The Dissertation Committee for Allison Rebecca Wente Certifies that this is the approved version of the following dissertation:

Magical Mechanics: The Player Piano in the Age of Digital Reproduction

Committee:

_____
James Buhler, Supervisor

_____
Eric Drott

_____
Edward Pearsall

_____
Byron Almén

_____
Charles Carson

_____
Karl Miller

Magical Mechanics: The Player Piano in the Age of Digital Reproduction

by

Allison Rebecca Wente, B.A.; M.A.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

May 2016

Dedication

In loving memory of my spitfire of a role model, grandma Rose.

Acknowledgements

Schumann: thank you for helping form our writing group, for the endless professional and personal support, for the fun, productive, and collegial atmosphere, and for all of the laughs, barbeque, and tacos.

Many, many thanks to my friends Caitlin Hawley, Tiffany Reilly, Rebecca Pittman, and April Dannelly-Schenck for always listening, and for always being willing to bake delicious treats and chat for hours over a cup of tea (or coffee, I suppose).

Thank you to my family for your constant love, wisdom, guidance, and encouragement. Special thanks to my Gram and my parents, who shuttled me to and from countless music lessons and endured many torturous performances through my formative years, and to my sister who had to grow up with my musical noise. Thank you for never doubting me and for always understanding and supporting my love for music.

Finally, thank you to my husband, Alex, for always being there for me, and for providing a limitless supply of feedback, ice cream, and emotional support. Getting this degree wouldn't be half as much fun without you.

Magical Mechanics: The Player Piano in the Age of Digital Reproduction

Allison Rebecca Wente, Ph.D.

The University of Texas at Austin, 2016

Supervisor: James Buhler

By the early twentieth century the machine aesthetic was a well-established and dominant interest that fundamentally transformed musical performance and listening practices. While numerous scholars have examined this aesthetic in art and literature, musical compositions representing industrialized labor practices and the role of the machine in music remain largely unexplored. Moreover, in recounting the history of machines in musical recording and reproduction, scholars often tend to emphasize the phonograph, rather than player piano, despite the latter's prominence within the newly-established musical marketplace. Although the player piano failed to maintain a stronghold in the recorded music marketplace after 1930, the widespread acceptance of recording technologies as media for storing and enjoying music indicates a much more fundamental societal shift. This dissertation is an exploration into that shift, examining the rise and fall of the player piano in early twentieth-century society. As consumers accepted mechanical replacements for what previously required an active human laborer, ghostly, mechanical performers labored tirelessly in parlors, businesses, and even concert halls.

Through eighteenth- and nineteenth-century examples of mechanical sounds in music, and of music imitating or scoring machines, along with a cultural historical overview of the player piano and its environment, Chapter 1 explores the background information necessary for an analysis of mechanical music. Chapter 2 organizes mechanical music into three categories: (1) music written to sound like or imitate the machine; (2) music written to record and reproduce the skills of virtuoso performers; and (3) music written specifically for machines. This chapter addresses a diverse variety of audiences and spaces to make clear the widespread influence of the machine on musical culture. Chapter 3 includes a sonic analysis of two 1919 recordings Rachmaninoff made of his C# Minor Prelude, one roll one record, framed within a broader theory of memory based on Henri Bergson's *Matter and Memory* (1896). Chapter 4 steps away from the notes on the page and instead includes several examples of player piano advertisements from 1900-1930, organized into categories based on themes like labor, gender, and education. Finally, chapter 5 touches on the ways in which machine music converges with or diverges from theories of absolute music.

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Preface

This dissertation addresses issues of labor and musical mediation in the early

twentieth century, a time of great technological and industrial change. More specifically,

I explore how musical machines and mechanical music are influenced by and

consequently reflect industrialized labor practices. Musical practice underwent a

fundamental shift in the early twentieth century as music making — the physical labor of

producing sound — no longer belonged solely to the realm of the performer. The

growing popularity of mechanically reproduced music reflected a basic cultural

acceptance of this transformation in musical practice. Despite the popularity of

mechanical music evidenced by the player piano's dominance over the market through

the early 1920s and the roughly 2.5 million player pianos sold between 1900 and 1930,

scholars of recording have tended to gloss over the player piano in favor of the

phonograph.[1] Indeed, David Suisman critiques scholars for their treatment of the player

piano as little more than a footnote in the history of sound recording, an odd digital blip

in a history almost exclusively focused on the analog.[2]

While scholars such as Suisman have started to raise awareness of the player

piano's importance in the history of recording, it remains an underdeveloped research

area. Writing on the state of player piano research, pianolist Rex Lawson claims "there

are one or two museums that treat the player piano as a tourist attraction, but there is

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[1]Arthur W. J. G. Ord-Hume, *Player-Piano: The History of the Mechanical Piano and How to Repair it* (New York: A. S. Baines, 1970), 34.
[2]David Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure': Rethinking Musical Mechanization through the Phonograph, the Player-Piano, and the Piano," *Social Text* 102 (Spring 2010): 13.

virtually no serious academic work done on the subject at all."[3] This dissertation is a study into not only the functional mechanics of the player piano, but also the cultural milieu that gave rise to it and then largely abandoned it.[4] The dramatic shift in the production and consumption of music, along with general scholarly indifference toward mechanical instruments, specifically the player piano, prompts several questions: why is it that scholarly research so often glosses over or completely ignores the player piano when presenting the history of recorded music? How is it that listeners could move so quickly and with so little apparent resistance from an experience of music that required the presence of the laboring human body to an experience that substituted for this laboring body a form a mediating technology? How, finally, do people's relation to and interactions with music change with the coming of recording technologies? I explore these questions to discern and reveal how the cultural acceptance of technologies for recording music and sound was negotiated.[5]

Moreover, I place music written for player piano and other machines into a larger timeline of musical development, connecting machine music to more traditional musical works. Indeed, machines entered the musical landscape much earlier than the machine

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[3]Rex Lawson, "What Should Librarians Do with Piano Rolls?: A Tentative Solution form the IAML Conference in Götenborg, Sweden," *Fontes Artis Musicae* 53, no. 4 (October-December 2006): 356.

[4]See also Jean Baudrillard's critique of Siegfried Giedion's "kind of epic history of the technical object [because it] notes the changes in social structure associated with technical development, but scarcely address such questions as how objects are experienced, what needs other than functional ones they answer, what mental structures are interwoven with — and contradict — their functional structures, or what cultural, intercultural and transcultural system underpins their directly experienced everydayness." Baudrillard, *The System of Objects*, trans. James Benedict (New York: Verso, 2005), 2.

[5]There is a growing body of literature devoted to capitalism and the commodification of culture, most notably analyzed in Jacques Attali's *Noise* (1985) and later continued in work by scholars such as Timothy D. Taylor in *The Sounds of Capitalism: Advertising, Music, and the Conquest of Culture*, and the collection of writings edited by Mark Katz, Timothy Taylor, and Tony Grajeda in *Music, Sound and Technology in America* (2012).

age as it is usually defined (roughly 1918-1945), and connecting music written for the mechanical performer — player piano, automaton, etc. — to works from the eighteenth- and nineteenth-century canon gives under-acknowledged mechanical music cultural and historical importance. Conversely, recognizing the mechanical origins of and influences on well-known works points to the validity and necessity of machine music as an area of study. Through an examination of a player piano recording and a phonograph recording of the same time, I form a theoretical framework that contrasts the essentially digital technology of player piano music with the analog technology of phonograph recordings, the latter rapidly taking over the market in the years after 1930. Examining advertising practices that brought player piano technology into homes and businesses adds weight to the cultural background of the instrument, and analyzing particular compositions written for the instrument fleshes out its technological capabilities. By establishing the player piano as an important part of the development of digital recording technologies, my work reframes and complicates the history of recording technologies while also addressing how mechanization radically transformed the practices and labor economies of early twentieth-century musical culture at various levels.

During the machine age, machines and their music influenced multiple areas of musical culture, from film scores to popular music and even the concert hall. But the opposite was also true: industrialized labor practices, based on Frederick Winslow Taylor's *Principles of Scientific Management* (1911), changed the musical marketplace

and musical culture as a whole.[6] Taylorism involves a systematic analysis of labor into smaller more manageable tasks to be carried out by unskilled or moderately skilled workers. In breaking down labor and standardizing it, Taylorism places workers in positions that play to the strengths of the system, rather than those of the individual workers. The individual is dissolved into the mass of almost interchangeable workers, a small cog in a large wheel, and is thus absorbed into the labor machine's inner workings. Each chapter of this dissertation addresses a different aspect of the changing environment of musical labor in the early twentieth century. An examination of advertisements, recordings, recording practices, and compositions of the time reveals the extensive impact industrialized labor had, and continues to have, over musical production and reproduction. And as a mechanical instrument that achieved great success in the mainstream marketplace, the player piano is a valuable historical, musical, and cultural artifact that demands more scholarly discussion.

While it is well established that phonograph records (and radio) eventually come to dominate the market for musical recording with the player piano falling to the wayside, the differences between these two methods of recording illustrate the theoretical differences between digital and analog recording explored more thoroughly in Eric Rothenbuhler and John Durham Peters' "Defining Phonography: An Experiment in Theory."[7] Rothenbuhler and Peters analyze the historical shift between older sound-recording technologies and digital sound media. What they call "phonography" includes

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[6]Frederick Winslow Taylor, *The Principles of Scientific Management* (New York: Harper & Brothers Publishers, 1911).
[7]Eric W. Rothenbuhler and John Durham Peters, "Defining Phonography: An Experiment in Theory," *Musical Quarterly* 81 (1997): 242-264.

all analog sound recording devices such as cylinders, discs, or magnetic tape that are specifically meant to convey recorded sound. Digital technologies are meant to store and transmit binary data, not necessarily just sound, and as such no longer contain actual traces of the past.[8] Suisman elaborates on the distinction by distinguishing the phonograph record's "sound-in-time" from the player piano roll's "sound-in-knowledge."[9] Both the record and the player piano roll inscribe information — the record captures a hearing, whereas the roll stores a program of actions — but each kind of information interacts differently with their respective players. The player piano rolls are a kind of binary data and the rolls work or do not work — they do not, like the record, gain a crackling patina, a character that permeates the sound as they age. Rather, atmospheric conditions, small tears in the roll, and operator error lead to flawed player piano performances, or renditions that are obviously marked by the instrument's characteristic mechanical sound.[10] The phonograph captures sound as it occurred in time, as a particular instance of musical labor, and the record bears scars earned through its history and heard in its pops and crackles. While the phonograph appears to age gracefully, at least as long as it remains playable, the small tears and operator errors behind a flawed player piano performance seem to cement the player piano's stereotypically mechanical sound, and thus contribute to the instrument's obsolescence.

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[8]Ibid., 255.

[9]This distinction is discussed further in Chapter 3. Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 23-24.

[10]Dr. Alexander Buchner, *Mechanical Musical Instruments*, Trans. Iris Unwin (London: Batchworth Press, 1959), 37-38.

The philosophical differences between the information captured and stored on player piano roll compared to phonograph record is crucial. It is a difference of analog and digital sound, and the presence of the player piano's digital storage of data in the early twentieth century changes the shape of sound recording's historical evolution. Digital recording, in this case, predates analog. While some sources may try to define the span of time during which the player piano becomes irrelevant,[11] I contend that it has no real end point, as its technology has had a profound, if mostly unacknowledged, influence on the digital music of today. Telling the history of recording then requires a focus on digital processes during the player piano's peak, the increasing importance of analog recording that becomes dominant with the introduction of electrical recording in the mid-1920s, and a return to digital beginning in the 1980s with the introduction of CDs and later, MP3s. The story — the history of sound recording and digital media — changes dramatically when the player piano is taken into account. The latest sounds from the tiny gadgets of today have a longer historical background based in a cultural conception that started not in the 1990s, but the 1890s. Indeed, today's digital sounds hearken back to the player pianos that filled roller rinks, saloons, and parlors of the early twentieth century with music. The crackling of records is hardly a new sound, but historically analog sound recording is the newcomer when compared to digital player piano rolls. Indeed, as the

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[11]For example, Arthur Reblitz writes,

> In the late 1920's when electronic amplification enabled the phonograph and radio to provide musical entertainment at a fraction of the cost of an automatic piano, the player piano met its demise, and the economic depression of the 1930's practically wiped out the whole piano industry.

Arthur Reblitz, *Player Piano Servicing and Rebuilding* (Lanham, MD: Vestal Press, 1985), 1-2.

meticulously punched holes in player piano rolls show, digital technology came first; digital technology is, in fact, vintage.

This dissertation begins by setting the historical stage with information on the player piano and its rolls, technological culture following the First World War, and piano roll operators — pianolists. The required background information leads to a discussion of the concrete through examples from Haydn and Schubert and a fleshing out of the mechanical musical topic in the early twentieth century. It then gradually unwinds into more theoretical and abstract areas through sonic analyses of recordings, cultural cues as indicated by player piano advertisements from 1900-1930, and a detailed discussion of the concept of absolute music in light of mechanical reproduction. The player piano or machines that make music play a primary role in each chapter, whether through examples of music written for machines, music written to imitate mechanical sounds, or music played by machines, or through a sonic comparison of musical recordings made by player piano and phonograph, a glimpse into marketing the player piano, or how machine music augments and changes the meaning of absolute music.[12] A secondary thread running through this dissertation follows the mechanization of labor, or more specifically, the mechanization of musical labor. Although most people are aware that the First World War produced a mechanical and technological boom, how the mechanization of industrial

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[12]A large body of scholarly work already exists addressing recording histories — I rely on Oliver Read and Walter Welch's *From Tin Foil to Stereo: Evolution of the Phonograph* (1976), Mark Coleman's *Playback: From the Victrola to MP3, 100 Years of Music, Machines, and Money* (2003), and William Howland Kenney's *Recorded Music in American Life: The Phonograph and Popular Memory, 1890-1945* (1999) — and theories of recorded sound and communications, especially Friedrich Kittler's *Gramophone, Film, Typewriter* (1999), Jonathan Sterne's *The Audible Past* (2003), and Mark Katz's *Capturing Sound: How Technology has Changed Music* (2004).

labor influenced and shaped the mechanization of musical labor has not been much discussed. The sounds of the mechanized industry of the twentieth century bled beyond factory walls, and with those sounds came the industrialized labor practices that forever changed the musical marketplace.

Chapter 1 examines industrial practices of mechanical music making, including an overview of the roll-making process, a general account of technological development that followed the First World War, and an analysis of the pianolist's labor process. Although the player piano often played in the background of films, roller rinks, saloons, dance halls, and parties, examining its role in the early twentieth-century musical economy foregrounds interesting details regarding the formation of what would become a musical culture dominated by recording. In this chapter I provide the necessary background information on the player piano and its environment from a cultural historical standpoint. The background information in chapter 1 fuels discussions of mechanical music and labor that runs throughout the rest of this dissertation.

Chapter 2 addresses the issue of mechanical music through a topical analysis of the mechanical in music. The chapter defines the musical topic of the mechanical through examples from composers such as Haydn, Beethoven, and Schubert, which form a historical basis of musical representations of the "machine," and then develops these topical ideas in examples from the first part of the twentieth century. The twentieth-century examples come from film, popular player piano rolls, and the concert hall, and each example falls into one of three categories: music written to sound like or imitate the

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machine, music written to highlight the skills of virtuoso performers while also

showcasing what the machine can do, and finally music written specifically for machines.

This chapter also discusses Frederick Winslow Taylor's theory of scientific

management, which was designed to maximize efficiency through the analysis and

streamlining of labor, as it relates to the player piano as a laborsaving device that allows

the "deskilling" of musical labor. Much like factory work of the time, the player piano is

not completely automated; but it does require markedly less skill (and somewhat different

skills) and has a higher tolerance for errors by its operator than does a regular piano. In a

factory organized according to scientific management, the human body continues to labor

despite significant displacements by machines, but the factory requires a different kind of

work — regulated, operational labor. The labor process essentially bifurcates into manual

and intellectual, and most laborers fall into one category or the other. Manual workers

complete such mindless tasks as tightening nuts and bolts, whereas intellectual laborers

monitor machines and manual laborers. The labor required of a player piano operator is

akin to this intellectual, managerial labor, as the operator oversees the machine as it

completes the manual task of playing the instrument. As Taylor's labor practices

reorganize factories and the system of production, the sounds of the machine saturate all

kinds of music, from the rolls playing at the local saloon, to film scores and concert halls.

If recent scholarship has acknowledged a role for the player piano in the history of

recording, little work has nevertheless been done in theorizing the differences between

the player piano and the phonograph in terms of storing and re-creating sound.[13] In

chapter 3, I approach these differences using the two kinds of memory put forth in Henri

Bergson's 1896 work, *Matter and Memory* as a frame.[14] The chapter opens with a brief

overview of Bergson's two kinds of memory — habitual memory, and the memory image

captured in time — and examines how these kinds of memory might relate to the

recordings made by the player piano and phonograph. Drawing on a November 1927

article from *Scientific American* which outlines the recording and editing processes,

accounts in trade papers such as *Variety* and *The Violinist* and in standard player piano

histories by Arthur W.J.G. Ord-Hume, Harvey Roehl, and others, I detail the process of

editing and perfecting the rolls. I also analyze two 1919 recordings — one piano roll and

one phonograph record — of Rachmaninoff playing his own C# Minor Prelude,

illustrating how the two recording mediums emphasize and embody different ideals.

Recording and the ability to store musical performance affect not only the nature of

performance and musical labor, but also fundamentally change the status of musical

memory as the differences in how the player piano and phonograph each capture and

store musical performances suggest two different interpretations of how musical memory

functions, differences addressed through the discussion of Bergson's kinds of memory.

