a century old by 1913, if one dates its beginnings from the Boston Associates' 1815 textile mill in Waltham, Massachusetts, the immediate predecessor to the immense factories of Lowell and other New England mill towns. Yet Highland Park marked a major departure in the pace and character of human-machine production. To realize the vision of Ford and his associates of a car for the multitude at the cheapest possible price demanded not only specialized new machines, but also more extensive and intricate coordination between mechanical production and human operatives than anything previously known.

The new dance of the assembly line began on April 1, 1913, in Ford's flywheel magneto assembling department (Fig. 2). Twenty-nine workers who had stood at separate workbenches hitherto now found themselves facing a row of flywheels that slid along a continuous surface. Previously, each man had individually put together an entire flywheel magneto assembly from sixteen magnets with their supports and clamps, sixteen bolts, and other parts, a job that took about twenty minutes. Now this process was minutely subdivided and tasks were specialized, so that a man put only a single part on the assembly, added a few nuts, or simply tightened them, then pushed the flywheel a foot and a half or so to the next worker. Each performed his little step over and over for nine hours. Even by the end of the

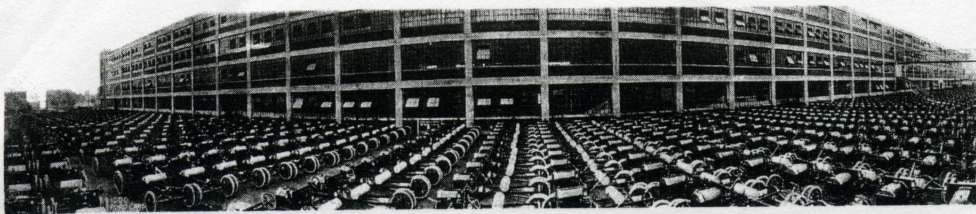


Figure 1. The promise of mass production: one day's output, Ford Motor Company, Highland Park, 1914. (Collections of the Henry Ford Museum and Greenfield Village; Ford Archives P833.682)

first day, the transformation in output was impressive. Workers who had earlier produced a new assembly every twenty minutes now averaged one every thirteen minutes and ten seconds. Ford production engineers introduced refinements almost immediately. By pulling the magnetos along the line with a chain at a set rate, they found that they could regularize the workers' pace. Within another year, flywheel magnetos were coming off the line at a rate of one every five man-minutes. Assembly line methods had cut the original time in fourth.²

Ford managers and engineers quickly experimented with similar methods in other departments (Fig. 3). Automated machines, standing virtually side by side, were accorded key positions on the shop floor. As the circulation among these machines increased in scope and pace, conducted by conveyors, gravity feeds, and a growing number of subassembly lines, the men on the line became correspondingly confined and repetitive in their actions. Division of labor reached new heights, so that workers came themselves to resemble machines in their simple, robotic movements. "The man who puts in a bolt does not put on the nut," Ford approvingly declared; "the man who puts on the nut does not tighten it." Each worker, Ford remarked euphemistically, was relieved of "the necessity for thought" as "he does as nearly as possible only one thing with only one movement."³

The achievement of a continuous flow of production along moving assembly lines, first applied to magnetos, engines, and transmissions in 1913 and to chasses early in 1914, has frequently been described in terms of flowing water, as rivulets fed into streams, which were channeled in their turn into rivers and building to a "Great Flood."⁴ But it still more resembled an intricate dance, part military drill, part industrial ballet, as every position and movement of every worker was adapted to the requirements of modern mass production. In this dance of the assembly line, men and machinery oddly exchanged attributes. Parts became animated and marched steadily from one station to another. Workers became more stationary and mechanical: a highly synchronized, increasingly immobile and deskilled corps de ballet as they participated in the intricately sequenced and continuous flow in which the ballerinas, Ford's adored Tin Lizzies, gathered their parts and were triumphantly borne aloft—by 1925 every thirty seconds of the working day (Fig. 4).



Figure 2. The birth of Ford's ballet mécanique: assembling the flywheel magneto, Ford Motor Company, Highland Park, 1913. (Collections of the Henry Ford Museum and Greenfield Village; Ford Archives P.833.167)

The spectacle of this smoothly flowing, intricate production might be regarded as not only a dazzling industrial feat but an object of beauty as well. A century before, when Francis Cabot Lowell reinvented a power loom, which promised to permit the organization of all manufacturing processes from raw cotton to finished cloth within a single integrated mill complex, his coinvestor Nathan Appleton reported that the two men sat “by the hour, watching the beautiful movement of this new and wonderful machine, destined as it evidently was, to change the character of all textile industry.”⁵ So too the development of moving assembly lines was clearly destined to revolutionize the character of automotive production, and it too was proclaimed beautiful. Describing the chassis assembly for *Engineering Magazine* in 1914, industrial engineer Horace Arnold enthused that the process “affords a highly impressive spectacle to beholders of every class, technical or nontechnical.”⁶

Far more than Arnold acknowledged, however, the beauty of the dance depended on the class perspective of the observer. What was beautiful to an engineer could be a *Totentanz* to a worker on the line. Arnold did not add that during the