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[13]See: Arved Ashby, *Absolute Music, Mechanical Reproduction* (Berkeley: University of California Press, 2010); Mark Katz, *Capturing Sound: How Technology has Changed Music* (Berkeley: University of California Press, 2004); David Suisman, *Selling Sounds: The Commercial Revolution in American Music* (Cambridge, MA.: Harvard University Press, 2012) and "Sound, Knowledge, and the 'Immanence of Human Failure'"; Timothy D. Taylor, "The Commodification of Music at the Dawn of the Era of 'Mechanical Music,'" *Ethnomusicology* 51, no. 2 (Spring/Summer, 2007): 281-305.
[14]Henri Bergson, *Matter and Memory* (New York: Zone Books, 1991).

In chapter 4 I analyze advertisements from 1900-1930 in order to demonstrate first how manufacturing companies encouraged listeners to accept music played by machine, and second the important role that the player piano played in this advertising campaign. Advertisements catered to both sides — at some points telling listeners to imagine the pianist at the bench and to treat the roll as if it were a live performer, and at others emphasizing the uncanny and entertaining spectacle that delivers more than the live performer ever could. The performing body, or lack thereof, provides complex and controversial material for a discussion of interpretation and embodiment of the work. I divide a sampling of advertisements into four categories: (1) advertisements that highlight the machine-like perfection of the instrument's performances; (2) advertisements that feature player pianos as a labor saving replacement for women's labor at the keyboard; (3) advertisements selling player pianos as educational instruments; and (4) advertisements that define the player piano as a device that stores and reproduces musical labor as an own-able and stockpile-able commodity. This chapter also includes a discussion of invisible labor, using the economic theory and analysis of Alfred Dupont Chandler to draw parallels between overall economic trends and the early twentieth-century player piano market.

Chapter 5 gives three different snapshots of player piano music composed at different stages of the instrument's popularity, but first I include an overview of the idea of absolute music as elaborated by Carl Dahlhaus and others and show how its definition is transformed by — or perhaps becomes fully realized in — mechanical reproduction. I use several analyses to illustrate how the mechanical performer influences the

composition and performance of a work. The first example is Stravinsky's *Étude pour Pianola* (1917), from before the instrument reached its highest peak of popularity. Then I discuss several works by composers such as Hindemith, Toch, and Casella, all from the 1920s when the instrument was most popular. Finally I include an analysis of one of Nancarrow's works, composed for player piano in the 1940s after the instrument's popularity had declined. In addition, this chapter talks about absolute music in the age of mechanical reproduction.

Chapter 1: Introduction

"Makes you feel kind of creepy, don't it, Doctor, watching them keys go up and down?

You can almost see a ghost sitting there playing his heart out."[1]

-Kurt Vonnegut, *Player Piano*

The player piano emerged at a time when many consumers were open to, and fascinated by, technical innovations. The mechanical improvements that took place in the early twentieth century — due, at least in part, to the technological pressures of World War One — and industrialized manufacturing practices led countries like the United States through what John E. Kasson calls "a pivotal transition from an economy organized around production to one organized around consumption and leisure as well."[2] Transformations in manufacturing and industry — Taylorism, scientific management, mass production, assembly lines — carried over into the cultural sphere wherein the production and consumption of mechanical instruments and piano rolls soared. Before the phonograph's popularity surpassed the player piano's (beginning roughly in the mid 1920s), the player piano paved the way for recorded music, and the instrument's rise and fall forms a necessary historical and theoretical link between live and recorded performance. Technological displays were a kind of spectacle, and the player piano's visually uncanny display caught the attention of the early twentieth-century musical

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[1]Kurt Vonnegut, *Player Piano* (New York: The Dial Press, 2006), 32.
[2]John E. Kasson, *Amusing the Million: Coney Island at the Turn of the Century* (New York: Hill and Wang, 1978), 106.

marketplace. Advertisers and salesmen pitched the instrument as "easy to play" (I will return to this theme in Chapter 4), and player piano manufacturers enjoyed great success first in instrument sales and later in roll sales up until the stock market crash of 1929.[3]
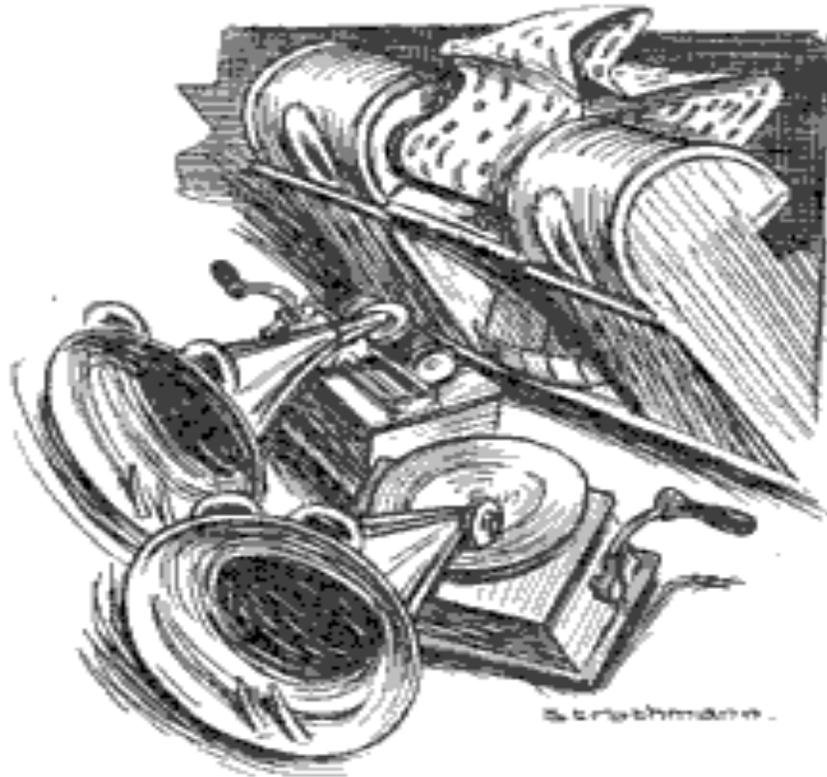
"*Does it go about to seek whom it may devour?*"

Figure 1.1: Cartoon from John Philip Sousa's "The Menace of Mechanical Music"[4]

Enthusiasm for technological innovations in art found its contrast in the fear that mechanical and recorded performances would replace the live performer.[5] Indeed,

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[3] Andrew Durkin, "The Self-Playing Piano as a Site for Textural Criticism," *Text* 12 (1999): 167.

[4] John Philip Sousa, "The Menace of Mechanical Music," *Appleton's Magazine* 8 (1906): 284.

[5] Sousa also claimed that these technologies would "reduce the expression of music to a mathematical system of megaphones, wheels, cogs, disks, cylinders, and all manner of revolving things." Sousa, "The Menace of Mechanical Music," 279-80.

Carolyn Abbate writes, "by 1900 marionettes and automata, vast music boxes, and music machines with their phantom hands, are... both magical and terrible."[6] The cartoon shown in Figure 1.1 comes from John Philip Sousa's 1906 article "The Menace of Mechanical Music." In it, two anthropomorphized phonographs and a push-up player piano with its large-toothed mouth agape advance towards the viewer while the piano roll trails behind in the wind. Sousa's article critiques phonographs and player pianos alike, and he claimed it is "simply a question of time when the amateur disappears entirely, and with him a host of vocal and instrumental teachers, who will be without field or calling."[7] But the player piano did not rob concert pianists of their jobs. Instead, it provided incidental accompaniment to commercial establishments and an in-home supplement to concert performances, a source of in-home entertainment for middle-class families. Moreover, concert pianists and famous composers capitalized on the player piano by creating arranged rolls of orchestral works or reproducing-piano roll performances that could be sold nation-wide. For example, Sergei Rachmaninoff recorded for Ampico; Igor Stravinsky made rolls for the Pleyel Company in Paris and the Aeolian Company in London and composed his *Étude pour Pianola* specifically for the player piano; George Antheil composed *Ballet Mécanique* for sixteen synchronized player pianos; Paul Hindemith, Ernst Toch, and Gerhart Münch all premiered works for mechanical piano at the 1926 Donaueschingen chamber music festival; and composers like Felix Arndt and

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[6]Carolyn Abbate, "Outside Ravel's Tomb," *Journal of the American Musicological Society* 52, no. 3, (Autumn 1999): 497.
[7] Sousa, "The Menace of Mechanical Music," 280.

Zez Confrey composed and recorded rolls of virtuosic ragtime works.[8] Outside of parlors and concert halls, player pianos labored tirelessly in saloons, movie theaters, restaurants, dance halls, roller rinks, and department stores, or even in the streets luring in passersby.[9]

THE BASICS: PLAYER PIANO MECHANISM AND METHODS OF ROLL PRODUCTION

The player piano could labor tirelessly in parlors and businesses because it is a kind of elaborate music box, with a rotating barrel that feeds perforated paper rolls across a tracker bar marked with a series of holes. The player piano automates parts of the traditional or "silent" piano — the pressing of a key, which causes the hammer to strike the string, the use of foot pedals to lengthen or soften the hammer strikes, and the force with which the hammer strikes the strings (for varying articulation, dynamics and phrasing).[10] While the player piano is a relatively simple machine compared to the computers of today, the machinery itself can get quite complicated; my overview of the mechanics of the instrument is a simplification based on Arthur W. J. G. Ord-Hume's lengthy discussion of how the player piano works. Ord-Hume explains it, "the player-piano is a machine containing a partial vacuum into which air is continually trying to find

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[8]David Suisman, *Selling Sounds: The Commercial Revolution in American Music* (Cambridge, MA: Harvard University Press, 2012), 244.

[9]Businesses often used orchestrions in addition to or instead of player pianos. Orchestrions were large cabinets containing percussion and piped instruments, and, like player pianos and other mechanical instruments, they played music from perforated rolls or discs. Orchestrions are also associated with ice cream parlors, dance halls, and merry-go-rounds, providing the iconic merry-go-round sound still used on the rides today. Charles Davis Smith, *The Welte Mignon: Its Music and Musicians* (Vestal, N. Y.: Vestal Press for the Automatic Musical Instrument Collectors' Association, 1994), 48.

[10]Please note that the overview of the player piano mechanism in this section is generalized and that there are numerous variations to the system. The development of just the pneumatic device took place over several decades and led to multiple models. Moreover, there are several differences between models depending on from when they date, from which country, and at which price point.

access. In entering the instrument, it is made to perform a mechanical function."[11] The

tracker bar connects by channel to a pressurized chamber, which maintains a vacuum

when the operator's feet pump the piano's foot pedals. When a hole in the paper roll

aligns with a hole in the tracker bar, air passes from the chamber to release a valve that

corresponds to a particular key on the piano. For a player piano to access all 88 keys,

there must be 88 small mechanisms (which are staggered to allow them all to fit).[12] The

player piano's pneumatic action corrects many of the imperfections found in a music box

or early phonograph — it does not slow down or stop randomly because it does not

require winding-up, rather just a skilled operator to pump its pedals and regulate the

pressurized chamber.[13]

There were three primary methods of production for regular player piano rolls.

These methods reveal the different ideologies behind musical production and recordings

in the early twentieth century.[14] The first two methods of producing piano rolls involved

a live pianist. In one method, the piano keys were hooked up to eighty-eight carbon

markers that pressed down with the keys of the piano. Some companies maintained a

small group of staff pianists to play pieces onto rolls.[15] After the performance, arrangers

and editors would manually punch holes into the roll corresponding to the pencil

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[11]Arthur W. J. G. Ord-Hume, *Player-Piano: The History of the Mechanical Piano and How to Repair It* (New York: A. S. Baines, 1970), 143.

[12] Ord-Hume, *Player-Piano*, 150.

[13]For more information on the mechanics of the player piano, see Ord-Hume's "Chapter 7: How the Player Piano Works," *Player-Piano*, 141-174.

[14]Production of the rolls made specifically for the reproducing piano, a more expensive model of player piano that controlled not only the keys but dynamics, tempo, and expression, is detailed more thoroughly in chapter 3.

[15]Suisman, *Selling Sounds*, 148.

markings.[16] Through roll-punching machinery, many rolls could then be made from one master roll. In the second method, the piano keys hooked directly up to a special piano that punched holes into a master roll as the pianist played. These two methods of making rolls from a live performance developed during the 1910s, when "the public was eager to hear more lifelike 'solo' performance."[17] After the roll was first punched, editors and arrangers fixed mistakes by taping over holes made by wrong notes and re-punching corrected holes, and added octave doublings for emphasis.[18] While both of these methods involve a live pianist, the ultimate result also involved editing and arranging *after* the initial take — an option not available with early phonograph recordings.[19]

The editing and arranging after the fact erases flaws and enhances the performer's playing, advantages that appealed to performers as well. Any error in the strip or cylinder was easily detectable by the human ear. According to Alexander Buchner,

> each job had to be calculated at least to a fiftieth of a second. This meant that the pins on the cylinders or the holes in the rolls had to be placed exactly to half a millimeter. The effect of atmospheric conditions on the exact parts of the mechanism, or the result of long use, led to tiny changes which noticeably affected the performance. [20]

Overly perfecting a roll, however, led to performances that were too perfect and mechanically exact — a human musician's performance would include variations in

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[16]Michael Montgomery, Trebor Jay Tichenor , and John Edward Hasse, "Ragtime Piano Rolls," in *The History of Ragtime* (Schirmer, 1985), 94.

[17]Ibid., 94.

[18]Ibid.

[19]The third method, discussed later in more detail, is the only method that creates rolls *without* the playing of a live pianist.

[20]Dr. Alexander Buchner, *Mechanical Musical Instruments*, Trans. Iris Unwin (London: Batchworth Press, 1959), 37-38.

timing and volume that may not be written on the score.[21] Piano roll editors and arrangers — much like the music editors working with digital music today — balanced this issue through processes very similar to modern-day quantization and humanization.[22] Quantization is the process of making a performance adhere to the regularity of the metrical structure. Editors of rolls routinely re-cut imprecise musical performances so that they more meticulously accorded with the rhythms of the musical score.[23] Unfortunately, this process of quantization can lead to overly exact rhythms that sound machine-like and unnatural. Humanization is a process that undoes the mechanical precision of quantization, usually by adding a measure of randomness that places notes slightly off the strict metrical grid or by re-incorporating performance nuances such as *accelerandi* or *rubati*. Often, the quantization and humanization processes involved doctoring the rolls to such an extent that resulting sounds became impossible for an artist to re-perform.

Rolls were often marketed as the authentic reproduction of a particular pianist or composer, and advertisements made claims such as: "The Welte Artistic Player-Piano… Gives the Absolutely True Reproduction of the Individual Play of the World's Most Famous Pianists," the Duo-Art "brings the playing of the most gifted pianists of all time into the home — their performances reproduced with the naturalness of which only the Duo-Art is capable," and the Ampico offers "Perfect Recording plus *Perfect Re-*

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[21]Dan Timis and David Gerard Willenbrink, "Method and System for Editing Digital Audio Information with Music-Like Parameters," U.S. patent number US5792971 A, published August 11, 1998, filed September 18, 1996.

[22]Quantization and humanization are modern-day terms that I am borrowing to help explain the editing processes of rolls.

[23]Ibid.

enactment."[24] George Gershwin, Claude Debussy, Ignacy Jan Paderewski, Rachmaninoff, Edvard Grieg, and many other notable performers' and composers' performances were marketed on rolls that would have been recorded in a way similar to one of these methods. These first two methods often involved spotlighting the performer, showcasing his or her skills as a virtuoso performer or composer, subtly perfected so that the playing might still be believable. Ideally, the reproducing piano roll would have been recorded from the famous pianist playing onto the roll, but oftentimes this was not the case. For example, pianolist Rex Lawson claims Gershwin and Stravinsky's rolls are not recorded performances but hand-made transcriptions.[25] Nonetheless, Suisman writes that the reproducing piano is "most often remembered for having recorded, as nothing else at the time could, piano performances by many of the era's leading composers and pianists … but these much-prized rolls were exceptional."[26] Indeed, reproducing pianos, which were meant to accurately reproduce the style and interpretation of a particular performance in addition to the correct notes, were markedly more expensive and never made up more than twelve percent of the player-piano market.[27] Embellished rolls, by contrast, involved taking the playing of a lesser-known pianist and enhancing it so that the playing of the machine itself was on display, the machine became a kind of virtuosic performer. Indeed, rolls made by enhancing and essentially *erasing* the individual marks of the playing of a lesser-known pianist align more with the third method of roll creation, rolls punched

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[24]Ads reprinted in Harvey N. Roehl, *Player Piano Treasury: The Scrapbook History of the Mechanical Piano in America* (Maryland: Taylor Trade Publishing, 1961), 47, 50, 58. Italics in the original.
[25]Rex Lawson, "What Should Librarians Do with Piano Rolls?: A Tentative Solution form the IAML Conference in Götenborg, Sweden," *Fontes Artis Musicae* 53, no. 4 (October-December 2006): 357.
[26]Suisman, *Selling Sounds*, 148.
[27]Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 17.

without the playing of a live pianist, as any differences between the two rolls would likely be aurally indistinguishable.

Thus the third method of punching rolls is the earliest and also the most interesting in terms of the way it effaces or even erases the marks of a particular performer. As Michael Montgomery, Jay Tichenor Trebor, and John Edward Hasse write, "the earliest piano rolls were not true recordings of someone's actual playing."[28] The arranger knew precisely how many inches of paper corresponded to a particular number of measures of music and would measure and cut rolls essentially by eye, dividing the sheet into perforations for various notes to produce a master roll.[29] Arrangers loosely referred to the score, and they often added difficult virtuosic embellishments and octave doublings that could result in a version of the piece that would be impossible for the human pianist to play.[30] Sometimes arrangers enhanced celebrity piano rolls as well, for example rolls supposedly made by Gershwin or Gustav Mahler, when transcribed, require a two-piano arrangement in order to make the work playable live. Andrew Durkin writes, "In addition to making 'real' piano playing sound 'better' (by getting rid of the 'mistakes' in a player roll), the most skilled piano roll editor/arranger could make an entirely 'artificial' performance (that is, one created entirely *by* the editor/arranger) sound 'real.'"[31] Durkin concludes that though a finished roll was most often marketed as "handplayed," it actually resulted from multiple hands — the pianist's, the editor's, and the arranger's.[32] This final

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[28]Montgomery, Tichenor, and Hasse, *The History of Ragtime*, 93.
[29]Ibid.*,* 93.
[30]Durkin, "The Self-Playing Piano as a Site for Textural Criticism," *Text* 12 (1999): 175.
[31]Ibid., 176.
[32]Ibid.

method of roll production was the predominant method through the 1910s and its performerless roll punching may have indirectly inspired the straight-to-roll compositions that appealed to composers like Stravinsky or Conlon Nancarrow.[33] Moreover, the performer's role — or lack thereof — particularly demonstrates how shifting labor practices impacted the musical milieu.

WAR AND LABOR

Traditionally, musical labor produces musical works. Or, rather, musical labor — musicians' labor — *reproduces* musical works.[34] But mechanical reproduction and sound recording complicate musical labor and performance by eliminating, changing, or supplementing various elements of the performance equation, an equation traditionally based on the economy of listener, performer, and composer.[35] Reproductions and recordings then convert the resulting product into a musical commodity that both resembles and counters live performance. Unlike live performance, reproductions and recordings claim to offer perfection — perfectly executed, perfectly quantized and re-humanized, perfectly impossible renditions of works, human performance concretized as musical and technical precision. Editing early phonograph records was at best difficult

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[33]Montgomery, Trebor and Hasse, *The History of Ragtime*, 94.

[34]The following works discuss the philosophy of performance and the work in performance: Edward T. Cone, *Musical Form and Musical Performance* (New York: W. W. Norton, 1968); Lydia Goehr, *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music* (Oxford: Oxford University Press, 1992); Peter Kivy, *Authenticities: Philosophical Reflections on Musical Performance* (Ithaca: Cornell University Press, 1995).

[35]Notable scholarly works on this subject include Leonard B. Meyer's *Emotion and Meaning in Music* (Chicago: Chicago University Press, 1956), Roger Sessions' *Musical Experience of Composer, Performer, Listener* (Princeton: Princeton University Press, 1950), and John Rink's *The Practice of Performance: Studies in Musical Interpretation* (Cambridge: Cambridge University Press, 1995).

and usually took place before or during the recording process.[36] The process often required numerous takes from the performer, hoping for a lucky "perfect" performance from a single take. The record, once recorded, was no longer editable except through a rudimentary form of dubbing, so recordists and engineers put musicians through a kind of pre-editing process, staging performers at certain distances from the horn and requiring all dynamics be mezzoforte or softer.[37] One account from 1910 claims musicians were required to stand on stools or platforms, spread around the room.[38] Player piano rolls, on the other hand, were relatively easy to edit and perfect — the process involved measuring and punching or re-punching the roll, depending on a given company's equipment and whether it required the music be played onto the roll or punched in manually.[39] The player piano, not the phonograph record, saw greater success earlier, while the record would not surpass the roll in popularity until the mid 1920s when microphones and an electrical process greatly improved the recording quality and amplification improved the reproduced sound.

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[36]For a more thorough discussion of the editing process for both records and *rolls*, see chapter 3.

[37]Mark Katz, introduction to *Music, Sound and Technology in America,* ed. Timothy D. Taylor, Mark Katz, and Tony Grajeda (Durham: Duke University Press, 2012), 23-25.

[38]*The Violinist* Vol. 9, 5 (September 1910): 7.

[39]"Recording the Soul of Piano Playing," *Scientific American* (November 1927): 422.
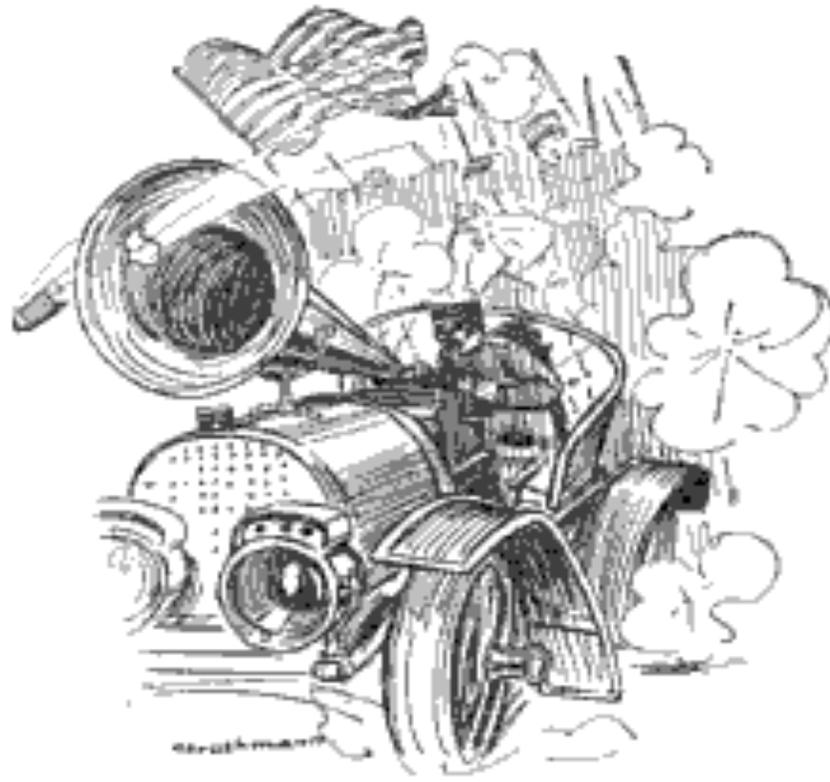
"*Led into the strife by a machine.*"

Figure 1.2: War Cartoon from Sousa's "The Menace of Mechanical Music"[40]

Some historical background on the displacement or replacement of musicians'
labor, on society's stance on technology during and after the First World War, and on the
industrialization of labor as defined by Frederick Winslow Taylor's principles of
scientific management (outlined in his 1911 monograph) will set the stage for later
chapters' discussions of labor and mechanical reproduction. Almost a decade before the
war, Sousa's "The Menace of Mechanical Music" predicted music's changing role in
battle with a cartoon, shown in Figure 1.2. Sousa describes the image as follows,

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[40]Sousa, "The Menace of Mechanical Music," 282.

Shall we not expect that when the nation once more sounds its call to arms and the gallant regiment marches forth, there will be no majestic drum major, no serried ranks of sonorous trombones, no glittering array of brass, no rolling of drums? In their stead will be a huge phonograph, mounted on a 100 H. P. automobile, grinding out "The Girl I left Behind Me," "Dixie," and "The Stars and Stripes Forever." How the soldiers' bosoms will swell at the thought that they are being led into the strife by a machine! (…) Music teaches all that is beautiful in this world. Let us not hamper it with a machine that tells the story day by day, without variation, without soul, barren of the joy, the passion, the ardor that is the inheritance of man alone.[41]

Sousa's prediction, to a certain degree, comes true. The war substantially increased the number of lethal machines including tanks, machine guns, and airplanes — in a February 1915 issue of *Scribner's Magazine* Charles Lincoln Freeston quotes an officer who, eight weeks into the war, proclaimed, "This is not a war of men. It is a war of machines."[42] Journalism historian Ross F. Collins writes, "the Great War offered a canvas to display the triumphs of the machine age. The great innovations of this industrial era could serve in so many ways to bring new developments of science to the ancient techniques of warfare."[43] World War One took mechanical devices' relatively recent improvements and applied them to weaponry; the innovations once applied to save and improve upon modern life, to save lives, now rapidly increased the efficiency in killing.

The mechanical improvements to weaponry and then, consequently, the very large number of casualties from the war would make people more wary of certain kinds of technology. And yet machines and technology fueled western societies in the public and private spheres; people operated machines at home, at work, and in the trenches. By the

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[41]Ibid.

[42]Charles Lincoln Freeston, "The Motor in Warfare: Power and Speed in the Great European Conflict," *Scribner's Magazine* 57, no. 2 (February 1915): 185.

[43]Ross F. Collins, *World War One: Primary Documents on Events from 1914-1919* (Westport, CT: Greenwood Publishing Group, 2008), 347.

1920s, machines were ubiquitous and the "massive amounts of useful energy"

information technology scholars Erik Brynjolfsson and Andrew McAfee attribute to the

Industrial Revolution "led to factories and mass production, to railway and mass

transportation. It led, in other words, to modern life."[44] Moreover, architecture historian

Reiner Banham suggests that "the true 'ghosts in the machine' of the Twentieth Century"

are the "echoes of a far from faint-hearted epoch when men truly tried to come to terms

with 'the Machine' as a power to liberate men from ancient servitudes to work and

exploitation."[45] Theodor W. Adorno, writing through a Marxist lens, similarly observed

the machine "is an end in itself only under given social conditions — where men are

appendages of the machines on which they work."[46] In the workplace, men operate and

supervise machines while machines carry out the actual labor, making, producing, or

maintaining a commodity, a usable product.[47] Adorno claims that the "cult of the

machine" finds its musical opposition in "unbarring jazz beats;" the rhythms of jazz and

ragtime act as a kind of anti-machine, dodging the relentless and regular rhythms of

domestic and public machines through syncopation.[48] Yet for Adorno, the regular beat

acts as a kind of home base, a required grounding for any kind of syncopation to occur.

[44]Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (New York: W. W. Norton and Company, 2014), 6-7.
[45]Reiner Banham, *Theory and Design in the First Machine Age* (London: The Architectural Press, 1960), 12.
[46]Marx and Engels write, "owing to the extensive use of machinery and to division of labour, the work of the proletarians has lost all individual character, and, consequently, all charm for the workman He becomes an appendage of the machine, and it is only the most simple, most monotonous, and most easily acquired knack, that is required of him." Karl Marx and Friedrich Engels, *The Communist Manifesto* (London: Penguin Books, 2002), 227. Theodor W. Adorno, "On Popular Music," in *Cultural Theory and Popular Culture: A Reader*, ed. John Storey (New York: Pearson Education Limited, 2006), 83.
[47]For more details on Taylorism and industrialized labor, see Chapter 2.
[48]Adorno, "On Popular Music, 83.

James Buhler explains that Adorno's claim is "that the rhythm, despite its appearance as syncopation, relies on the social ground of the recurring beat to be heard as such."[49] Indeed, Adorno claims syncopation is nothing new — "in the techniques of syncopation, there is nothing that was not present in rudimentary form in Brahms and outdone by Schoenberg and Stravinsky."[50] Thus while the syncopated rhythms of jazz seem new and modern, Adorno contends they are historically and socially grounded and, in fact, rather old fashioned. Their anti-mechanical dodging relies on a mechanical background of steady beats present in syncopated pre-war examples.

Out of the trenches, factories and mass production continued throughout the war. Indeed, for many soldiers, returning home often meant a return to a Taylorized, industrial factory. Taylor championed a system of labor that emphasized efficiency in obtaining the end result. Scientific management analyzes larger tasks into component tasks until they are simple enough to require only relatively unskilled laborers. Laborers then carry out the same task each day in a desubjectivized mechanization of what may have formerly required one highly skilled labor. This is the process of deskilling. Taylor's (and slightly later the Model T assembly lines of Henry Ford) system stems from the American managerial revolution, a revolution at the tail end of the nineteenth century, led by engineers, that saw success in improving productivity, efficiency, planning, and systems

[49]James Buhler, "Frankfurt School Blues: Rethinking Adorno"s Critique of Jazz" in *Apparitions: New Perspectives on Adorno and Twentieth Century Music*, ed. Berthold Hoeckner (Routledge, 2006): 125.
[50]Theodor W. Adorno, "On the Fetish Character" in *The Culture Industry: Selected Essays on Mass Culture* (New York: Routledge, 1991), 57.

in the workplace.[51] According to Alan McKinlay and James Wilson, Taylorism and

Fordism are symptoms of an

> "efficiency" movement in which … machine technology was the guiding
> metaphor of the efficiency craze, an image redolent of a sense that personal
> competence entailed subordination to an engineered hierarchy under professional
> leadership. Taylorism was not simply a technical solution specific to work
> organization but was a *cultural* innovation. The machine metaphor was
> enormously broad, and deeply ambiguous, at once conveying a dehumanizing
> logic while also suggesting a bountiful meritocracy.[52]

Mass production was the preferred method of production in factories by 1913-14, lasted

throughout the war, and was still very much the norm for factories during the 20s, the

machine age proper. In making the workplace more efficient, societal labor ideals shifted

toward a system prizing efficiency and productivity, a system that rewarded workers for

their ability to assume a place in the line and to increase production so that companies

could sell more goods or services and thus make more money. It makes sense, then, that

the emphasis on efficiency, product standardization and perfection in the workplace

would filter into early twentieth-century musical culture. The player piano, with its

perfectly standardized rolls, musically exemplifies these cultural emphases.

A PIANOLIST'S WORK

The most conspicuous aspect of the player piano is its absent player, its invisible

entertainer.[53] Yet most early player pianos required a live operator, someone skilled in

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[51]Alan McKinlay and James Wilson, "'All They Lose is the Scream': Foucault, Ford and Mass Production," *Management and Organizational History* 7, no. 1 (February 2012): 46.
[52]Ibid., 47.
[53]Auslander suggests that the player piano is a first-order simulacrum, "a device that counterfeits a human performance but clearly is not human." In this, it is more tied to humanity than the phonograph record,

manipulating the knobs and pedals on the player piano. Marketers urged people to learn

to operate the player piano instead of the traditional "silent" piano, as they claimed the

process involved markedly less skill. Manufacturers were keen on commercializing

leisure time, and the idea of a perfect in-home performance without substantial practice

appealed to consumers. People were given instructions and some even took lessons in

operating the machine; the number of player piano teachers and how-to guides increased

exponentially.[54]

But for all of the assertions made for "perfection without practice," operating the

player piano was not simple. While the pianolist does not literally press the keys of the

piano as a pianist would, the pianolist's job requires a large number of subtle shifts that

are akin to those of the pianists's fingers on the keyboard or feet on the pedals. Concert

pianolist Rex Lawson explains that the pianolists must use their feet to control the

dynamic force of the player piano's mechanical fingers as they strike the keys. The

pianolist, he says, must "acquire a subtle and fluent use of the tempo lever; and his left

hand must carry out the functions of sustaining and una corda, which his feet are too

preoccupied to manage. . . Unthoughtful pedaling will produce unthoughtful music,

devoid of light and shade and without the slightest signs of life."[55] Lawson adds:

> Just as an experienced driver is able to cope with left and right hand drive, with
> manual and automatic gearboxes, with indicator and windscreen wiper controls on

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which is second-order. Philip Auslander, *Liveness: Performance in a Mediatized Culture* (London: Routledge, 1999), 116-117.

[54]Taylor, "The Commodification of Music at the Dawn of the Era of 'Mechanical Music,'" 287.

[55]Rex Lawson, "Stravinsky and the Pianola" in *Confronting Stravinsky: Man, Musician, and Modernist*, ed. Jann Pasler (Berkeley: University of California Press, 1986), 286.

differing sides of the steering wheel, so a pianolist learns to control tempo, dynamics and pedals in a variety of ways.[56]

Although a well-trained and musical pianolist could create realistic and high-quality performances from a player piano and most player pianos were built to produce musical performances, Lawson claims "most performers lacked the musical understanding to use such an easily acquired digital technique. As a result, the mistaken impression was created that the player piano had its own unique sound, characterized by inexorable tempi and terrace dynamics with only one terrace."[57] Although Lawson lists the characteristics he believes to be undesirable in a musical performance, the inexorable tempi and flat dynamics of a bad pianola performance are exactly what drew some composers to the instrument — these are the "mechanical" sounds that lend the player piano its unique classification as something other than the traditional "silent" piano, played by a live musician. Rather than the mechanical labor required for piano playing, the player piano required a managerial labor, more akin to checking the gauges of a machine. The at-home performing musician transitioned from a highly skilled laborer, to a moderately skilled manager.

Though the deskilling of musical labor sounds like a negative side effect of mechanical instruments, this deskilling helped bring much more music to people's homes. The Aeolian company went so far as to compare the invention of the player piano to the printing press, writing,

[56]Rex Lawson, "What is a pianolist?" last accessed August 31, 2013, http://www.rexlawson.com/index.html?contents.html&0.
[57]Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky*, 286.

> Just as the printing press opened the world of knowledge and literature and
> through to all men instead of to the few, so the Pianola opens the world of music,
> of emotion, and of self-expression to all instead of merely to the few with talented
> fingers. [58]

It required little substantial investment of skill and did not take years to learn, but people were still involved in their own entertainment to some extent — they controlled the foot pump or hand crank, they adjusted the tempo and volume knobs. The main difference between a player piano performance and that of a live pianist is in the former's predetermined outcome. Recorded music — whether for player piano, reproducing piano, phonograph record, or even MP3 — is locked in to a particular performance, while the human musician can follow or ignore the instructions in the score.[59]

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[58]The Aeolian Company, *The Weight of Evidence on the True Musical Worth of the Pianola and Its Absolute Supremacy in Its Field* (Aeolian Company, 1914).
[59]Suisman, *Selling Sounds*, 93.

Chapter 2: Music Imitating Machines, Machines Imitating Humans

INTRODUCTION

The regular and mechanical clanking and ticking industrial noises of factories and

urban spaces influenced musical compositions as early as the late eighteenth century.

Composers developed a musical representation of the mechanical by emphasizing

percussive sounds like the ticking or clanking gears, or highly pitched woodwind gestures

that imitate the musical sounds of mechanical clocks or toy pipes. Often, works included

passages of seemingly endless flurries of notes, such as a repetitive accompanimental

pattern akin to the whirring of a spinning wheel or clicking metronome. These

characteristic sounds are features of the musical topic of the mechanical.