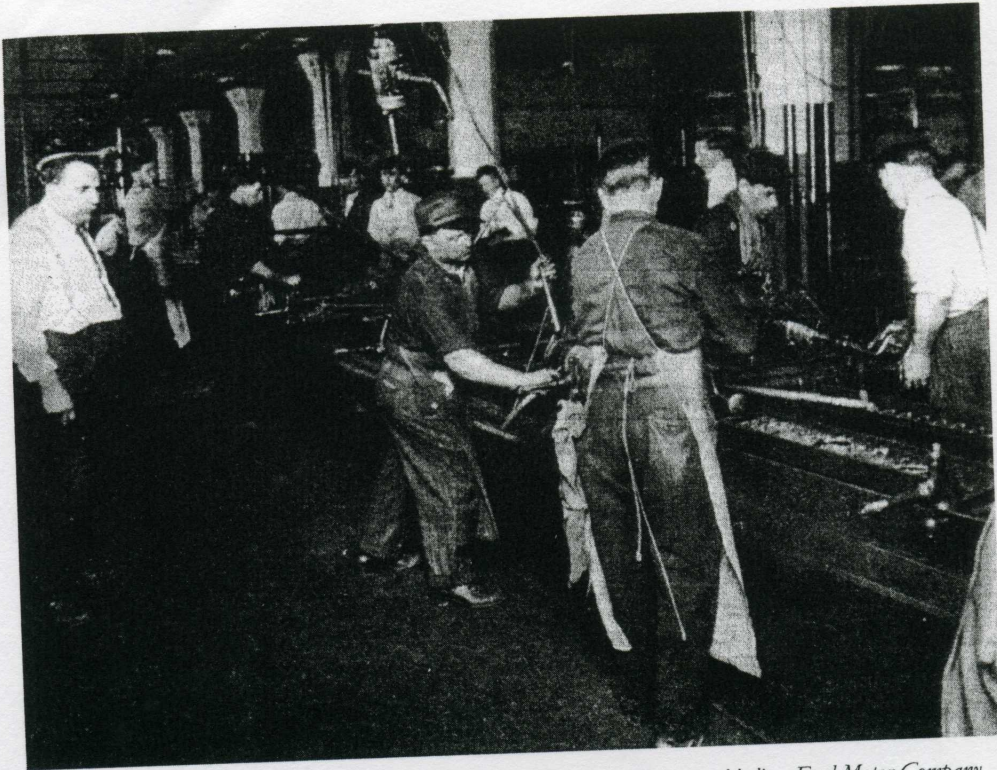


Figure 3. Expanding the corps de ballet: foreman and workers on front-axle assembly line, Ford Motor Company, Highland Park, 1913–14. (Collections of the Henry Ford Museum and Greenfield Village; Ford Archives, N.O.19505)

previous year, labor turnover at Highland Park reached 380 percent, eloquent testimony to the dance's exhausting pace. To mollify his workforce, Ford in January 1914 announced his vaunted five-dollar day (for qualified workers), though problems persisted. As the wife of one assembly line worker wrote anonymously to Ford two weeks later, "The chain system you have is a *slave driver!* My God!, Mr Ford. My husband has come home & thrown himself down & won't eat his supper—so done out! Can't it be remedied? . . . That \$5 a day is a blessing—a bigger one than you know but *oh* they earn it."⁷

MODERN TIMES: CHARLIE CHAPLIN'S BALLET MÉCANIQUE

Ford's transformation of automobile assembly from static to dynamic principles bears inexact but important analogies with roughly contemporaneous developments in the history of film. The industrial ballet that Ford pioneered at Highland Park depended on breaking down the processes of production into their most minute components and organizing them in the most efficient and repeatable sequences. So, too, filmmakers necessarily assembled each movie discontinuously,

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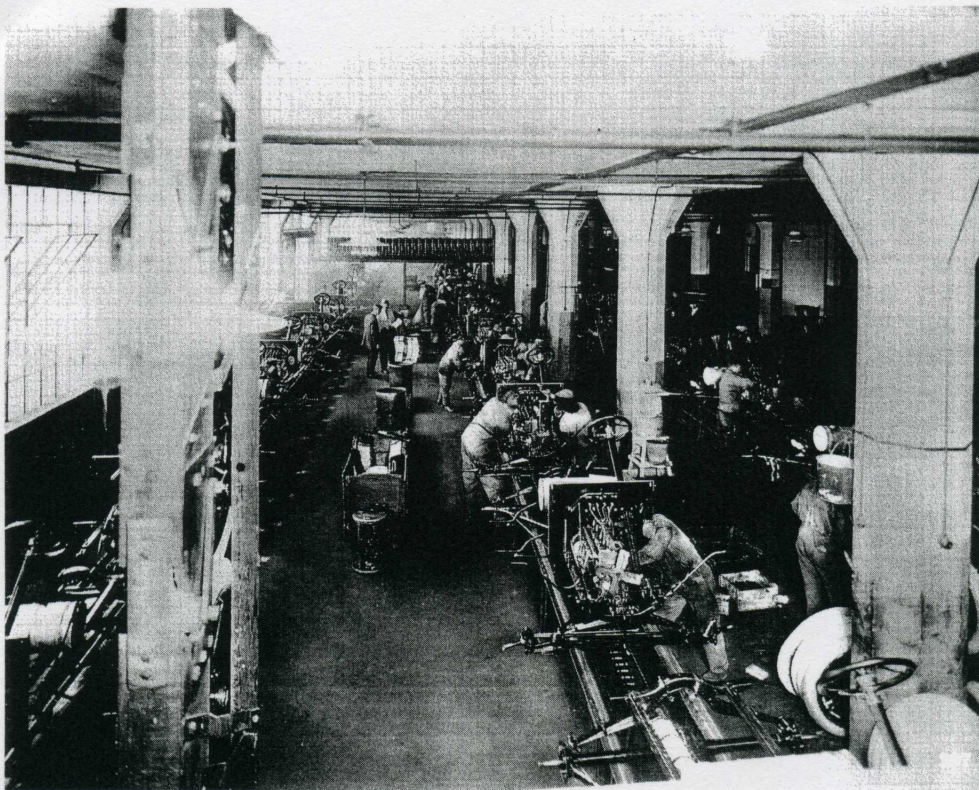


Figure 4. *March of the Tin Lizzies*: general view of "the line," Highland Park, 1914. (Collections of the Henry Ford Museum and Greenfield Village; Ford Archives neg. no. 833-987)

making sequences piecemeal (and often with immense repetition) and increasingly learning to follow, not narrative logic (any more than Ford assembled his cars from the tires up), but the most efficient use of sets and personnel. Obvious and fundamental to the medium of film was what art historian Erwin Panofsky identified as early as 1934 as "the dynamization of space and, accordingly, *spatialization of time*."⁸ Whereas live theater presumed the audience's static perspective on the stage and action, film permitted, and soon demanded, that spectators surrender imaginatively their fixed positions: to view the movements implied by the camera and the cutting and editing as a continuous flow of space, carrying them along with it. The possibilities were incalculably enhanced for presenting the world in dynamic terms, as an integration of collages, multiple perspectives, variable speeds, shifting and intricate rhythms. In this sense, all film might be regarded as inviting viewers to join in new dances of the machine. But, more particularly, movies displayed a remarkable affinity for technology as a subject, theme, and metaphor for the new. Moviemakers quickly became among the most profound—and incontestably the most popular—painters of modern life. Chief among these modernists for the multitude were the great makers of silent comedy.