For musical topic, I rely on the definition Hatten gives in *The Oxford Handbook*

of Topic Theory,

> a familiar style type with easily recognizable musical features, ranging in
> complexity from a simple figure (fanfare, horn call), to a texture (learned style as
> polyphonic and/or imitative; chorale or hymn style as homophonic), a complete
> genre (various dance and march types; French overture), a style (*ombra*, *tempesta*,
> *Empfindsamkeit*), or some overlap of these categories.[1]

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[1]Robert S. Hatten, "The Troping of Topics in Mozart's Instrumental Works," in *The Oxford Handbook of Topic Theory*, ed. Danuta Mirka (New York: Oxford University Press, 2014), 514. The literature on musical topics is extensive and includes Leonard Ratner, *Classic Music: Expression, Form and Style* (New York: Schirmer Books, 1980). Wye Jamison Allanbrook, *Rhythmic Gesture in Mozart: Le Nozze di Figaro & Don Giovanni* (Chicago: University of Chicago Press, 1983). Kofi Agawu, *Playing With Signs: A Semiotic Interpretation of Classic Music* (Princeton: Princeton University Press, 1991). Hatten, *Musical Meaning in Beethoven: Markedness, Correlation, and Interpretation* (Bloomington: Indiana University Press, 1994). Hatten, *Interpreting Musical Gestures, Topics, and Tropes* (Bloomington: Indiana University Press, 2004). Raymond Monelle, *The Musical Topic: Hunt, Military, and Pastoral* (Bloomington: Indiana University Press, 2006). William Caplin, "On the Relation of Musical Topoi to Formal Function," *Eighteenth Century Music* 2, no. 1 (March 2005). Nicholas McKay, "On Topics Today," *Zeitschrift der Gesellschaft fur Musiktheorie* 4, 102 (2007): 159-183 provides an excellent overview.

Mechanical music maintains a kind of stable, regular aesthetic, only moving harmonically through operations such as modulations or sequences — the musical equivalents to shifting gears. In music that features a musical topic of the mechanical, an elegaic string melody will often serve as an antipode, marking the human by way of contrast. In addition to perpetual motion (which often manifests in continually repeated notes or gestures), mechanical music frequently emphasizes percussion and high-register woodwinds. These three attributes serve to outline the musical topic of the mechanical, and as the following examples will show, these sounds came to mark the "machine" in the classical tradition.[2]

The musical topic of the mechanical changes maintains its recognizable characteristics even as the machines themselves evolve. Nevertheless, some examples of the musical topic of the mechanical imitate simpler machines, such as Gretchen's perpetually spinning wheel in Franz Schubert's "Gretchen am Spinnrade" (1814), shown in Example 2.1. The entire accompanimental line in "Gretchen" is modeled on her spinning wheel, from the bass voice's regular dotted half note imitating its pedal, the bouncing bobbin in the tenor line, and the wheel itself in the right hand line.[3] Moreover, the movements of the pianist's hands while playing the work mirror the movements of the machine — the left pinky literally presses and holds the bass pedal, the left thumb

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[2]The examples in this introduction are to serve as a rough sampling of the musical topic of the mechanical and are only a few of its many manifestations; an exhaustive catalogue of the topic in music of various time periods is a subject for another project.

[3]Lawrence Zbikowski describes the right hand's sixteenth notes as "swirling," and claims "Schubert's accompaniment is, of course, meant to evoke the sound of the wheel in action, with the swirling sixteenth notes summoning the wheel itself and the repetitive, off-beat accents in the middle voice representing the clack of the bobbin." Lawrence Zbikowski, "Music, Language, and Multimodal Metaphor, " in *Multimodal Metaphor*, eds. Charles Forceville and Eduardo Urios-Aparisi (Berlin: Mouton d Gruyter, 2009): 367.

bounces through its eighth note pattern, and the right hand line forces the wrist to circle

above the keyboard like the spinning of the wheel. Lawrence Zbikowski describes,

"Schubert's accompaniment does not, in any direct way, imitate the sound of a spinning

wheel (which is unpitched) although it does provide a surprisingly accurate analog for the

act of spinning."[4] This example goes beyond imitating the ticking or clicking of

machinery — this example creates a mapping of the machine into the musical sounds

played and, perhaps more directly, in the movements made by the pianist.

Example 2.1: Gretchen's spinning wheel, *Gretchen am Spinnrade*, D. 118 mm. 1-2

Other examples include certain features of the musical topic of the mechanical,

such as the perpetual motion of the eighth notes in the following Haydn example. In a

personal correspondence from 1791, Joseph Haydn wrote: "I am quite fresh and well, and

occupied in looking at this mighty and vast town of London, its various beauties and

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[4]Ibid., 368.

marvels causing me the most profound astonishment."[5] Haydn's 1791 trip to London was

also his first journey out of his home country, and he was fascinated and "astonished" by

its size and incredible traffic.[6] London's population and industrial marvels would inspire

twelve "London" symphonies, including his Symphony no. 101 (1794), whose ticking

second movement earned the symphony its nickname "The Clock."[7] The constant short

eighth notes in bassoons and strings, shown in boxes in Example 2.2, iconically resemble

the ticking of the clock's mechanism and serve as an early musical representation of the

mechanical.

[5]Letter of January 8, 1791, reprinted in Karl Geiringer, *Haydn: A Creative Life in Music* (New York: W. W. Norton & Company, Inc., 1968), 105.
[6]Ibid.
[7]Ibid., 359.

Example 2.2: Ticking clock in Haydn's *Symphony No. 101 in D Major*, II, mm. 1-5[8]

As this Haydn example demonstrates, composers were intrigued by the possibility

of integrating mechanical sounds into music as early as the late eighteenth century.

Tamara Balter writes of the "mechanical" or "automaton" in Haydn's music, citing the

music's "mechanical elements, such as endless repetition, often with a gradual slowing

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[8]This example does not include parts for horns and percussion, all of whom are silent during these measures.

down, as when a machine needs rewinding."[9] Indeed, to musically represent a machine, Haydn includes musical lines that imitate the ticking clocks. The steady and relentless rhythms, such as the incessant ticking eighth notes in Example 2.2, serve as a model for the "perpetual motion" of the musical topic of the mechanical.

The second movement of Ludwig van Beethoven's Eighth Symphony (1812), with its distinctive scoring of chattering woodwinds, shown in Example 2.3, is more characteristic of the musical topic of the mechanical. As the example shows, the woodwinds carry constant sixteenth notes that imitate a clock or metronome — the latter, a relatively recent mechanical invention given the work's 1812 date.[10] Standley Howell writes that the movement was "inspired by Maelzel's recently invented chronometer (forerunner of the metronome)."[11] The strings carry the melody, accompanied by the wind instruments' "crisp chords," as George Grove calls them,[12] and the movement ends abruptly without the expected repeat, as if turned off by switch. The movement's ticking woodwind accompaniment serves as the basis for the musical topic of the mechanical in this example.[13]

[9]Tamara Balter, "A Theory of Irony in Music: Types of Irony in the String Quartets of Haydn and Beethoven" (PhD diss., Indiana University, 2009), 126.

[10]Standley Howell, "Beethoven's Maelzel Canon: Another Schindler Forgery?" *The Musical Times* 120, no. 1642 (Dec. 1979): 987.

[11]Ibid., 988.

[12]George Grove, *Beethoven and His Nine Symphonies* (New York: Dover, 1962), 292.

[13]In her work on the *Automaton* topic in music, Tamara Balter writes, "Beethoven's interest in the musical depiction of the mechanical and its metaphorical extensions reached its peak during the last ten years of his life, especially in the scherzi of Opp. 127, 131, and 135." Balter, "A Theory of Irony in Music," 133.

Example 2.3: Metronome in Beethoven's Eighth Symphony, mvt 2, mm. 1-6

In Léo Delibes's ballet *Coppélia* (1870), an inventor creates a life-like mechanical dancing doll. Confusion ensues when Franz, a young man from town, sees the doll and falls in love with her. Franz's jealous girlfriend Swanhilde rallies some of her friends and together they break into the inventor's home. In it they find the doll, Coppélia, along with several other mechanical dolls. They set the dolls into motion, resulting in *Musique des Automates*, shown in Example 2.4. High-register woodwinds, violins and viola, and glockenspiel take over with repetitive eighth-note figures, while the piccolo carries a high toy-like melody of constant sixteenth notes. This example features the musical topic of the mechanical in its perpetual motion, high-register woodwinds, and steady eighth and sixteenth notes.

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Example 2.4: Delibes' *Musique des Automates, Coppélia*, mm.1-8

Olympia's occasional winding down in her aria *Les Oiseaux Dans la Charmielle*
in Jacques Offenbach's *The Tales of Hoffmann* (1880) illustrates the topic of the
mechanical in opera. Similar to *Coppélia*, Olympia is an automaton with which a human
character falls in love. When Olympia performers her aria, she occasionally winds down
and needs to be re-wound in order to continue. In the excerpt shown in Example 2.5,
Olympia's virtuosic melody stalls out on B♭ and then descends chromatically through A,
A♭, and G before stalling out on G♭. The music stops while Olympia's creator,
Spalazani, rewinds her so she can continue the aria. This instantiates an example of the

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mechanical through the perpetual motion in Olympia's line, and because her winding-down is musically illustrated in the stalling out of the line. Her voice catches on B♭, sticking like a rusty gate.

Example 2.5: Olympia winds down in *Les Oiseaux Dans la Charmielle*, *The Tales of Hoffmann*, Offenbach, mm. 42-49

Well-known composers from as early as the eighteenth century were interested in writing specifically for mechanical instruments as performers. Additional examples include London's Royal Music Library's collection of several George Frederic Handel works for chimes and carillon, and Haydn and Wolfgang Amadeus Mozart's pieces for flute-playing clock.[14] Balter cites the fifth movement of Beethoven's String Quartet in C-sharp Minor, Op. 131 as the typical model for the musical topic of the mechanical before analyzing Haydn's Rondo finale in the Quartet in B-flat Major, Op. 33/4 for its mechanical gestures. The musical topic of the mechanical appears in various examples throughout the eighteenth- and nineteenth-century canon. Thus, by the twentieth century, audiences would have been familiar with mechanical sounds from the classical tradition.

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[14]Charles B. Fowler, "The Museum of Music: A History of Mechanical Instruments," *Music Educators Journal* 54, no. 2 (Oct. 1967): 45.

Early twentieth-century composers writing for films such as *L'Atalante*, *À Nous la Liberté*, *Metropolis*, and *Modern Times*, along with composers writing for mechanical instruments such as the player piano, could then rely on these already-established musical conventions when writing mechanical music.

My discussion of the musical topic of the mechanical defines "machine" broadly, suggesting that it underpins musical representations of spinning wheels, clocks, and automatons. In addition, some examples, such as Schubert's spinning wheel or Haydn's "clock," imitate the machine, whereas others, such as works written for mechanical clock, literally score the machine, and still others, such as the dancing mechanical dolls in *Coppélia*, minimize the "mechanical" sounds but reproduce a machine's movements, especially the movements that accompany a mechanical failure. When grouped together these distinct musical representations of machines combine to create an overall musical topic of the mechanical, a topic that the rest of this chapter separates and complicates in a parsing out of the machine and its role in music.

SCORING THE MACHINE IN THE TWENTIETH CENTURY

By the early twentieth century, machines were ubiquitous — they had moved into the domestic sphere and were increasingly becoming a dominant aesthetic interest. From the well-defined edges in Pablo Picasso and Georges Braque's cubist paintings to the Italian futurists' fascination with technology and industry and the surrealist's juxtaposing of seemingly random objects, the machine aesthetic — an aesthetic that encourages the imitation of the sounds and shapes of the machine without necessarily replicating the

device's usefulness — saturated early twentieth-century cultural products, including musical compositions for the parlor, stage, saloon, and screen. In addition, the factory-based machine, a laborsaving device, reached its ultimate potential when the machine took over the labor process, requiring workers to supervise the mechanism rather than laboring themselves.

During the early twentieth century, then, the machine attained a new level of cultural power. As it was integrated into more and more parts of life and especially as it became automated through engines, the machine form and mechanical practice greatly influenced art, entertainment, and work. As mechanical sounds were a part of the classical music tradition dating back centuries, by the twentieth-century audiences would have been familiar with mechanical sounds in music. With the advent of recording technologies and mechanical instruments, though, composers in the early 1900s had new mechanical means to compose and perform music. For example, composers who wanted to represent machines could draw on already-established musical conventions from the classical era when writing mechanical music, in a sense doubling the mechanical aspects of music by presenting mechanical sounds as played by a machine. In what follows, I discuss how the sounds of the machine (ticking, stomping, whirring and whistling) and musical sounds made by machines (sirens, propellers and especially the player piano) manifest in twentieth-century musical compositions. In addition, I look at labor practices and how the mechanization of labor connects and overlaps with the mechanization of music, of art.

In the rest of this chapter, I use labor theory to frame a discussion of how a culture of mechanization embeds itself in and influences music in the early twentieth century. More specifically, I organize "machine music" into three categories, outlined in Figure 2.1: music written to sound like or imitate the machine, music written to highlight the skills of virtuoso performers while also showcasing what the machine can do, and finally music written specifically for machines. These three categories encompass a wide variety of audiences and spaces, from the movie theater to the domestic parlor and professional stage, and also a wide variety of performing bodies, from the behind-the-scenes film musician to the celebrity virtuoso and established classical performer. Because of the diverse and wide audience of mechanical music, the similarity in features and sounds across all three categories makes clear the widespread influence of the machine aesthetic on early twentieth-century musical culture.

	Written to:	**Example(s):**
1	Sound like or imitate the machine	*Metropolis*, *Modern Times*, *À nous la Liberté*
2	Highlight the Skills of the virtuoso; showcase the mechanical instrument	Confrey's Novelty Rags
3	Written Specifically for Machines	Antheil's *Ballet Mécanique*

Figure 2.1: Three Categories of Machine Music

As examples for the first category, music written to imitate or narrate the machine, I examine three classic films: the opening scene of Fritz Lang's *Metropolis* (1927) and the assembly line scenes of René Clair's *À nous la Liberté* (1931) and Charlie

Chaplin's *Modern Times* (1936).[15] These examples are particularly useful because, while

the kinds of machine used in these films differ from one another, the "mechanical

sounds" in each film score maintain certain characteristics of the musical topic for the

machine as discussed in this chapter's introduction: a quick, steady rhythm, heavy

emphasis on percussion and woodwinds, and frantic string lines. For the second category,

music written to showcase the virtuoso pianist through the machine, I discuss novelty

rags such as Zez Confrey's "Kitten on the Keys," "Dizzy Fingers," and "Poor

Buttermilk," which highlight Confrey's virtuosic skill as recreated on a player piano and

therefore showcase not only the celebrity pianist but also the reproducing capabilities of

the machine itself. Finally, as an example of music written specifically for machines, I

use George Antheil's *Ballet Mécanique,* a piece he claimed to have written "OUT OF and

FOR machines."[16] Antheil's piece is just one of many examples of music written

specifically for machines — composers such as Paul Hindemith, Igor Stravinsky, and

Alfredo Casella wrote pieces for the player piano. Each example I discuss in this chapter

illuminates a different aspect of the complicated angles of the musical machine, but each

example represents just one of many options. The machine age does not leave its musical

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[15]Kenneth Schuyler Lynn, *Charlie Chaplin and His Times* (New York: Simon & Schuster, 1997), 383. Chaplin did not possess the musical knowledge to compose a full score, so he worked with others in order to put together the music for *Modern Times*. As Kenneth Schuyler Lynn describes, "Chaplin would show up at the studio in mid-morning, armed with a couple of musical phrases he had thought of for the sequence at hand. Raksin would duly write them down. Then they would run the footage over and over and discuss how the music might relate to it. Sometimes they decided to go with Chaplin's melody. On other occasions they would modify it, or one of them would invent a new melody. Some of the phrases they began with were extensive, while others consisted of only a handful of notes. Again and again, Chaplin would whistle the tune, or hum it, or pick it out on the piano as they developed and varied it in accordance with the action on the screen. The work was hard."

[16]George Antheil, "My *Ballet Mécanique*" *De Stijl* 6, no. 12 (1925). Reprinted in George Antheil, *Ballet Mécanique* (Milwaukee: Schirmer, 2003), vi. Capitalization in the original.

accompaniment untouched as late-nineteenth-century music fades out to the catchy tunes

of syncopated ragtime and the cacophonous new sounds of the avant-garde.

THE MACHINE ON SCREEN

"But those who toiled knew nothing of the dreams of those who planned…"
-Maria, *Metropolis* (1927)

Gottfried Huppertz, a German composer and actor, scored Lang's futuristic

science fiction film *Metropolis* (1927), by one account the most expensive German

production of the silent era.[17] As described in a 1928 article in *Close Up* magazine, Lang

was a Viennese director for the German studio Ufa noted for his "intelligence and breath"

and gothic style.[18] In its own time, *Metropolis* was called "a vision of the machine age,"[19]

and it focuses on class divisions, which have become so extreme that classes are

separated into physical levels with the highest classes above ground and the workers

below.[20] Lang based his metropolis on New York City and as Paul Rotha writes, the film

captures the city's "rows of rectangular windows, its slow-treading workers, its great

geometric buildings, it contrasted light and shade, its massed masses, [and] its

machinery."[21] The epigram of Lang's *Metropolis* is "the mediator between hand and

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[17]Peter Larsen, *Film Music* (London: Reaktion Books Ltd., 2005), 35.
[18]E. Hellmung-Waldow, "The Spy," *Close Up* 2, no. 6, June 1928, 65.
[19]Wilbur Needham, "The Future of the American Cinema," *Close Up* 2, no. 6, June 1928, 46.
[20]Irena Paulus, "Stanley Kubrick's Revolution in the Usage of Film Music: 2001: A Space Odyssey (1968)" *International Review of the Aesthetics and Sociology of Music* 40, no. 1 (June 2009): 102. Gottfried Huppertz"s score was not used, and the film was extensively re-cut, when the film was released for the American market.
[21]Paul Rotha, *The Film Till Now: A Survey of World Cinema* (New York: Twayne Publishers, Inc., 1960), 275.

brain must be the heart!" (0:30).[22] In its allegory of the modern alienated work place, the

film paints the laborer as the hand, dull and unintelligent, whereas the manager is the

head, intelligent but detached. Mirroring the class divisions, the realms of the hand and

the head are completely separate — one below ground, the other above, one poor, the

other rich. The film maps the division of labor and consequently class division onto the

parts of the body, and the situation becomes so dire as to require a mediator, the heart, in

order to keep the head and hand from separating completely, resulting in utter anarchy.[23]

The film's opening scene depicts a dystopic view of the modern industrial age.

Shown in Figure 2.2, a new shift of laborers files in as the previous shift files out, heads

down, moving as one large body fatigued by the clock. The new shift workers take their

place at work only to endlessly repeat the same task. The specificity of their work

alienates them from recognizing any sense of accomplishment, making the labor appear

futile and purposeless; despite the essential role they play in keeping the energy plant

running, workers have little awareness of the significance of their labors, a point

emphasized when the workers destroy the machine that provides power to the city (and

also prevents the lower levels where the workers live from flooding). In addition, the

system encourages isolation, as workers need not interact with one another to complete

their jobs — even though they file in and out as a faceless mass, their work isolates them

when, similar to assembly line workers, the shift laborers' work breaks a larger process

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[22]Timestamps refer to the 2008 DVD.

[23]Graeme Turner, *Film as Social Practice* (New York: Routledge, 1988), 173. In his analysis of
Metropolis, Graeme Turner writes that the mediating character in the film fulfills a sort of Christ-like role;
he is "the 'heart' which guides the co-operation between the 'head' (the ruler) and the 'hands' (the
workers)." He later writes about the political undertones of the film, which Hitler admired for its Fascist
leanings.

into smaller tasks. The worker is little more than a small cog in a large wheel: an easily replaced piece of the labor machine. Relatively unskilled, mindless and mechanical, this work alienates the individual from the labor process and the machine thereby remakes the worker in its own image.

Figure 2.2: Laborers, *Metropolis*

In representing labor, *Metropolis* gives Frederick Winslow Taylor's "principles of scientific management" concrete form; the reproduction of the system assumes primary status, coming prior to the individual. In his 1911 monograph, Taylor champions a systematic re-organization of industry based on a set of facts and rules derived from scientific analysis aimed at developing a system that privileges efficiency and productivity. For Taylor, the end-result, production, takes precedent over a rewarding labor process for the worker. He therefore prefers unskilled, unthinking labor — labor

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organized so that "an intelligent gorilla" (Taylor's turn of phrase for labor so simple that

human decision making need not be involved) can accomplish it.[24] Taylor's indelicate

phrase for a conception of simplified labor draws attention to his overall notion of the

labor process. In imagining labor as subhuman work, Taylor's assembly line process

strips workers themselves of subjectivity, and so also of their humanity, re-rationalizing

labor as the work of objective *bodies* of pure drive, mindless and faceless, trained to

mimic to the letter the machines that would replace them. This rationalization follows a

two-step process. First, the production process deskills labor, desubjectivizes individuals

and melds them into a mechanized collective body of laborers whose de-emphasized

humanity categorizes them as neither man nor machine. These laborers exemplify

Taylor's "intelligent gorillas," useful only in so far as they can mimic and repeat the same

task ad infinitum. Second, the production process models this collective body on the

machine and it does so in such a way that as technology improves, eventually an actual

machine can replace the collective. The workers embody — anticipate and make present

— the mechanism in a new society of alienated individuals.

Taylorism and the general industrialization of labor transform society. As Michael

Hardt writes, "society itself was gradually industrialized even to the point of transforming

human relations and human nature. Society became a factory."[25] Taylor's ideal of

unskilled labor comes close to fruition in the gruesome picture presented in *Metropolis*.

The main difference between Taylor's concept of the "intelligent gorilla" and its real-

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[24]Frederick Winslow Taylor, *The Principles of Scientific Management* (New York: Harper & Brothers Publishers, 1911), 40.
[25]Michael Hardt, "Affective Labor," *Boundary 2* 26, no. 2 (Summer 1999): 91.

world counterpart is that the assembly line worker must have some skill — in order to repeat the same task the laborer must first learn the task itself. While the difficulty and skill level required for each individual task in the industrialized labor process can vary, it is important to note that Taylorism creates a moderately skilled worker, not a completely unskilled one; it creates an *intelligent* gorilla, capable of learning a specialized task only to mindlessly repeat it. Taylor's laboring intelligent gorilla maintains his intelligence only insofar as it is necessary for labor and production; it is a mechanical intelligence, more akin to programming than actual learning.

MODERN METROPOLIS: MUSIC WRITTEN TO SOUND LIKE OR IMITATE THE MACHINE

Metropolis, *À nous la Liberté,* and *Modern Times* each highlight the representation of mechanized labor, the first in worker's repetitive and seemingly meaningless monitoring of the machines, the second two in the similarly repetitive and particular labor on the assembly line. The two labors are of the same kind, as both demand first that a worker repeat the same task again and again for an assigned number of hours, and second that the work ends when the clock marks the ending of a shift, not with the completion of a particular product or task. Working for the clock leaves the worker with little satisfaction; he — in these films laboring with and as machines is men's work — sells his time without any claim to ownership of the final result. The combined labor of multiple bodies increases production as time-based work seemingly presents a mechanized living body as the perfect worker. Yet it is uncertain whether that laboring living body need also be human. With its simple tasks, managerial labor and the

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assembly line standardize work, in the process eradicating the individuality, the least

machine-like and most human part of the process, from the labor equation. Thus while

scientific management still requires actively laboring human bodies, it requires a

relatively unskilled labor that can be carried out by an "ordinary man" (Taylor's term),

not the highly skilled labor of an artisan or craftsman. Because most people can carry out

assembly line work, it champions the desubjectivized average individual, the individual

who is not an individual but one who blends seamlessly into the new labor machine.[26]

The new prevalence of this desubjectivized individual, toiling away in the modern

workplace, drew comment from artists and writers, musicians and critics. But through

film, especially, the figure regains some measure of subjectivity, when storylines focus

on the lives of the laborers, juxtaposing their invisibility in the line with their humanity

and individuality. Michel Chion writes,

> Machines are good when they serve to build a better world, and it is in this
> positive light that they were presented, with or without synch sound effects but
> often with a musical accompaniment suggestive of the mechanical and the
> motorized, in the silent or sound films of Eisenstein (*The General Line* [a.k.a. *Old
> and New*] [1929]), Vertov (*Enthusiasm* [1930]), and Dovzhenko (*Earth* [1930].
> What Lang (in *Metropolis*), René Clair (in *À nous la Liberté*), and Chaplin (in
> *Modern Times*) criticized was not machines themselves but the abuses of the
> Taylorism that they served, especially in the effort to control time (clocks are
> prominent symbols in all three films).[27]

Metropolis, *À nous la Liberté*, and *Modern Times* are just a few examples of films that

critique early twentieth-century labor practices and of films with machine-influenced

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[26]F.W. Taylor also writes that eventually "no great man can (with the old system of personal management) hope to compete with a number of ordinary men who have been properly organized so as efficiently to cooperate." Taylor, *The Principles of Scientific Management,* 6-7.

[27]Michel Chion, *Film, A Sound Art*, trans. Claudia Gorbman and C. Jon Delogu (New York: Columbia University Press, 2003), 41.

musical accompaniment. In *Metropolis*, Lang presents the seemingly desubjectivized

individuals of Taylor's industrialized society as the shuffling mass of workers. Exiting

the factory, the workers look weary, their bodies drained of energy, and yet the workers'

mindless labor leaves something behind, something that propels them out of the factory at

shift's end.[28] While industrialized labor drains bodies of energy and minimizes human

interaction, the very human need for socialization remains; the worker's individuality

holds on despite the industrialized and desubjectifying working conditions. Regardless of

their unified appearance, the worker's drained bodies moving together actually highlights

each worker's individuality; each man's individuality pushes him forward.[29]

Clair's *À nous la Liberté*, scored by *Les Six* member Georges Auric, follows two

cellmates first as they labor over toy horses on an assembly line, shown in Figure 2.3, and

later as they make their separate ways outside of prison.[30] Unlike the laborers in

Metropolis, whose work drains them of their energy, *À nous la Liberté* depicts a more

direct kind of forced manual labor. In *À nous la Liberté* the prisoners assemble the toys

by hand; their collective labor creates the machine. Moreover, Clair's *À nous la Liberté*

influenced Chaplin's *Modern Times*, which also features assembly line labor. *Modern*

Times tells of a faulty factory worker, shown in Figure 2.4, who falls behind on his

[28]Karl Marx writes of the something left behind, comparing it to mathematical "errors." For more on the elimination of error from musical performance, see Chapter 4. Karl Marx, *Capital: A Critique of Political Economy,* Part IV, ch. 13, ed. Frederick Engels, trans. Samuel Moore and Edward Aveling, revised Ernest Untermann (New York: Random House, Inc., 1906), 354.

[29]The need for human interaction and for an outlet from the monotonous plant opens up a new market for entertainment and leisure. As outlets for this untapped spirit, amusement parks and films for entertainment outside of the home, and player pianos, phonographs, and radios, serve as new in-home entertainment centers. John F. Kasson, *Amusing the Million: Coney Island at the Turn of the Century* (New York: Hill and Wang, 1978), 65.

[30]Déirdre Donnellon, "French Music Since Berlioz: Issues and Debates," in *French Music Since Berlioz* ed. Richard Langham Smith and Caroline Potter (Burlington: Ashgate Publishing, 2006), 13.

assembly line duties after encountering a series of distractions. The comedy that ensues is

pure humanity in its flubs and flaws; the film uses humor to show the ridiculousness of

forcing a human to work as if he were a machine. The mechanistic labor highlights the

inadequacies of humans, which comedy then highlights further through the particular

absurdities of Chaplin's lead character. At one point Chaplin's character tries to work on

the machine and instead it pulls him in, not only foregrounding his incompetence in

tinkering with the machine but also the machine's ability to physically overtake him,

making even more of a mockery of the situation.

Figure 2.3: Toy horse assembly line in *À nous la Liberté*'s French prison

Figure 2.4: Chaplin as an assembly line worker in *Modern Times*

A kind of social commentary, Chaplin's film criticizes the assembly line model as an inhumane, ludicrous and often impossible — it creates a work environment in which human failure is both inevitable and punishable. *Metropolis*, then, portrays the ideal workers who are worn-down by their seemingly purposeless labor, and *Modern Times* portrays a reality wherein all workers are not created equal; some workers cannot possibly fulfill the duties required of them, and no worker can operate to the machine's perfect standards. In each film, the music accompanying the laboring bodies includes sounds meant to imitate the machine on screen — Huppertz's score for *Metropolis* aligns music and machine so that the two work together, Auric's score for *À nous la Liberté* includes music made by the laborers themselves, and *Modern Times'* score echoes the

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flaws in the system and its laborers.[31] The emphasis on woodwinds and percussion, constant driving rhythms, and awkward or odd accentuations all mark the "mechanical" aspects of the music, while in each film string melodies come to mark the human. In the analysis that follows, I look at particular scenes from each film to demonstrate how the mechanical aspects of the music demonstrate the advantages and more importantly the disadvantages of living in a mechanized culture. Each selection provides just a few of the many ways mechanical music can function in my first category, written to sound like or imitate the machine.

Metropolis's original score begins with a triumphant theme that leads to a shimmering C major triad for the full orchestra that coincides with the title (0:37). The screen fades and, as shown in Example 2.6, the music quickly shifts to an allegro marked by a spinning chromatic flurry in the upper woodwinds (0:50). The trumpets, brass and strings pound out minor harmonies on the upbeats, creating a sharp contrast against the heroic and stable melody and major key of the title sequence. Stomping pistons (marked explicitly in the score as "Stampfende Kolben") appear on the screen as the beginning of a montage sequence. The restless pumping of the pistons comes through musically in the offbeat accents and incessant chromatic cycling of woodwind neighbor groups. The steady eighth note bass, which seemed comfortable in the title sequence, now adds to the

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[31]Janet Sayers and Nanette Monin write of Chaplin's role as a service worker later in the film. They say that the nonsense song the tramp sings is a "commentary on another type of industrial work — service work." (3) Ultimately, they claim that Chaplin's transition from assembly line worker to service worker acts as a "transformative agent for the process of industrialization. The audience of customers (and ourselves as the film's viewers and producers of meaning) is transformed, from demanding, complaining, and controlling, to entertained, enriched and happy;" Janet Sayers and Nanette Monin, "Comedy, Pain and Nonsense at the Red Moon Cafe: The Little Tramp's Death by Service Work in *Modern Times*" (paper presented at the Art of Management Conference, Paris, 2004), 20.

edgy and uneasy quality of this section, because it is at odds with the awkward offbeat

accented harmonies and the two essentially create constant accents at the eighth note

level. The screen shows a close-up shot of the pistons as they move up and down, notably

out of sync (in the Kino DVD print) with the accented offbeat eighth note harmonies.[32]

The misalignment between music and machine inadvertently features the odd

circumstances surrounding music written to sound like a machine. Undoubtedly the

pistons shown on screen have a particular sound, and yet the music, with its high

woodwinds and blaring horns, clearly departs from the sound of the pistons themselves

and instead creates a musical version of a generalized "mechanical" sound. The regularity

of the offbeat accents, the nervously fluttering woodwinds, and the blaring horns each

take certain aspects of the mechanical — its regularity and relentlessness, its

unpredictability and insensitivity to musical expectations — and apply them to more

familiar musical circumstances. The music does not directly map the noise of the

machine onto the score; rather, the music picks and chooses certain features of

mechanical sound and applies them to create a musical representation of the machine.

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[32]The original version of *Metropolis* was lost shortly after its 1927 Berlin premiere. When I write of the alignment between score and film, I refer to the 2004 restored version released on DVD. Also note that in 2008, an additional 25 minutes of footage was found in the Museo del Cine in Buenos Aires. Larry Rohter, "Footage Restored to Fritz Lang's 'Metropolis,'" *The New York Times*, May 4, 2010, accessed October 20, 2014, http://www.nytimes.com/2010/05/05/movies/05metropolis.html.

Example 2.6: Allegro, *Stampfende Kolben, Metropolis*

    The three vertical pumping pistons fade into three horizontal strips of light (marked in the score as "Vertikale Lichtstreifen") (0:54) that soon reveal a large spinning wheel (0:57). Shown in Example 2.7a, the woodwinds continue to flit nervously around as the offbeat accents calm to octave Es divided by A, resting only briefly before beginning with a dissonant melody that prominently features the leap of a minor seventh. Shown in Example 2.7b, the melody itself is jagged and awkward, machine-like in its indifference to standard melodic resolutions and practices. The awkward intervals and dissonant harmony — when stacked, the pitches used in the trumpet's melody here creates a polytonal affect, juxtaposing an A major harmony against an E♭^{7} — directly contradict the perfectly round and regular spinning wheels on screen. Furthermore, the meter shifts from simple quadruple in the stomping pistons section to compound duple for the vertical lights. Compound duple and the spinning woodwinds bring to mind Gretchen's spinning wheel, but the similarities between the two examples ends there —

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Huppertz's score employs hemiola to obscure the meter, with a simple triple pattern in the bass against the compound duple feel of the woodwinds and trumpet. The layering of dissonance, of superimposing audiovisual dissonance upon harmonic and metric dissonance, aligns with my earlier suggestion that the music borrows certain characteristics from the machine. In this case the music borrows the machine's indifference to artistic forms of balance and regularity to give the impression of musical noise, a music that follows the logic of programming and mindless action rather than artistic passion.

Example 2.7a: *Vertikale Lichtstreifen, Metropolis*

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Example 2.7b: Awkward melodic line with jagged, dissonant leaps; *Metropolis*

As the large wheels completely take over the visual landscape, the upper woodwinds cease fluttering, switching to grace-note-accented chimes on G♭ that bring to mind the blow of a factory whistle or siren used to mark the end of shifts, shown in Example 2.8 (1:13).

Example 2.8: Cracking Whistle blows, *Metropolis*

The grace note sounds like a squeak in the mechanism, followed by vibrato-free G♭s. The screen shows many different parts of the machine as the four-note repetitive melody in the bass becomes more insistent. At times multiple images layer and blur the edges of

the mechanism and the pieces appear as independent machine. Each machine tirelessly labors on screen, and yet the film never shows them producing any sort of product, setting the tone for the workers' feelings of futility regarding their unimportant labor. At this point the film has not disclosed that the machine images shown belong to the machine that powers the city, and in retrospect, each part of the mechanism has been shown on such a close, individual level that we never actually see the full machine. All of these moving parts represent the desubjectified laborers, toiling without any sense of purpose.