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For if mechanization made some jobs harder, it made the comedian's easier. At the very beginning of the twentieth century in his influential lectures on laughter, French philosopher Henri Bergson declared, "The attitudes, gestures and movements of the human body are laughable in exact proportion as that body reminds us of a mere machine."⁹ The comic possibilities of mechanical bodies as well as of animated objects, frequently operating at cross-purposes, formed the basis of much of American silent comedy, particularly in the work of the three greatest masters: Charlie Chaplin, Buster Keaton, and Harold Lloyd. The silent film comedians quickly developed a distinctly cinematic vision in which the presence, pace, rhythms, and often recalcitrant wills of modern inventions played a major role. Thus, in *Get Out and Get Under*, Lloyd gamely opened the hood of his Model T to repair the engine, only to be comically swallowed by it. First his head disappeared under the hood, then his shoulders, and so, by degrees, the rest of him, right down to his feet.¹⁰ Some of Keaton's greatest films, such as *The Navigator* and *The General*, made machines (here a steamship and locomotive, respectively) virtual costars.

Yet the work of these great silent comedians was decisively displaced by a further technological innovation: the advent of sound in 1927. As other silent filmmakers either withdrew or attempted to adapt to the changed character of the medium, Chaplin stubbornly clung to the silent tradition—and virtually stopped making movies. Following the January 1928 release of *The Circus*, he produced only one film, *City Lights*, in the eight years before the February 1936 premiere of *Modern Times*.

Modern Times is thus a critique of the increased demands of modern technological society in a double sense. On one level, it satirizes the callousness of an impersonal mass society indifferent to the worth and beauty of the individual human imagination. Chaplin traced the film's inspiration directly to the plight of Detroit workers who, in his words, "after four or five years at the factory-[conveyor] belt system, became nervous wrecks."¹¹ A decade earlier, in 1923, Chaplin had visited such factories. Indeed, he was escorted on a special tour of the Highland Park plant by Henry Ford himself and his son Edsel—during which the din of assembly forced them to shout into one another's ears (Fig. 5).¹²

On a second and more personal level, the critique of Chaplin's film was also infused with his deep unhappiness as a filmmaker with the technology of sound. The demands and expense of "talking pictures" made impossible his earlier practice (one shared by Keaton and Lloyd) of freely "improvising as he went along, advancing the plot as notions came to him."¹³ In addition, the poetic world of the Tramp, with its indebtedness to sentimental melodrama as well as to mime, depended on silence, Chaplin believed; "the first word he ever uttered would transform him into another person."¹⁴ Silent films were never truly silent, of course;

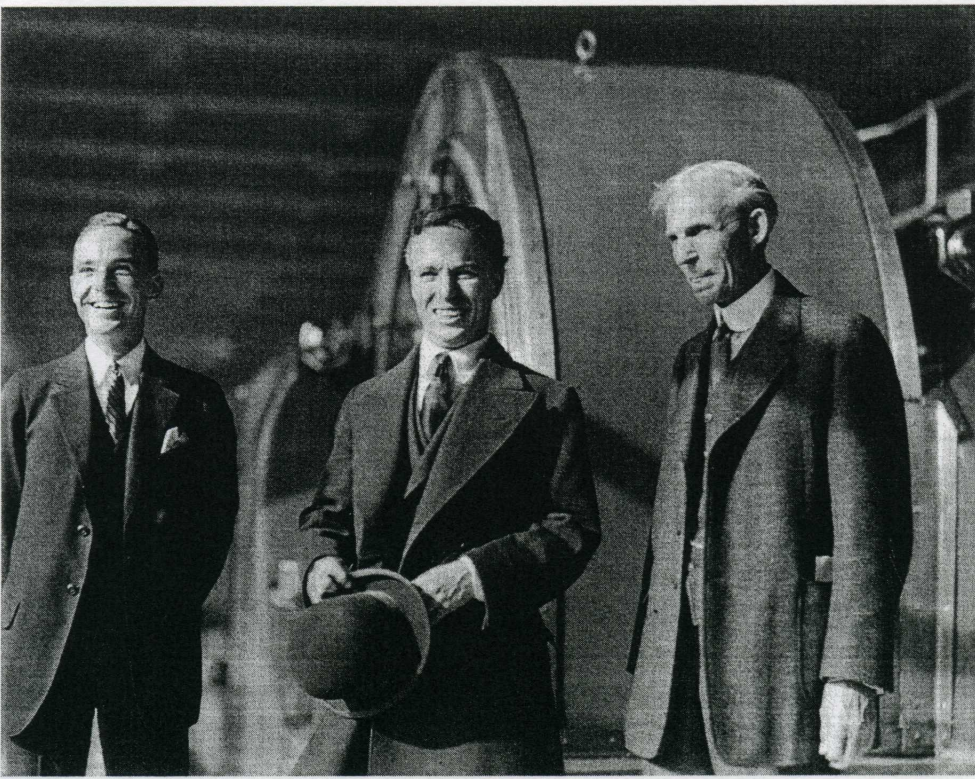


Figure 5. Touring the stupendous Ford system: Chaplin with Edsel and Henry Ford, Highland Park, 1923.
(Collections of the Henry Ford Museum and Greenfield Village; Ford Archives neg. no. 0-4144)

they presumed and relied on musical accompaniment, so that, as Panofsky noted, they assumed somewhat of the character of ballet.¹⁵

Sound in this sense in Chaplin's 1936 film is an inextricable part of the frenetic and regimented character of modern life (as it was of Ford's factory), and the Tramp's (and Chaplin's) commitment to the poetry of the silent era becomes another aspect of his character's wistful longing for grace and poetry in a society increasingly preoccupied by instrumental (and ultimately inhuman) values. The harsh, mechanized alarms and whistles in *Modern Times*, including the blare of speech over loudspeakers, recordings, and radios (face-to-face conversation continues to be silent), represents, among other things, Chaplin's protest at the noisy world that had killed the silent tradition.¹⁶ The celebrated dance of the machines that Chaplin created in the film must be seen in this double context.