The machine images fade to a ten-hour clock that counts down the seconds in synchronization with the woodwind whistling (1:16). Ultimately the whistling upper woodwinds prove prophetic as the clock moves nearer to 10:00 and all other voices chime in for a gradually building trill that coincides with the image of a factory whistle blowing (1:29). The whistle marks the end of one shift and the beginning of another, and the screen goes black but for the words "Shift change" (1:35). The "whistle" sounds through the intertitle, linking the two scenes. The image changes again, now showing two groups of shift workers, one filing in, and the other out (1:39). The harsh trilling blurs and smoothes the quick image changes from machine to title to workers. As the gates rise, the whistle stops and after a very brief pause the music's character changes (1:46). Shown in Example 2.9, an elegiac melody enters in the strings, highlighting the music's change from imitating the machine to imitating the beaten-down laborers.
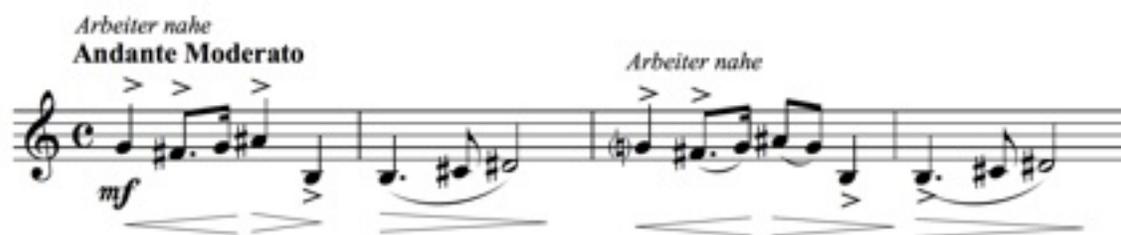
Example 2.9: Elegaic Strings' Melody, *Metropolis*

The melody begins with a lower neighbor around G that pushes the line up,

implying a G minor tonality. But the melody reaches an augmented second to A♯ only to

tumble down a major seventh to B. A♯ sounds like B♭ in the previously-suggested key of

G minor; the score reveals the augmented interval and so also the melody's tonal

ambiguity between G minor and B major. The large leap down partially resolves as the

strings climb up, but they only make it to D♯, shifting the tonal center towards B before

the theme begins again and reverses it to G. The melody falls each time and never

successfully climbs out of the registral depths. Much like the melody, the workers are

stuck in the lowest level of society with no chance of working out of it, no mobility into

the upper classes who live above the workers in quality of life and in their literal

placement above ground. Yet the ascent to D# hints at something more — a teasing hint

at B major in the midst of a somber minor-sounding melody. G minor dominates register

and metric placement and the melody consistently returns to G minor. It is as if the

melody, in its tonal uncertainty, captures the worker's internal separation of individuality

and mindless labor. The dominant G minor stands for their monotonous tasks, while B

major's glimmer of hope represents the indefatigable human need for social interaction.

Workers file in and out to this melancholic melody, those filing in moving at

exactly double the speed of those filing out. The coordinated movements of the men

portray them not as individuals within a group, but faceless parts of a whole; their

collective efforts form an industrialized laboring machine. The group shares one task,

monitoring the machine. As Gavin Kitching describes it, "in the factory with an

automatic machinery system, workers are reduced to attendants of machines, and there is

a growing 'separation of the intellectual powers of production from manual labour' since

an even lower level of skill is required than in manufacture."[33] In other words, the

separation of intellectual and manual is built in to the managerial labor process; the labor

in *Metropolis*, in fact, requires less skill than the assembly line labor of *À nous la Liberté*

or especially of *Modern Times*. In *Metropolis*, then, the labor process divides and

subdivides work into a series of unskilled actions distributed across the laboring whole.

The combined labor of the mass of relatively unskilled workers keeps the machine

running — the group of workers embodies the heart of the machine, they keep it

pumping. Meanwhile, the system devalues the individual skilled laborer and increases

productivity. The workers themselves are like the disjointed pieces of the machine at the

film's opening, isolated from the end result, toiling for a product to which they will never

connect. Industrialized labor also isolates the workers from each other as their impersonal

labor ignores the human need for connection and socialization. Each laborer is a part of

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[33]*A Dictionary of Marxist Thought*, s.v. "Industrialization," by Gavin Kitching, ed. Tom Bottomore
(Oxford: Basil Blackwell Ltd, 1991), 257.

the masses and individual responsibility and ownership fall to the wayside, victim to the constant need of industry-driven consumer culture.[34]

Clair's *À nous la Liberté* presents a slightly different approach to the mechanization of labor, in that the only tools the prisoners are shown using to make toys are simple ones — hammers, paintbrushes, etc. The prisoners sing as they work, which in a sense humanizes the soundtrack; the music comes from the men, not their labor. Although the music sets the tempo for their labor, its lyrics comment on their imprisoned status. The men sing "*La liberté, c'est pour les heureux* (Freedom is for the fortunate)," and "*Ah! . . . paignez ceux qui sont. . . . En prison! . . .* (Ah! . . . be sorry for those who are . . . In prison! . . .).[35] The music's plodding compound duple meter acts as conduit for the labor to completely take over the bodies of the men, and the primarily stepwise melody, shown in Example 2.10, possesses not only the results of their labor but also their voices. The least mechanical instrument, the human voice, becomes a part of the laboring assembly line. Later, they sing of their lack of freedom and plead for sympathy with "*La liberté, c'est toute l'existence.* (Freedom is everything in life)" and "*A nous, à nous la libertè . . . .* (Give us, give us our freedom . . .)."[36]

Example 2.10: The prisoners' melody, transcribed by author

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[34]For more information on the destruction and re-assembly of *Metropolis*, see Michael Minden and Holder Lachmann, ed., *Fritz Lang's Metropolis: Cinematic Visions of Technology and Fear* (Rochester: Camden House, 2000), 117-122.

[35]Trans. Richard Jacques and Nicola Hayden, *À Nous La Liberté and Entr'acte: films by René Clair* (New York: Simon and Schuster, 1970), 13, 15.

[36]Ibid., 16-17.

The prison assembly line operates on a pre- or early industrial model based on

hand-held tools and human labor rather than a literal machine made of metal and gears.

Instead, the prisoners are the nuts and bolts of the machine while the non-diegetic simple

flute melodies (motivic ideas taken from the melody shown in Example 2.10) punctuated

by occasional snare drum hits serve as a kind of childish military band accompaniment,

commenting on the simplistic nature of the prisoners' work.[37] The music in *À nous la*

Liberté, music written to sound like or imitate the machine, provides the least obvious

example of the first category of machine music. *À nous la Liberté* depicts prisoners who

are already considered subhuman by most of society as Taylor's "intelligent gorillas."

And their music — like their labor — is simple, lacking much of the mechanistic

virtuosity and rhythmic complexity of other examples.

Metropolis paints a bleak picture of industrial society with its unhappy workers

and obvious class divisions, and *À nous la Liberté'*s prison setting is similarly gloomy. In

Modern Times, however, Chaplin uses humor to make a similar statement through

"naturalistic and concrete images of an America under economic siege."[38] Chaplin, an

English early film star known particularly for his silent comedies, composed much of the

music for *Modern Times* himself. As he did not possess the musical knowledge to

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[37]The snare hits and melodic snippets on flute sound militaristic rather than mechanical. Indeed, the military is a kind of human machine, working as one body for a common goal.

[38]Joan Mellen, *Modern Times* (London: Macmillan, 2006), 38. Lawrence Howe similarly writes that *Modern Times* is "the product of a particular historical moment of transition in cultural attitudes about technology and about cinema…*Modern Times* marks an intersection of the technological production of material goods and art." Lawrence Howe, "Charlie Chaplin in the Age of Mechanical Reproduction: Reflexive Ambiguity in *Modern Times*," *College Literature* 40, no. 1 (Winter 2013): 61.

compose a full score, Chaplin worked with others — namely, David Raskin — in order to

put together the music.[39] Kenneth Schuyler Lynn describes the score's composition:

> Chaplin would show up at the studio in mid-morning, armed with a couple of
> musical phrases he had thought of for the sequence at hand. Raksin would duly
> write them down. Then they would run the footage over and over and discuss how
> the music might relate to it. Sometimes they decided to go with Chaplin's melody.
> On other occasions they would modify it, or one of them would invent a new
> melody. Some of the phrases they began with were extensive, while others
> consisted of only a handful of notes. Again and again, Chaplin would whistle the
> tune, or hum it, or pick it out on the piano as they developed and varied it in
> accordance with the action on the screen. The work was hard.[40]

Thus while the credits list Chaplin as the film's director, producer, writer, star, and

composer, Chaplin in fact had quite a bit of help in putting the score together —

ironically, Chaplin lacked the musical skill to transcribe and orchestrate the score for his

film commenting on the assembly line's de-skilling of the labor process.

In the assembly line portion of the film, Chaplin plays an inept factory worker.[41]

The scene begins with playful strings and twinkling upper woodwinds accompanied by

the image of workers hammering away on the line (3:11). Chaplin turns screw after

screw, pausing briefly to scratch an itch (3:26). The line moves ahead without him and he

causes it to back up. The music shifts into minor as Chaplin and his supervisor argue

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[39]Raksin gives a full account of his experience of working with Chaplin in "Life With Charlie" (1983), in *The Hollywood Film Music Reader*, ed. Mervyn Cooke (Oxford: Oxford University Press, 2010), 69-81
[39]Lynn, *Charlie Chaplin and His Times*, 383.
[40] Ibid.
[41]In *Charlie Chaplin and His Times*, Kenneth Schuyler Lynn writes that there was a "well-founded suspicion that [Chaplin] had lifted his basic ideas for the picture's assembly-line scenes from René Clair's satire of the machine age, *À Nous la Liberté* (1931)." Lynn, *Charlie Chaplin and His Times*, 372.

(3:39).[42] Chaplin gets back to work only to have a bee, marked aurally by a series of

ascending triads in the flute shown in Example 2.11, fly around his head (3:50).

Example 2.11: The distracting bee, transcribed by author

He falls behind again and the line backs up. The man working next in line signals for the

foreman to stop the line (4:17). The music stops as the supervisor marches over to inquire

about the holdup. His question carries through into the music with a blaring ascending

line in the trombone (4:21), shown in Example 2.12.

Example 2.12: Question and Answer, transcribed by author

When Chaplin points to his wrist, recently struck by his neighbor's hammer, the bassoon

responds with the same gesture, softened by the difference in timbre (4:23). The

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[42]Even though Chaplin's *Modern Times* was made in 1936, several years after the advent of sound film, Chaplin's tramp character does not speak at all in the film. Instead, the tramp sings a nonsense song, "Je cherche après Titine," because Chaplin believed if the tramp were to speak "the first word he ever uttered would transform him into another person." See Charles Chaplin, *My Autobiography* (New York: Simon & Schuster, 1964), 366. Michel Chion writes of the significance of the Tramp's song in *Film, A Sound Art.* See Michel Chion, *Film, A Sound Art*, 22-24.

supervisor yells at Chaplin's neighbor and the trombone returns, this time with an emphatic descending line (4:25). The supervisor marches away and Chaplin points to his neighbor, marked by another ascending gesture in the oboe, again a softer timbre, this time in an even higher range (4:30). As his neighbor kicks Chaplin, the two fall back into line and the entire orchestra comes back in (4:33) — the smooth orchestral score underlying the machine directly contrasts against the meandering music that takes over when the workers are on the line with the machine turned off.

The president of the company comes over the speaker and pushes for more speed just as Chaplin is relieved from his spot on the line (4:42). He walks away to the same music that played earlier, the music of the assembly line. Even though he is not actively working on the line, his body still jerks through the motions of his labor, turning screws in the air as his legs awkwardly try to walk after standing for so long (5:06). Garrett Stewart describes these awkward laboring aftershocks as symptoms of the "internalization of mechanical rhythm." The rhythm, Stewart writes, "attacks Charlie and pushes him over the edge early in *Modern Times*; for him there is no stoppage of the machinery in his own nervous brain as he careens wildly about the factory in an involuntary hysteria of bolt-tightening gestures long after he has been yanked from the conveyor belt."[43] That the music follows Chaplin, not the machine, is revealing: while the music scores the machine in *Modern Times*, the "machine" is not the monstrous mass of metal and screws, but rather Chaplin, and at times the other workers, repeating the same

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[43]Garrett Stewart, "Modern Hard Times: Chaplin and the Cinema of Self-Reflection," *Critical Inquiry* 3, no. 2 (Winter, 1976): 297.

tasks mindlessly, mechanically, and monotonously. Chaplin's twitching stills by the time

he clocks out and heads to the men's room for a smoke break (5:19). His time away from

the line cues a romantic melody in the strings, shown in Example 2.13, with the harp for

accompaniment (5:22).

Example 2.13: Break Music, transcribed by author

Much like in *Metropolis*, the string-heavy music comes in during the laborer's

time away from the line, thus the strings become marked as less mechanical, an aural

indication of humanity when compared to the percussion, brass, and woodwinds of the

more mechanical music used in *Metropolis*'s opening and Chaplin's depiction of

assembly line labor. As Chaplin relaxes into his smoke, the factory manager's face

appears on the bathroom wall, yelling at him to "get back to work!" (5:35). Merely

mentioning work lights a fire beneath Chaplin and the music responds accordingly,

immediately switching to the rhythmic, fast-paced, woodwind-dominated music of the

assembly line. After little argument Chaplin clocks back in (5:44). He takes his place on

the line and resumes his screw-turning duties (6:20).

Later in the film we see Chaplin working his afternoon shift. The same music

enters as earlier, only now even the strings are frantically moving through a rapid,

serpentine melody (14:03). Meanwhile syncopated staccato repeated pitches in muted

trumpet, mallet hits, and triad arpeggiations in the woodwinds emphasize the frenzied

nature of the music. Chaplin quickly falls behind and when his supervisor yells at him the

strings switch to five-note chromatic sequence that gradually moves up by half step (14:13), shown in Example 2.14.

Example 2.14: Chromatic sequence, Strings, transcribed by author

When his supervisor leaves, the strings begin constant arpeggiations over harp glissandi until he falls so far behind that the strings repeatedly glissando while mallets mark the beat with repeated quarter notes, gradually ascending higher and higher as Chaplin loses control (14:23). Chaplin climbs onto the line to try to regain his place but he moves towards the mouth of the machine. His neighbor catches his feet but with a loud cymbal crash Chaplin enters the chute at the end of the conveyor belt and winds through the gears, tightening stray bolts as he goes (14:45). The music stops as the cymbal crash resounds. Figure 2.5 shows Chaplin trapped in the gears, tightening stray bolts as he goes, while the woodwinds and glockenspiel bumble through an out of tune underwater-sounding waltz. Chaplin's supervisor unwinds the machine and the music changes character again, moving through an ascending chromatic line as Chaplin untangles from the machine's innards and re-enters the workroom with a piccolo trill and flourish (15:11).

Figure 2.5: Chaplin in the machine, *Modern Times*

The "machine" music of *Metropolis* and *Modern Times* uses woodwinds and percussion centered themes, constant driving rhythms, and awkward or odd accentuations to mark the "mechanical" aspects of the music. *Metropolis*'s music maps directly on to images of the machine — the stomping pistons and spinning wheels — and the music conveys the mechanical within the context of a more traditional score. Rather than directly imitating the sounds of the machine, *Metropolis'*s score presents a mechanized musical version of those sounds — music imagined as machine. The score for Chaplin's *Modern Times* is similar to that of *Metropolis* in that the music accompanying the assembly line scenes is distinctly mechanical. Like *Metropolis*, *Modern Times'* score heavily relies on quick, regular rhythms and woodwinds and percussion to highlight the

mechanical nature of Chaplin's work. Overall, then, both film scores use music that is written to sound like or imitate the machine; they each perform mechanical sounds through a musical lens.

The difference between the three film scores lies in the mechanism that each score imitates. *À nous la Liberté* imitates the machine on screen, but the laboring prisoners metaphorically embody the machine. In *Metropolis* the mapping is more direct, as the screen clearly shows each machine that the music imitates and when the machine image changes, the music changes as well. However *Modern Times* is complex because the music correlates more directly to Chaplin's movements — which certainly clash with the mechanistic movements he *should* be carrying out in order to fit in on the assembly line — rather than the movements of the machine. But if the assembly line turns a group of workers into a collective body of labor wherein the most valuable laborers are those who blend best into their work, then the actual machine in *Modern Times* is the collective body of workers, much like in *À nous la Liberté*. Chaplin's "individuality" makes it difficult for him to assimilate into this body, and the music illustrates his distractions and flaws as an assembly line worker by accompanying the distracting bee or his itchy nose. Nonetheless, Chaplin is a part of the assembly line, and the machine music scores him, not the rivets and gears of the machines. The soundtrack for what is human, portrayed in these two examples as romantic string melodies, shuts off in favor of the mechanically minded music of an assembly line laborer, a laborer who can divide his work into small, mindless and easily repeated tasks. Chaplin's incessant tightening of gears aligns with the

incessant ringing of mallet and woodwind instruments in his score, a score for the human machine.

MECHANICAL NOVELTY: MUSIC WRITTEN TO HIGHLIGHT THE SKILLS OF VIRTUOSO PERFORMERS WHILE SHOWCASING THE MACHINE

The fascination with assembly lines and mass production indicate a society acclimated to the manufacturing processes of the Industrial Revolution. By the early twentieth century, mass production had become the norm for the urban working class as machines spread beyond the factory and into the parlor; in other words, the machine affects not only men at work but also women and children at home. And at this point, the Industrial Revolution means more than just the mechanization of labor; it is a full mechanical revolution that infiltrates even intimate domestic space, introducing professionally performed musical entertainment into the home through the player piano, phonograph and radio. For those who could not afford an in-home unit, penny arcades and saloons provided coin-operated instruments and phonographs stocked with the latest rolls and records. Mechanical music resonates on the street as well, as saloons and motion picture houses placed player pianos just outside their doors to draw people in with their jangly tunes. Many movie theaters and dance halls switched to player pianos instead of live musicians to save money and have endless hours of entertainment. Early player piano models required an active operator to pump the pedals and to provide dynamic variation, but later models needed only a power source. I focus on the player piano in the analyses that follow, rather than phonograph recordings or radio segments, because while the

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phonograph, radio and player piano all put the performer's skills to the forefront, only the

player piano delivered physical evidence of a player's technique through the visual

display put on by the piano's keys.[44] Piano roll manufacturers and virtuosic performers

capitalized on this unique feature that opened a niche they could fill with pieces like the

novelty rag.

Novelty rags fall within the basic genre of ragtime, which is "a style of popular

music that flourished from the mid-1890s to 1918. Its main identifying trait is its ragged

— i.e., syncopated — rhythm."[45] In their history of ragtime, David Jasen and Trebor Jay

Tichenor describe ragtime as a "musical composition for the piano comprising three or

four sections containing sixteen measures each which combines a syncopated melody

accompanied by an even, steady duple rhythm."[46] Ragtime played an important role in

the history of American popular music, especially between the mid-1890s and the First

World War, but its popularity exposes something of a contradiction in the musical

economy of the time. Other popular sheet music of the time catered to the amateur

pianist, but ragtime's complex rhythms usually demanded significantly more of the

pianist.[47] The music was often too challenging for the average amateur pianist, but newer

technologies (phonograph, radio, and player piano) made the latest hot jazz, boogie-

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[44]Some pianists, such as Duke Ellington, purportedly learned to play stride piano (a New York style that emphasizes the ragtime bass with a low octave or tenth on beats one and three, and a middle-range chord on beats two and four) by practicing with the depressed keys of the player piano. Ellington learned a piece by slowing the roll and tracing the movement of the keys until he memorized them. Arnold Shaw, *The Jazz Age: Popular Music in the 1920's* (Oxford University Press, 1987), 80.

[45]*Grove Music Online, Oxford Music Online*, s.v. "Ragtime," by Edward A. Berlin, accessed August 27th, 2014, http://www.oxfordmusiconline.com/subscriber/article/grove/music/A2252241.

[46]David A. Jasen, Trebor Jay Tichenor, *Rags and Ragtime: A Musical History* (Dover, 1978), 1.

[47]*Grove Music Online*, "Ragtime," Berlin.

woogie, stride piano, ragtime, and novelty pieces accessible to audiences.[48] Moreover, with its tricky syncopation, ragtime gained a strong following especially among saloon audiences, as most turn-of-the-century saloons and picture houses had pianos that offered employment to any pianist with the skill to negotiate the ragtime rhythms.[49]

Because motion picture houses were a relatively new phenomenon, the player piano could fade into the background behind the fascinating display on the screen. In addition, ragtime's presence in saloons at the turn of the century helped smooth the transition from live pianist to player piano, as the player piano could work longer hours, with fewer errors and, most importantly, at a much lower cost than a live musician. Saloon owners invested in the machines and the investment paid off when the machines drew in customers and provided them with inexhaustible entertainment. Because much ragtime was composed specifically for the piano, it especially suited the player piano and thus the player piano became a kind of showcase for the talents of such ragtime composers as Scott Joplin and Zez Confrey.

Specifically known for his novelty rags, American composer Zez Confrey's "Kitten on the Keys," "Dizzy Fingers," and "Poor Buttermilk," epitomize the genre. Confrey studied music at the Chicago Musical College and then, along with his brother, performed in a touring orchestra beginning around 1915.[50] The novelty rag, described as

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[48]Shaw, *The Jazz Age: Popular Music in the 1920's*, 12.
[49]Jasen and Tichenor, *Rags and Ragtime: A Musical History*, 2.
[50]*Grove Music Online, Oxford Music Online*, s.v. "Zez Confrey," by Mark Tucker, accessed November 25th, 2014, http://www.oxfordmusiconline.com/subscriber/article/grove/music/46997.

a "series of complicated workouts for virtuoso pianists," is a successor to ragtime.[51] The style involves "plentiful triplets, syncopations and parallel fourths" that "ensured the ongoing brightness and dynamism,"[52] and it rose to popularity after World War One. Novelty piano pieces strongly emphasize speed and technique; while the melodies are often simple and seem easy, the speed and relentless notes usually proved too difficult for the amateur pianist.

An important distinction between ragtime and novelty rags is that ragtime primarily found success in sheet music sales, while the novelty rag became popular more through piano roll (and phonograph) sales. The piano roll drew attention to the piece but more importantly it drew attention to the (absent) pianist, celebrity composer/performers whose ghostly fingers could tickle the ivories from coast to coast. While scholars credit Felix Arndt with the composition of the first novelty rag in 1915, Confrey brought the style into the limelight in 1921 with his "Kitten on the Keys" followed by "Dizzy Fingers."[53] These pieces were specifically composed to show off his technique through the machine, in particular, the player piano. As such, they are examples of a second category of mechanical music: music composed to highlight the skills of virtuoso performers while also showcasing the limitless technique of the mechanical piano.

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[51]Scott Yanow, *Classic Jazz: Third Ear—The Essential Listening Companion* (San Francisco: Backbeat Books, 2001), 3.

[52]Stephen Banfield, "Music, Text and Stage: Bourgeois Tonality to the Second World War" in *The Cambridge History of Twentieth-Century Music*, ed. Nicholas Cook and Anthony Pople (Cambridge: Cambridge University Press, 2004), 98.

[53]Felix Arndt was a New York based composer who composed "Nola" for his fiancée Nola Locke. Arndt made up to three thousand piano rolls for companies such as QRS and Duo-Art before his tragic death. Shaw, *The Jazz Age: Popular Music in the 1920's*, 86.

"Kitten on the Keys," Confrey's best-known work, has three sections, much like a traditional rag. Its introduction, shown in Example 2.15, includes chromatically descending octaves in the left hand with a syncopated melody set in parallel fourths in the right hand. The right hand melody's ornamented descent leads to the dominant, C major, on the downbeat of m. 4, which triggers the left hand to drop into a lower register and reverse direction, ascending to a two-measure syncopated vamp that leads to the beginning of the first section of the piece. Thus far the music is not overly challenging, though the amateur pianist would most likely need to practice the syncopated parallel fourths. Despite that, the piece gets markedly more complex as the first section of the piece begins. The right hand melody swings through a dotted eighth to sixteenth note rhythm and the melody hops all over the keyboard. Meanwhile, on each beat the left hand strums chords spanning an octave at the smallest and a tenth at the largest, placing a somewhat high demand on the size of the pianists' hands — or the roll editor's skill — before shifting to the characteristic low octaves on beats one and three followed by mid-range chords on beats two and four.

Example 2.15: "Kitten on the Keys" Introduction

The piece's trio section, the beginning of which is shown in Example 10, hammers at a relentless *fortissimo* with accents on almost every attack, including the blaring octaves in the left hand. The relentless accents bring to mind the staggered accents of *Metropolis*, shown in Example 2.16, wherein the constant accents cancel one another out. In "Kitten on the Keys," as in *Metropolis*, the accents imply an indifference to metrical hierarchy and beat patterns in an aggressive push towards randomness rather than musical coordination. The right hand takes advantage of the full keyboard, reaching G7 multiple times. At several points the right hand must balance one syncopated rhythm in the top voice while the lower voice carries another syncopated rhythm, all while

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keeping track of the steady left hand chords and octaves which often require the left hand

to hop between the low and middle ranges of the keyboard.

Example 2.16: "Kitten on the Keys" Trio

Example 2.17 shows one particularly difficult passage from the end of the trio.

Negotiating this combination of rhythmic complexity and large range demands a highly

skilled pianist, a skill level that the average amateur would not have. In addition, the

piece's *allegro moderato* tempo would challenge even a skilled pianist. These factors

increased demand for rolls and records of the piece, and more specifically for Confrey's

performances of the piece on rolls and records. As David Thomas Roberts writes, "The

novelty style was influenced by piano-roll arrangements, and many works demanded

considerable pianistic skill; indeed, their composers were among the most adept pianists

in the popular field."[54] In composing difficult works, Confrey essentially created a demand for more than sheet music — Confrey sold *his performance* along with the piece.

RH: two-voice syncopation

LH: Large leaps

Example 2.17: Particularly difficult syncopation in "Kitten on the Keys"

"Dizzy Fingers," while markedly less complex than "Kitten on the Keys," still employs several technical features that would be difficult for the amateur pianist. For example, metric dissonance in the B section undoubtedly adds to the "dizzy fingers" that sway above the metrically regular bass line. As shown in Example 2.18, the right hand slips into triple meter while the left remains in quadruple. This is an example of *secondary rag* rhythm, which is "marked by patterns of three eighth notes against an explicit duple- meter beat."[55] Note that a secondary rag is not always syncopated — rather, it is recognizable because of its "repeating three-note melodic pattern

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[54]*Grove Music Online, Oxford Music Online*, s.v. "Novelty Piano," by David Thomas Roberts, accessed October 27th, 2014, http://www.oxfordmusiconline.com/subscriber/article/grove/music/49104.
[55]Jeffrey Magnee, *Irving Berlin's American Musical Theater* (Oxford: Oxford University Press, 2012), 130.

superimposed on a duple meter" which creates shifting accents.[56] When viewed at another metric level, these accents can create traditional syncopation, but syncopation is not a primary feature of the secondary rag. In this example, beat 1 moves early by one beat per measure until eventually the two hands realign, as indicated by the large box.

Example 2.18: Secondary Rag- Metric Dissonance in "Dizzy Fingers"

"Poor Buttermilk" has a darker tone than "Kitten on the Keys" and "Dizzy Fingers," and Jasen and Tichenor call its B section "the most rhythmically complex of anything found in Novelty rags."[57] The B section, shown in Example 2.19, begins with a misalignment between the hands, much like "Dizzy Fingers." The section begins in B♭ minor with an eighth note chromatic descent in octaves in the left hand. The right hand enters half a beat too late, and the left hand pauses on beat two as if to allow the right hand to catch up. But the right hand breaks after two eighth notes as well — after every two eighth notes in each hand, there is an eighth rest that keeps the hands metrically

[56]*Grove Music Online,* "Ragtime," Berlin.
[57]Jasen and Tichenor, *Rags and Ragtime: A Musical History*, 219.

misaligned. The right hand comes in on the upbeat of beat one and follows the same two-eighth, one-eighth, rest pattern a half beat behind the left hand. This hypermetric confusion lasts just over one measure before the left hand settles back into even quarter

Example 2.19: Hypermetric Complexity in "Poor Buttermilk," mm. 20-27

notes, but the evenness only lasts for 3 measures before the right hand throws the rhythm off again with a new syncopated pattern above an even pattern in the left hand. Example 2.20 shows melodic simplification of the first measure to highlight its syncopation. Both syncopated sections repeat before an end-accented introduction to the return of the A section.

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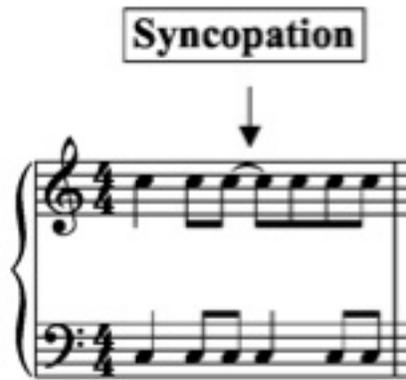
Example 2.20: Melodic simplification of m. 24

These three pieces are just a small sample of Confrey's ninety novelty rags — a figure that marks him as the "most prolific and versatile writer of piano novelties."[58] The novelty rag became popular just as recording technology was starting to take off, and Jasen and Tichenor explain that because of this "many rags appear only on recordings, performed by their composers."[59] These recordings include not only those for the phonograph record, though, but also the player piano roll, which delivered the imprint of an artist's fingers on the keys to millions of other keyboards across the nation. As previously mentioned, the new rag repertory provided several challenges that went beyond the skill level of many average pianists and thus pushed audiences toward recorded music to hear the newest and hottest styles.

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[58]Shaw notes that one of Confrey's unpublished pieces, "Twaify's Piano," was based on the noises made by a piano in Twaify's store in LaSalle, Illinois: "Confrey was able to imitate the out-of-tune keyboard, flapping piano roll, and the wheezes. It was this composition that led to his making piano rolls for QRS and Victor." Shaw, *The Jazz Age: Popular Music in the 1920's*, 86.

[59]Jasen and Tichenor, *Rags and Ragtime: A Musical History*, 215.

Records, rolls, and radio changed both public and domestic music consumption. This change indirectly affected live performers, professional and amateur. The playing of recorded music in businesses such as salons, motion picture halls, theaters, and roller rinks, meant listeners encountered recorded music outside of the home. Indeed, the convenience of recording technology, along with the motion picture and radio industries, eventually eclipsed the role of hundreds of vaudeville performers who had been touring over two thousand theaters nation-wide. In addition, recorded music changed performance practice in the private sphere, and from the turn of the century to the mid-1920s, sheet music sales slumped as player piano sales soared. Responding to music's changing domestic role, 1933 Edward B. Marks writes "Most pernicious of all was the effect of the new ether toy upon pianos. Home playing practically ceased."[60] Rather than writing difficult music for the stage, composers like Confrey wrote for recording, to showcase their own talents and capitalize on their skills as players as well as composers. Thus Confrey composed pieces specifically for mechanical mediation, through a machine that allowed him to record and duplicate his performance as a new musical commodity. David Suisman writes:

> Consumers assimilated the idea of music as issuing from an automatic machine (such as a phonograph or player-piano), detached from human labor, and fixed in objects (such as records or piano rolls), portable and storable, and independent of time and place. Music, which had once been produced in the home, by hand, was now something to be purchased, like a newspaper or ready-to-wear dress.[61]

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[60]Shapiro and Hentoff, *Hear Me Talkin' to Ya,* 103-4, quoted in Shaw, *The Jazz Age: Popular Music in the 1920's*, 13.
[61]David Suisman, *Selling Sounds: The Commercial Revolution in American Music* (Cambridge, MA: Harvard University Press, 2009), 10.

Concurrently, while Confrey and others composed and consumers adjusted to music as issued from a machine, detached from the human laborer, music became more accessible to more people through records and rolls.[62] The popular music market supplied a seemingly unending amount of catchy new tunes and consumers came to desire the commodity; consuming the latest pop tune became "the path to personal fulfillment."[63]

With its uncanny visual display, the player piano could not completely erase the visibility of the performer: in this case, the moving keys indexed Confrey's absent body. This additional invisible body, then, found a place in the living rooms of those who could afford it. The invisible performer played on command; the instrument conjured a performing specter, a servant to the player piano's operator. Taking a note from Taylor's positive spin on de-individualization in the workplace, player piano manufacturers worked hard to convince consumers that they were not listening to an instrument playing itself, but rather a piano modeled after real musicians, actual humans. People were not to think of the mechanics of the instrument — advertisements commanded listener's to think of the pianist just as listeners became more used to machine-issued music.

Such detachment of music from the laboring performer connects with Taylor's philosophy of breaking down labor into small easily-managed pieces, of blurring the overall production process in the fracturing of its steps so that no one laborer can be credited with a particular creation — it is the work of the virtual company as a whole, under the leadership of a few skilled and powerful individuals. The novelty rag follows

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[62]Suisman, *Selling Sounds*, 10.
[63]Ibid.

the same logic: the player pianos isolated laborers following instructions given in by roll, while the composer and publisher gained credibility and fame for their skilled contributions. Confrey's novelty rags exemplify mechanical performances that imitate human performances — the machine imitates the human as the player piano rolls of Confrey's works take his particular movements and store them to be replayed across the country at the will of the consumer. *Metropolis* and *Modern Times*, on the other hand, exemplify music that imitates machines, musical versions of mechanical sounds. In each case discussed thus far the machine plays an important role, whether it is inspiring music or parroting it.

THE UNSKILLED BALLET: MUSIC WRITTEN SPECIFICALLY FOR MACHINES

"My first big work… Scored for countless numbers of player pianos. All percussive. Like machines. All efficiency. NO LOVE. Written without sympathy. Written cold as an army operates. Revolutionary as nothing has been revolutionary."[64]
-George Antheil

In the above quote from a 1925 letter to Stanley Hard, George Antheil writes of his most recent work, *Ballet Mécanique.* Antheil, described in a 1924 issue of *Der Querschnitt* as a "young pianist composer who had been creating riots all over Central Europe, and the most dangerous menace to present-day compositions," began work on the piece in Paris in 1923.[65] After its successful July 17, 1926 premiere in Paris, its first

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[64]Quoted in Carol Oja, *Making Music Modern: New York in the 1920s* (New York: Oxford University Press, 2000), 81. Cited as a letter from Antheil to Stanley Hard, [9? March 1925], George Antheil Collection, Music Division, Library of Congress.
[65]Cesar Searchinger, "The Greatest Coup of Age," *Der Querschnitt* IV (1924): 47. Erika Esau writes, "More than any other European magazine in this restless decade, *Der Querschnitt* represented the politically detached aspirations of the aesthetically attuned of the Western world. Lightheartedly

New York performance on April 10, 1927 was a disaster;[66] correspondingly, the work

would come to be known as both his "zenith and his nadir."[67] The piece was advertised as

"the expression of America, Africa, and Steel," and Antheil himself reportedly claimed,

"[I] wanted to express American industry and American Architecture and found that I

could not do that with conventional music, so I proceeded to develop new forms."[68]

According to Antheil, the piece was to serve as a cautionary tale, "to warn the age in

which I was living of the simultaneous beauty and danger of its own unconscious

mechanistic philosophy, aesthetic."[69] The term *machine aesthetic* became tied to Antheil,

and according to Linda Whitesitt, this aesthetic consists of "motivically conceived

melodies and propulsion to his chordal ostinato patterns within a dissonant, yet static,

harmonic framework."[70] The piece, then, is efficient and cold, an unsympathetic

expression of industry and steel and a warning against the machine-centered spirit of

early twentieth-century American society.