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Much of *Modern Times* takes place in a futuristic factory strongly reminiscent of the autocratic factory in René Clair's brilliant satire *A Nous la Liberté* (1931). The action comically yet caustically reveals how thoroughly the factory regime assaulted every vestige of individual freedom and dignity—on the job, in rest room retreats, even during the lunch break, when the hapless Tramp participates in the

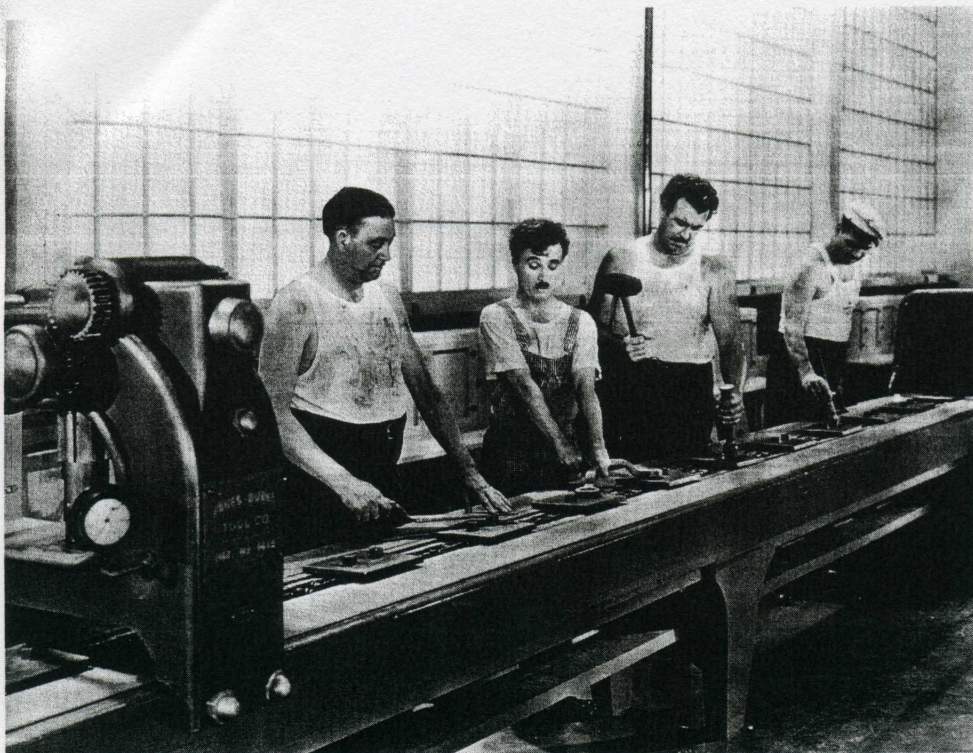


Figure 6. *The punishing pace of production: Chaplin's Tramp on the assembly line, Modern Times.* (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

trial of a feeding machine. Later that afternoon as the conveyor belt is speeded up, Chaplin's Tramp finally snaps under the strain. He frantically pursues his narrow task even as the conveyor belt reels him into the machinery's gigantic cogs and gears—like an automaton in an immense music box, the music of the sound track suggests (Figs. 6 and 7). Then, as he persists in his compulsive movements, all the impulses repressed by the factory regimen burst forth, and his dance begins.

Given the prim, fastidious character that Chaplin's Tramp had assumed, it is a surprisingly and significantly libidinous dance. Only a few years before *Modern Times*, Italian Marxist Antonio Gramsci, writing from a Fascist prison cell, had observed with reference to Ford, "The truth is that the new type of man demanded by the rationalisation of production and work cannot be developed until the sexual instinct has been suitably regulated and until it too has been rationalised."¹⁷ At Ford and elsewhere, the dance of the assembly line required not only that each worker surrender his intelligence and initiative to his employer, but also that he leave all his imaginative life (including his erotic longings) outside the factory gates.¹⁸ The Tramp's dementia exemplifies both this intense repression and its breakdown. The physical and mental fatigue of laborious repetition unleashes its opposite: a manic ballet filled with forbidden impulses and erotic desires (Fig. 8).

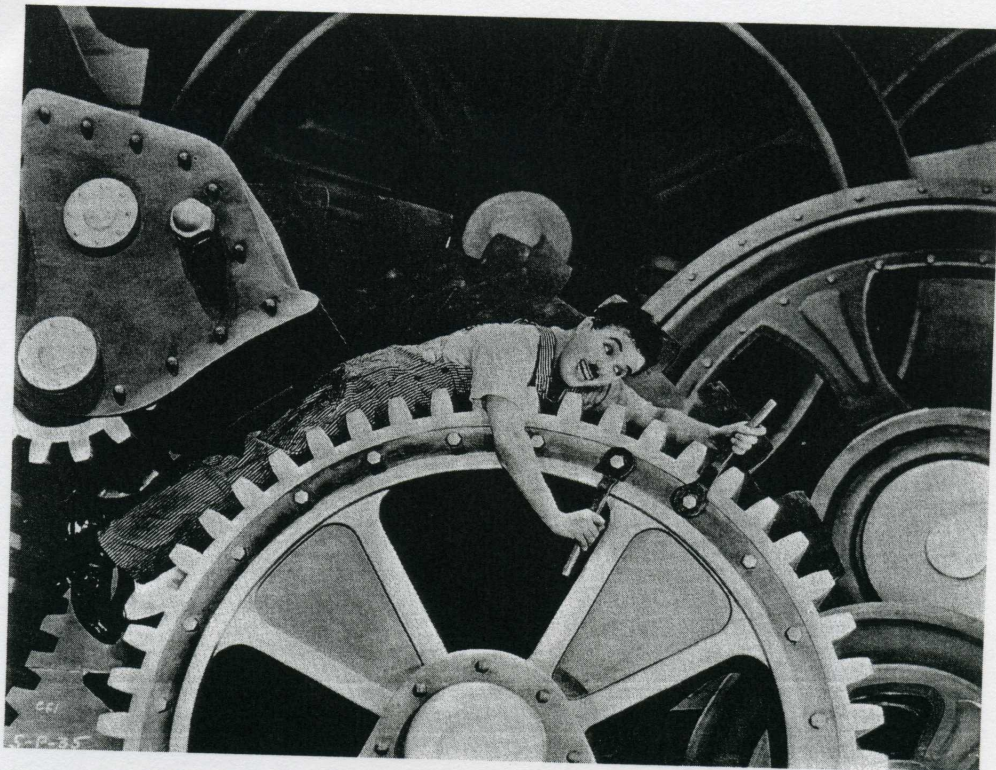


Figure 7. *Enmeshed in the gigantic machinery*, *Modern Times*. (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

In this respect, Chaplin includes a compressed homage to what remains the most celebrated modernist ballet of such impulses and desires, Vaslav Nijinsky's *Prélude à l'Après-midi d'un Faune* of 1912 (Fig. 9). "Your comedy is *balletique*, you are a dancer," Chaplin reported the great Nijinsky telling him in December 1916; in this dance Chaplin returned the compliment, even as he parodied the mincing steps of classical ballet that Nijinsky did so much to overturn.¹⁹ Lifting his wrenches to his ears to suggest horns, the Tramp briefly evokes Nijinsky's subversive masterpiece, which Chaplin deeply admired. Nijinsky had depicted the slow unfolding of a faun's sexual awakening to a nymph, his desire, pursuit, loss, and carnal embrace of the nymph's scarf. The Tramp, by contrast, once he involuntarily revolts from his confined position and narrow task on the line, rapidly seeks to apply his wrenches to anything remotely suggesting a loose bolt: first, his coworkers' noses and nipples, then the buttons and breasts of a young woman. After a distracted chase out of the factory (and the pursuit of a large-breasted matron wearing particularly big and inviting buttons), the Tramp returns for a final ballet of sabotage. With manic glee, he pulls the levers that control the assembly line, explodes the machinery, and, parodying a nymph at play, squirts oil in the face of everyone about him. For the first time, the Tramp is not only rebellious but also innovative in his actions—



Figure 8. *Afternoon of an industrial faun*, *Modern Times*. (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

though still gripped by a delirium induced by the enforced repetitive movements of the assembly line (Fig. 10).

The scene thus establishes a contrast that will recur again and again. Indeed, the entire film may be read as a series of struggles between the demands of a relentlessly impersonal social order—symbolized by enforced rhythms and lock-step institutions—and the Tramp's effort to hold onto a place of personal independence, imagination, and beauty—symbolized by mime and dance. Although the contest is appallingly one-sided, the Tramp refuses to be defeated. Significantly, however, he is often forced to fight on his enemies' ground, and his moments of greatest rebellion occur only when he has lost conscious control. He and later the waif whom he befriends (played by Paulette Goddard, who would soon become Chaplin's wife) are pursued by various authorities until at last they flee the city and, so far as possible, modern times altogether. The concluding scene contrasts with the jaunty walk with which Chaplin ended his two-reeler *The Tramp* (1915), even as it anticipates the end of Chaplin's next film, *The Great Dictator* (1940), with its denunciation of the "machine-men" of the Third Reich. Though they are not to be compared to Nazis, the machine-men by 1936 have already won.

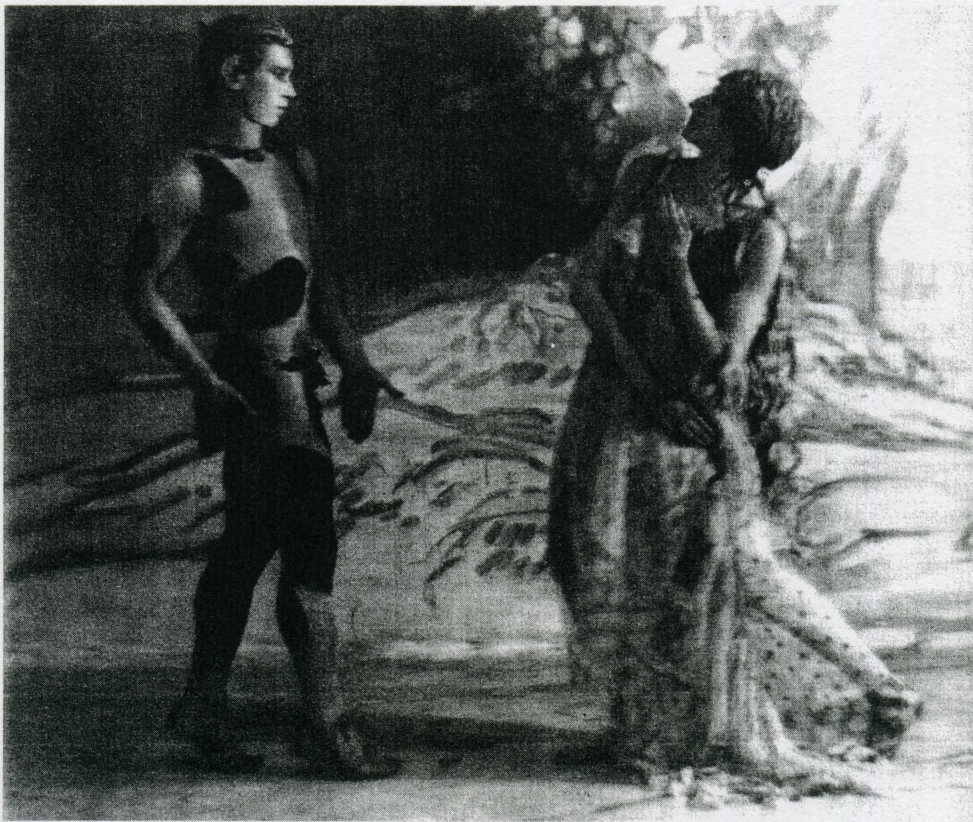


Figure 9. *Faun and nymph*: Vaslav Nijinsky with Lydia Nelidova in *Prélude à L'Après-midi d'un Faune*. (Photograph by Adolf de Meyer; New York Public Library for the Performing Arts)

THE ENGINE ROOM AS RHYTHM SECTION: THE LEISURED MALE DANCES

A year after Chaplin's *Modern Times*, Fred Astaire, the greatest dancer in the history of film, perhaps the greatest Western dancer of the twentieth century in any medium, performed his own dance of the machine, the "Slap That Bass" number in *Shall We Dance* (Fig. 11). The two dances are starkly different, and they reflect sharp differences in social perspective, in attitudes toward modern technology, in dance vocabularies and ambitions, and in attitudes toward talking pictures.

Whereas Chaplin's *ballet mécanique* was inspired by sympathy for industrial workers reduced to the position of robots, Astaire's reflected its origins in the privileged position of the film's director, Mark Sandrich, as he toured the boiler room on a luxury liner.²⁰ In the insouciantly implausible story of *Shall We Dance*, Astaire plays an American dancer, Pete Peters, who to advance professionally has assumed the persona of a Russian, changed his name to Petrov, and become a classical ballet star. But his real love (like Astaire's own) lies far from ballet in a



Figure 10. *The Tramp surrounded*, *Modern Times*. (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

modern, “outlaw style”: an eclectic mixture centered on American popular and romantic forms, particularly tap and ballroom dancing. He is especially interested in incorporating new rhythms into his dances, to take ballet and to make it modern. As he sails from Paris to New York on a luxury liner, he is inspired to create a new dance built on the contrasting rhythms of the machines of the engine room and African American jazz, to which Astaire owed so much.

The setting for this number rivals Chaplin’s factory in its emphatically “modern,” immaculate machinery, but it contains not a hint of anxiety or fatigue. An easy jive bubbles up from the African American workers as the chromium-plated machines provide an amiable rhythm section.²¹ The men begin working to the machine rhythms but almost immediately break off to create a relaxed musical interlude that plays off the mechanical beat. Easily, apparently effortlessly, they do what Chaplin’s Tramp could do in the factory only when he went berserk: improvise, creating new musical possibilities out of the soundscape about them. Some play instruments; others mime them with their voices. Within the context of the scene, their music is not a product, and certainly not an instance of alienated labor, but the expression of a lyric impulse, performed for no one’s pleasure but their own.

Astaire’s character begins as an enthusiastic onlooker to the jiving workers/



Figure 11. Improvisations in the engine room: Fred Astaire's "Slap That Bass" sequence, *Shall We Dance*. (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

musicians, but almost immediately he moves from spectator to singer and then, gloriously, to dancer. Exulting in the fact that, in Ira Gershwin's lyrics, "the happiest men all got rhythm," he launches into a jubilant series of steps, incorporating balletic elements and fluid gestures within a dazzling jazz-inspired set of tap riffs. Then, swinging over a railing as if in a zoo of mechanical creatures, he moves into what might be regarded as a series of challenge dances with individual machines. He easily mimics the dumbly repetitive movements and rhythms of each, and then polyrhythmically improvises on them. Instead of compelling him to labor to their pace, as in Chaplin's film, the machines seem to amuse him. His success as a dancer depends on freedom of movement, rhythmic intricacy, and inventiveness—distinctively human qualities that machines cannot duplicate. The dance culminates with a dizzying set of steps and twirls up a ramp, in which, like the "Bojangles of Harlem" number in *Swingtime* a year earlier, he is joined momentarily by his shadows to magnify his presence. It is an exuberant finale of human vitality and creativity. The scene ends with the black workers applauding his supposedly impromptu performance, acknowledging him as not simply an imitator but a master innovator who, like them, has made jazz a way of life.²²

If Chaplin's own resistance to sound technology formed a subtext to his dance with the machine in *Modern Times*, Astaire's preference for sound film as the ideal medium for his dancing surely informs "Slap That Bass." Once Astaire arrived in Hollywood in 1933, he appears scarcely to have looked back to the Broadway stage, even though he had performed before live audiences since the age of five. Contrary to his casual and sunny movie persona, offstage Astaire was relentlessly self-critical, anxious, and insecure, and he found in film a medium more suited to his perfectionism. Not only was he the chief dancer in his films, but also the major choreographer and director of the dance sequences. Indeed, Astaire established an approach to filming dance that quickly became the Hollywood standard for the next two decades. The essence of that approach was to make the camera an unobtrusive but supportive dancing partner, whether Astaire performed a solo or a duet.²³ He understood the camera's strengths and limitations well. It was like a Cyclops wearing blinders, with a flat, narrow perspective that could not encompass a wide stage, but that could concentrate intently on objects directly ahead and follow the most intricate steps. Astaire held the camera at a fairly consistent, comfortable proximity, pulling it forward and back with him as he moved, and refusing to let its attention wander in any way. In duets with Ginger Rogers, Astaire stayed close to her so the camera could see both of them at once. But solos offered Astaire his greatest freedom as a dancer, as is evident in "Slap That Bass." Astaire here dances both with the machines that we see and with the machine technology of film itself—though he discreetly never acknowledges their liaison by directly returning its adoring gaze.²⁴

BUSBY BERKELEY AND CINEMATIC SPECTACLE

The mode of dance cinematography that Astaire most fervently opposed and sought to eradicate was, of course, that of Busby Berkeley. In 1933, the year that Astaire began his film career with RKO, Berkeley was creating some of his most memorable dance sequences for Warner Brothers in the films *42nd Street*, *Gold Diggers of 1933*, and *Footlight Parade*. Some of these may also be regarded as dances of the machine, but in ways less obvious than those we have considered thus far. Most directly, they were ballets mécaniques in the sense that, as many critics have observed, Berkeley "made the camera dance." As director of dance sequences, he carried the tradition of musical spectacle to new heights, employing all the technical machinery at his command to create inventive and often self-aggrandizing cinematic triumphs, emphasizing virtuoso camera work, extensive editing, and frequent special effects.

Yet in addition to this self-reflexive sense, Berkeley created dances that expressed a vision of the modern world made possible by mass production and

profoundly shaped by its aesthetic and rhythms. Strange as it may be to suggest it, the great Busby Berkeley production numbers can be regarded as the flip side of Henry Ford's assembly line.

Berkeley's cinematic spectacles built on a rich stage and screen tradition that bears suggestive relationships to the rise of mass production at Ford and elsewhere. In the 1910s and 1920s, during roughly the same time that Ford was developing his system, Broadway producers mounted spectacles of mass consumption involving larger and more intricate aggregations of dancers than ever before. Although Broadway choreographers drew on a variety of dance traditions, their hallmark became "precision" dancing. Extravagant annual revues, such as the *Ziegfeld Follies*, the Schubert Brothers' *Passing Show*, *George White's Scandals*, and the *Earl Carroll Vanities*, dominated the New York stage until the onset of the Great Depression and the rise of sound films hastened their exodus to Hollywood.

The basis of all these productions lay in the display of female bodies in rapid, intricate, precise, and often fantastic patterns—the cavernous stage of the New York Hippodrome could hold over six hundred dancers at once.²⁵ In the broadest sense, the assembly line had its historical counterpart in the chorus line. The regiments of workers pursuing ever more specialized tasks in rapid, synchronized assembly found their inverted image in teams of nearly nude chorines, carefully grouped by size and appearance, performing elaborate dances of mechanistic precision, synchronization, and regimentation. "It is system, system, system with me, I believe in numbers and straight lines," declared influential Broadway choreographer Ned Wayburn in 1913, the very year in which Ford and his associates began their assembly revolution at Highland Park. And just as at Ford and elsewhere, managers stressed the "scientific" selection of the right worker for each task, Wayburn and other choreographers assigned their female dancers specialized tasks and divided them according to newly standardized sizes and shapes (with slang terms for each, drawn overwhelmingly from the world of livestock). In 1913, for example, these were differentiated into five categories: (1) "show girls," 5'7" and above; (2) "chickens" or "peaches," 5'5" to 5'7"; (3) "squabs," 5'2" to 5'6"; (4) "ponies" or "thoroughbreds," 5'3" to 5'5"; and (5) "pacers" or "broilers," 5' to 5'3".²⁶ In addition, the fast-paced, innovative, and complex patterns of production of Ford's Highland Park and, by the later 1920s, River Rouge factories found their analogy in Berkeley's extraordinary stage productions. As a *New York Times* critic admiringly observed in 1928, these dance numbers combined the utmost speed of which the human body was capable with "complicated and subtle rhythms that many a trained musician or a trained artist-dancer would find next to impossible to perform."²⁷ Gramsci had maintained "The exaltation of passion cannot be reconciled with the timed movements of productive motions connected with the most perfected automatism."²⁸ Berkeley and other dance directors apparently believed just the opposite. In their work, the mechanical and the erotic met and merged.

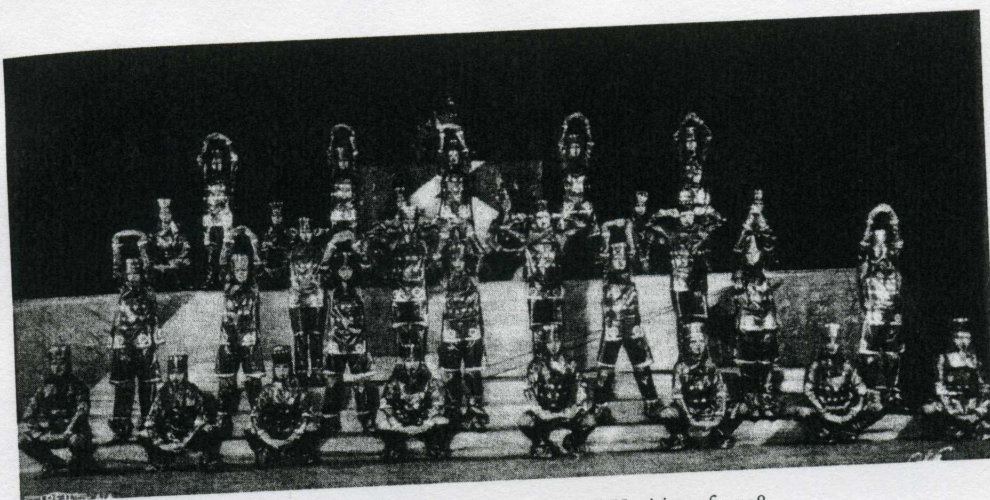


Figure 12. Busby Berkeley's "Machinery Ballet," *The Earl Carroll Vanities* of 1928.
(University of North Carolina at Chapel Hill)

The analogies between these Broadway revues and the assembly line could often be obscured by the late Victorian trimmings that garnished many musical production numbers; yet at times choreographers, including Berkeley himself, made the parallels startlingly overt. To cite but one instance, for *The Earl Carroll Vanities* of 1928, Berkeley devised "The Machinery Ballet," a number, according to the program, that was directly inspired by a tour of a Ford factory (Fig. 12). The number began by evoking the factory gates; then it offered its own version of the assembly line. As fiery lights flashed and smoke belched, robotic chorines danced in metallic costumes fitted with dials and switches. They whirled and spun, rose and fell in repetitive gestures as they continuously cycled past a series of platforms. Above them, a single dancer slowly turned cartwheels like a human cogwheel, then concluded with a lockstep march. In "The Machinery Ballet," Berkeley succeeded in creating a number that was both the hit of a revue famous for its raunchy appeal and a dance that critics compared to such recent modernist developments as Russian constructivist art, Karal Capek's play *R.U.R.* (1923), and Fritz Lang's film *Metropolis* (1926).²⁹

On a deeper level, the theme of the assembly line informs many of Berkeley's dances, even—perhaps especially—when its imagery is explicitly purged. Such is the case with the final dance number to be considered in this essay, "By a Waterfall" from *Footlight Parade* (1933).

Like *42nd Street*, made earlier the same year, the storyline of *Footlight Parade* emphasizes how the work of putting on a production number resembles a factory in its relentless labor, anxiety, and fatigue. By contrast, almost all of the musical numbers themselves appear to emerge fully achieved without any glimpse of rehearsals or suggestion of internal effort. By capturing this bifurcation between work and consumption, denial and display, these films register the deeper rhythms

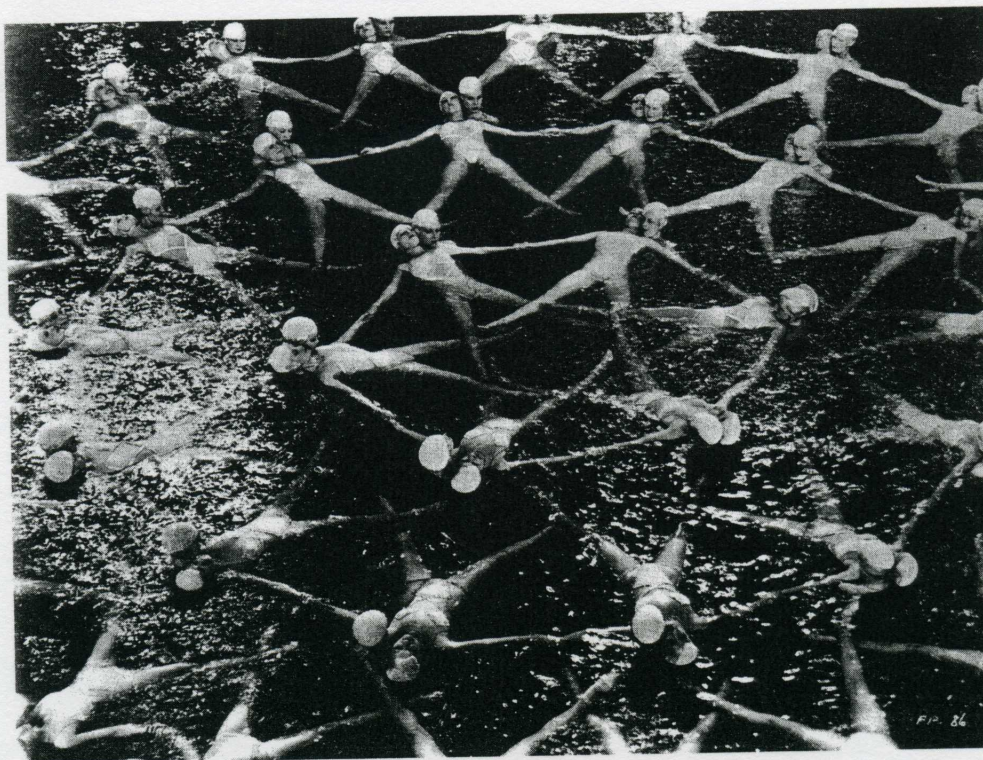


Figure 13. Interchangeable nymphs: Busby Berkeley's "By a Waterfall," Footlight Parade. (Courtesy of Turner Entertainment and Film Stills Archive, The Museum of Modern Art, New York)

of modern industrial capitalism. At the same time, despite their character as backstage musicals that supposedly show us the effort that the theater audience never sees, they not only preserve but also give new meanings to what Karl Marx satirically termed commodity fetishism, in which capital (here, musical spectacle and female pulchritude) seems to reproduce itself magically apart from human labor. ✓

"By a Waterfall" is the supreme instance of the Berkeley dance that insists on its utter remove from the world of mechanical production—only to testify to that world's underlying values. Here Berkeley gives us another dream of nymphs—not just one nymph (as in Chaplin) or a cluster (as in Nijinsky) but hundreds of them. The number begins with a shot from the perspective of a stage audience—and then gaily tugs moviegoers imaginatively out of their seats to witness effects impossible to capture on stage. After a prologue in which Dick Powell sings a song to Ruby Keeler and then falls asleep, she slips off her dress to caper with a veritable colony of water nymphs around a spectacular woodland waterfall that melds into an enormous swimming pool. As the beaming nymphs frolic in the water, Berkeley's camera joins wholeheartedly in the water play. It repeatedly dives under the surface and pops up again as it sports with and ogles the chorines. Then, it ascends to a commanding perspective as the interchangeable water nymphs lose their indepen-



Figure 14. Human fountain in
"By a Waterfall," Footlight Parade.
(Courtesy of Turner Entertainment
and Film Stills Archive,
The Museum of Modern Art,
New York)

dent human appearance entirely (Fig. 13). Concealing all but their heads and arms beneath the surface of the water, Berkeley organizes them like mechanical components into a spectacular series of abstract patterns. Assembled in straight lines with each girl placing her hands on the shoulders of the one in front of her, they merge, first, into sinuous rows. Then, as they drop their heads and bring their extended arms together to form triangles, they cluster in revolving kaleidoscopic wheels. Then the scene and perspective shift once more. The nymphs form an elaborate, five-tiered, rotating fountain that is enlarged still further through its reflection in the water (Fig. 14). Their individual bodies are recognizable once more, and their spread legs (a reiterated motif in this number as in much of Berkeley's work) carry an unmistakable implication of sexual availability. In these sequences, the chorines suggest structures that are both organic and industrial: snakes that might also be chains, geometric flowers that might also be gears, fountains that might also be turbines. The streams of water in the fountain sequence create an almost urinary or ejaculatory motif—perhaps a final outpouring of relief from the pent-up regime of the factory. Here is a brave new world of play fitted to Ford's assembly line. What remains at once abstractly beautiful and humanly disturbing about both is the way in which individual bodies are completely subordinated to the requirements of the larger impersonal design. The dream of erotic bliss cloaks the nightmare of industrial drudgery.

Whether these four dances celebrated the promise of modern industrial society or, in the case of Chaplin, protested against it, all pointed to the ways in which

modern machinery and the organization of mass production fundamentally altered the bodily rhythms governing work and play alike, from fatigue to erotic pleasure. The values of speed, standardization, interchangeability, uniformity, division of labor, and specialization of task had been prominent in American industrialization for at least a century by the time that Ford introduced assembly line production to Highland Park, but the potential of their full implementation and the aesthetic challenge that these values involved had never before been so fully grasped. Among those who responded most immediately and creatively were Hollywood comedians and choreographers, both keenly attuned to the literal and metaphoric rhythms of modern life. As they explored the aesthetic possibilities of a new, self-consciously modern Machine Age, they revealed some of its political stakes as well. A defining element of individuality in an age of mass production, their work suggests, was the freedom to create one's own dance out of improvised rather than compulsory rhythms and patterns. "Man's chief difference from the brutes," wrote William James, "lies in the exuberant excess of his subjective propensities. . . . Prune down his extravagance, sober him, and you undo him."³⁰ He might also have been defining a key difference between human beings and machines.

NOTES

1. McNeill, *Keeping Together in Time*. McNeill speculates that not only is the ability to perform dance and drill a unique human achievement; it also may be an essential element in our evolution to human society.
2. Hounshell, *From the American System*, 247–48. Hounshell's figures for the original output per worker are clearly erroneous, however.
3. Ford, *My Life and Work*, 83, 80.
4. Hounshell, *From the American System*, 244.
5. Appleton, *Introduction of the Power Loom*, 15. On both Lowell, Mass., and the aesthetics of machinery and machine production in the nineteenth century, see Kasson, *Civilizing the Machine*.
6. Arnold and Faurote, *Ford Methods and the Ford Shops*, 135. Prepared in 1914, this work was previously published in *Engineering Magazine*. The relative contributions of Arnold and Faurote are detailed on p. iii.
7. Hounshell, *From the American System*, 257–59.
8. Panofsky, "Style and Medium," 18.
9. Bergson, "Laughter," 79.
10. Brownlaw, *The Parade's Gone By*, 463.
11. Chaplin, *Autobiography*, 415.
12. "Chaplin Hero of the Masses."
13. "Chaplin: Machine-Age *Don Quixote*," 26.
14. Chaplin, *Autobiography*, 397.
15. Panofsky, "Style and Medium," 20.
16. Chaplin, *Autobiography*, 397, 412–13.
17. Gramsci, "Americanism and Fordism," 297.
18. Smith, *Making the Modern*, 51.
19. Chaplin, *My Autobiography*, 202–6. Chaplin had earlier made use of Nijinsky's ballet in the 1919 film *Sunnyside*; see McDonald and Mark Ricci, *Complete Films of Charlie Chaplin*, 160.