      To convey this mechanistic aesthetic musically, Antheil's original score includes

parts for three xylophones, electric bells, three propellers, tamtam, four drums, a siren,

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snobistisch, the magazine's inclusions of works by 'anyone who was anybody' in the Weimar period and its unorthodox graphic and literary style qualifies it as an avant-garde publication." "'The Magazine of Enduring Value': *Der Querschnitt* (1921-36) and the World of Illustrated Magazines" in *The Oxford Critical and Cultural History of Modernist Magazines*, Vol. 3. Ed. Peter Brooker, Sascha Bru, Andrew Thacker, and Christian Weikop (Oxford: Oxford University Press, 2013), 870.

[66]Julia Schmidt-Pirro, "Between the European Avant-Garde and American Modernism: George Antheil's '*Ballet Mécanique*,'" *Soundings: An Interdisciplinary Journal*, 89 no. 3/4 (Fall/Winter 2006): 407.

[67]Linda Whitesitt, *The Life and Music of George Antheil, 1900-1959* (Ann Arbor: UMI Research Press, 1983), xviii.

[68]Schmidt-Pirro, "George Antheil's '*Ballet Mécanique*,'" 408.

[69]George Antheil, *Bad Boy of Music* (Garden City, NY: Doubleday, Doran & Company, Inc., 1945), 140.

[70]Whitesitt, *The Life and Music of George Antheil 1900-1959*, 116.

two pianos, and sixteen pianolas written in four parts.[71] This combination was to emphasize the machine-like quality of the music, which was not meant as an abstract imitation of a machine, but rather as a physical, musical realization of the machine.[72] As Antheil famously claims,

> My *Ballet Mécanique* is a new FOURTH DIMENSION of music. My *Ballet Mécanique*, is the first piece of music that has been composed OUT OF and FOR machines, ON EARTH. My *Ballet Mécanique* is the first piece of music that has found the best forms and materials lying inert in a medium that AS A MEDIUM is mathematically certain of becoming the greatest moving factor of the music of future generations.[73]

Ballet Mécanique uses the player piano because of its possibilities as a machine rather than an instrument. Indeed, Antheil adamantly asserts that the piece does not *imitate* a machine, but rather it is a musical representation of the machine aesthetic.

Looking at the piece analytically, *Ballet Mécanique* can be broken into three main parts. The first, according to Antheil, "may be considered that of mechanical scientific civilization; the second and third barbaric ones, not unrelated to the American continent..."[74] *Ballet Mécanique* is an exercise in rhythmic relentlessness — Julia Schmidt-Pirro claims that the *Ballet Mécanique*'s "most notable characteristics are a steady eighth-note rhythm which seems to be interrupted only at the end of the piece by unusually long stretches of silence."[75] The work has, as it were, just two settings, completely on or completely off, as if operated by a switch. And yet despite the constant

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[71]George Antheil, *Ballet Mécanique* (Milwaukee: G. Schirmer, Inc, 2003).

[72]George Antheil, "My *Ballet Mécanique*: What it Means," *Der Querschnitt* 5 (1925): 791.

[73]Ibid.

[74]George Antheil, Composers notes on 1952-53 re-editing of *Ballet Mécanique* (Trenton, New Jersey: Templeton Publishing Co., 1959), 3.

[75]Schmidt-Pirro, "George Antheil's '*Ballet Mécanique*,'" 409.

barrage of eighth notes, the impression the piece delivers is one of unpredictability, the

infernal machine. The eighth-note pulse of the first theme hammers away, burying the

metrically irregular melody in the inner voice of pianolas I and II. Reduced to just the

melody in Example 2.21a and shown in its full pianola voicing in Example 2.21b, the

theme is based on a six-note pattern that constantly shifts just slightly, throwing off any

kind of strong metrical regularity.

Example 2.21a: *Ballet Mécanique*'s hidden melody.
BALLET MECANIQUE
By George Antheil

Example 2.21b: *Ballet Mécanique*'s hidden melody (all pianola parts), mm. 1-5
BALLET MECANIQUE
By George Antheil
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Figure 2.6 breaks down the pattern (X) and tracks its variants through mm. 1-12.The initial statement, X, includes six eighth notes that span the tetrachord from A-D. The final A holds across the bar line, indicated with the dash, delaying the pattern's attack in m. 2. The second statement of the pattern gets cut short, interrupted by the third statement, which successfully repeats the pattern from m. 1, X. In mm. 4-5 the variant (X') expands by one additional repeated pitch, C#, which again blurs the metrical placement of the pattern. The C# bumps the ½ X of m. 6 by half a beat so that it falls on the same part of the measure as the ½ X statement in m. 2. The brief interlude in m. 7 sounds like a quick resetting, as if the machine has been thrown off kilter with its half-statements and additional pitches. The reset is followed by another statement of X in m. 8. Measures 9-10 appear to follow the variant X' of mm. 4-5 with repeated C#s, but the final A gets cut off by another resetting interlude in m. 11. The machine catches on faster, resetting sooner. X appears without its final A one more time before the interlude material takes over with its wide-ranging harmonized scales that sound like the wind of the propellers in the background.

Meas.									LABEL
1	B	D	C#	B	C#	A	-		X
2	B	D	C#	B					½ X
3	B	D	C#	B	C#	A	-		X
4-5	B	D	C#	C#	B	C#	A	-	X' + 1
6	B	D	C#	B					½ X
(7)									(int.)
8	B	D	C#	B	C#	A	-		X
9-10	B	D	C#	C#	B	C#			X' + 1 – A
(11)									(int.)
12	B	D	C#	B	C#				X - A

Figure 2.6: Mapping *Ballet Mécanique*'s Melodic Variants; Chart labels correspond to labels in score in Example 2.21a

The opening twelve measures alone provide a rich example of how this music is staged to showcase the machines that play it. Behind the irregular patterns, the pianolas hammer dissonant harmonies of seven or eight notes per attack. The music, while not impossible for the human pianist, would be extremely taxing, demanding constant and regular *forte* eighth notes that stretch the hand to up to a tenth.[76] Meanwhile the propellers turn in the background, giving the music an unfamiliar whooshing punctuated by the occasional drum hit. The xylophone 1 maintains steady sixteenth notes that move between the hands chromatically in contrary motion, the upper line occasionally stuttering on its move from B-D and back, the lower from C down to G and resetting at different times than the upper voice. The pianolas and each hand of the xylophone function as three separate machines that align rhythmically while evidently remaining indifferent to the harmonic dissonance between them. The player piano mirrors this

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[76]Live performances usually follow Antheil's 1953 revised score, not the original 1926 score, which is more difficult to coordinate.

mechanistic indifference to harmonic dissonance, while the human performer struggles against it. In addition, maintaining constant eighth notes for the duration of *Ballet Mécanique* — with a runtime of anywhere from 10-24 minutes — places taxing demands on the technique of even the most tireless of pianists. Rhythm is the dominating factor in each example discussed so far, whether it is the regularly pumping pistons, turning gears on an assembly line, carrying out complex syncopations, or 1240 measures of mostly steady eighth notes. Thus a steady, relentless rhythm seems to be the most basic ingredient to the early twentieth-century machine aesthetic.

After the opening twelve measures, *Ballet Mécanique* continues to hammer through dense eighth note ostinati and scalar patterns with various mechanistic melodic fragments moving between the voices. After a sweeping pianola transition that ushers the music out of its opening, the first and second pianolas take the forefront again with eighth note triplets in m. 20, making the beat seem faster and more frantic. Rather than its contrary motion musings of the opening, the xylophones instead hold a dissonant tremolo between E and F♯ in the upper part, and D, E, and F♮ in the lower. The melody now moves through the different voices as if the ear is meant to trace the sound as it meanders through the innards of the machine. Occasionally the musical machine stops and starts, turning over like a faulty engine. For example in mm. 50-53, shown in Example 2.22, the pianolas come in awkwardly at the end of each measure with loud and dissonant mid-range chords followed by low strikes at the bottom of the keyboard's range. Other than the occasional propeller whir or drum hit, the other voices drop out in m. 50, creating a marked change from the thick tremolos and accented harmonies of mm. 48-49.

The electric bells ring often, slicing through the sonic texture, keeping audiences aware of the mechanistic nature of this music. The piece is meant for machines, and as such it avoids classification as tonal or atonal — Antheil claims that his *Ballet Mécanique* "is of no kind of tonality at all. It has nothing to do with tonality. It is made of time and sound… the two materials, FUNDAMENTAL materials, that music is made of…"[77] Yet Antheil's claim does not stop scholars from assigning various tonal and polytonal labels to the piece, for example when Keith Allan Cochrane explains that while the piece "does not depend on the harmonic orientation of sections to determine its form. Still, some sections are heard in definite keys while others are written without clearly identifiable tonalities."[78] Cochrane also explains the piece as in three main sections, while Schmidt-Pirro disagrees, describing it instead as "A Gigantic AAAAAAA-Form."[79] Either is possible, though Cochrane's divisions are difficult to find in the score and even more difficult to hear — while section divisions are readily apparent, it is difficult to say which divisions are more important and which less. AAAAAAA-Form disregards the differentiations clearly made between sections, and thus seems disconnected from what actually occurs in the music. If anything, a hybrid between Cochrane's and Schmidt-Pirro's formal descriptions fits the piece best — it follows something like an ABCDEF form, a form which has a trajectory but no underlying formal principal based on sectional recurrence.

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[77]George Antheil, "My *Ballet Mécanique,*" *De Stijl* 6: vi.
[78]Keith Allan Cochrane, "George Antheil's Music To A World's Fair Film" (Doctor of Arts diss., University of Northern Colorado, 1993), 50.
[79]Schmidt-Pirro, "George Antheil's 'Ballet Mécanique,'" 410.

Example 2.22: *Ballet Mécanique*'s mm. 48-53
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The divisions in the score itself date from the 1953 edition, as the original score has been lost. Most scholarly writings address Antheil's 1953 revised score rather than the original 1924 version, however, in 2003 Schirmer released a reconstructed 1924 score. The reconstruction was the result of a group effort by a team of editors, musicologists, engravers, pianolists, and electronic musicians. The process began with engraver and editor George A. McGuire, who then approached Rex Lawson, famed pianolist who decoded the piano rolls into notes by painstakingly proofreading them against the sections of manuscript compiled by McGuire. From there, Paul D. Lehrman translated Lawson's work into MIDI and created a program and click track so that one master machine could carry out the complex rhythmic and metric demands of the work, while a human conductor and performers follow the machine's lead.[80]

The machine indeed takes charge in this piece. Antheil's use of the "mathematical 2,3,4,5,6,7,8,7,6,5,4,3,2 principle" guides his expansion of consecutive eighth notes by measure groupings of each successive number (a two-measure group is followed by a three measure group, etc.).[81] Antheil describes this principle in his notes on the 1952-53 re-editing of the work, but despite his admission to using the principle, it would be somewhat difficult for the audience to hear amid the work's rapid tempo and cacophonous affect — audiences would perhaps hear the sections get longer and shorter again, but certainly would not be able to count through the mathematical principle behind it without practicing or following a (marked) score. In addition, the constant time-

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[80]George Antheil, *Ballet Mécanique*, xiv.
[81]Cochrane, "George Antheil's Music To A World's Fair Film," 58.

signature changes combined with the complex rhythms are challenging even for a conductor to follow, and thus the 2003 printing of 1924's *Ballet Mécanique* is meant to be lead by the machine instead. The machine leads the work, ahead even of the conductor. In other words, the conductor and the human musicians involved in the performance become a part of the machine; the machine takes them in as part of its mechanism, not unlike Chaplin's assembly line workers.

Perhaps the most jarring moment in *Ballet Mécanique* comes at the very end when all voices drop out for a measure of complete silence in m. 1221. Example 2.23 shows the next measure when the machine turns back on and the pianolas barrel in with tremolos as the siren wails, piercing the silence. Over the next several measures the meter shifts regularly and awkwardly from 11/16 to 10/16, then two measures of 11/16 before a measure of 8/16 and 17/16. The meter keeps changing as the pianolas' hammering sixteenth notes become tremolos, covering the entire range of the keyboard between the four instruments, until finally the very last measure brings the drums and pianolas together for a final syncopated measure of 11/8 to close the piece, shown in Example 2.24.

The ending is a blur after the shocking measure of silence, and when its extreme *forte* noise settles into the syncopated final measure the awkward syncopations feel like a relief. The piece ends with two eighth notes, the last one marked with an accent as if to deliver the final indifferent punch to audiences' musical expectations. The piece simply turns off as a machine would. There is no recapitulation or grand conclusion; the music stops as if with the flip of a switch. Antheil's *machine aesthetic* remains true to itself to

the very end, maintaining awkward rhythms and indifferent melodic fragments for the

length of the piece before quickly turning it off as clearly as it began.

Example 2.23: Breaking the silence, m. 1222
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Example 2.24: *Ballet Mécanique*'s ending, mm. 1238-1240
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UNPLUGGED

Perhaps the ability to unplug or switch off on a whim is what marks mechanical

music in the twentieth century as something novel. The introduction's examples of

Haydn, Offenbach, and Schubert provide just a few instances of how certain sounds in

the classical tradition became associated with the machine as its own musical topic.

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These examples carry through into the choices made by Huppertz, Auric, and Chaplin for their versions of music that imitates the machine. Of the three categories of machine music, the music in these films, then, is the *least* detached from the western tradition because they directly connect back to earlier musical representations of machines. This is not the case for Confrey's novelty rags, not because of the musical features of the rags themselves but because the novelty rags are composed to highlight the virtuoso *through specific kinds of technology*. Whether the phonograph or the player piano, Confrey and other composers took advantage of a unique new feature that recording technology provides in order to market not only their music but also their performing labor. This category of music was not possible before the advent of recording technology.

Antheil's *Ballet Mécanique,* while within the confines of the classical tradition, shoots for a new realm or dimension of musical expression. But the piece is not aimed at creating an outlet for twentieth-century human expression through music; rather, the piece is OUT OF and FOR machines, as if the machines themselves have need for an expressive outlet. By giving machines music, Antheil goes beyond anthropomorphization to the full *subjectification* of the machine. Antheil's work, then, allegorically functions as the musical realization of Taylor's principles. While Taylor never intended for his management system to apply to machines — he wrote his monograph to advise companies on how to efficiently organize and improve *human*, not mechanical, productivity — as machines come to be designed to assume the now-simple tasks carried out by human laborers, the machine eventually substitutes for human labor. The machine subsumes the role of manual tools, replacing them with their mechanized counterparts

much as the player piano assumes the function of a human pianist in Antheil's *Ballet*. Antheil writes for something new, an instrument that moves beyond its role as tool to the level of machine, emancipated from the restraints of human skill and capability. Indirectly, Taylor subjectifies the machine — machine as laborer, man as supervisor — just as Antheil subjectifies the machine in his *Ballet*. While it appears as though the piece — the machine — absorbs the conductors and performers, it is in fact realizing what Taylor's system predicts. Much like the industrial worker who or drudges through the same task again and again, this piece allows the performers and conductor to step to the side of the production process — the machine, as programmed by the roll, represents an appropriation of the performer's own productive power. Unlike the music of *Modern Times* or *Metropolis*, which inflect music with aspects of the machine, *Ballet Mécanique* inflects the machine with aspects of the human. In so doing, *Ballet Mécanique* comes closer to the ideal realization of industrialized labor, a labor that no longer requires humans.

Metropolis, *À nous la Liberté*, and *Modern Times* contain a kind of modified mechanical music, music that borrows particular features of the machine aesthetic in order to reinforce visual actions, or music that signifies "machine" without the direct and exclusive usage of the machine's sounds. Confrey's novelty rags exploit the machine's possibilities, using the player piano to showcase a particular pianist's talents. But Antheil's *Ballet Mécanique* creates a unique case in that it is not meant to help sell movie tickets or piano rolls. Despite its industrial origins, *Ballet Mécanique* is the only piece discussed that does not play to the capitalist market of its time. It is a machine music that

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belongs to the machine, and humans only participate as a kind of sideline authority over it. *Ballet Mécanique*, then, makes the most critical — and optimistic — observation about the outcome of early twentieth-century labor practices. The danger inherent in an era that embraces rather than fears mechanical technology is the dissolution of the human laborer as a tool into the mechanism, that the defeated, desubjectivized laborer will then become the faceless puppet at work. *Ballet Mécanique* suggests the opposite when it takes the beaten-down laborers, the musicians, and further mechanizes their labor, elevating the laborers to skilled — rather than the unskilled managers of *Metropolis* — supervisory positions. The humans then become authority figures pulling the strings, controlling the mechanized machine, the laboring puppet of a fully realized industrial society.

CONCLUSION

A caricature from 1927, shown in Figure 2.7, depicts a dressing-gowned Antheil sitting on a pillow with a bike pump and horn attached, hunched over a highly ornamented piano keyboard. His right foot appears to be inside the body of the piano and literal bells and whistles cover the piano itself. The top of the piano has a horn not unlike that of a1920s phonograph with haphazardly drawn music notes spilling out. Kitchen utensils hang from the phonograph horn and the whistles on the side of the piano are bursting with steam from the engine inside the body of the instrument. This image contains layers of machines, from the simple fork to the more complex steam whistles and phonograph horn, and the bicycle pump and horn attached to his seat emphasize the excessiveness of the machines that surround Antheil. The caricature pokes fun at

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mechanical music, and therefore also Antheil by depicting him as the lazy, comfortable operator, overseeing the machine, touching it only slightly with the tips of his fingers while the machine does the rest of the work. But more than making fun of Antheil, the caricature makes a critical observation about the industrialization and mechanization of musical labor: mechanized musical labor, much like mechanized production, is modern music, music in the age of post-industrialization. The 1927 caricature of Antheil and his machines predicts a post-industrial society, a society based on laboring machines and the humans that control them. Antheil, then, was a kind of pre-post-industrialized musician, a musician before his time, predicting and modeling the future role of editors and auto tune, roles that may not actually be so disconnected from those of the lost and greatest generations.
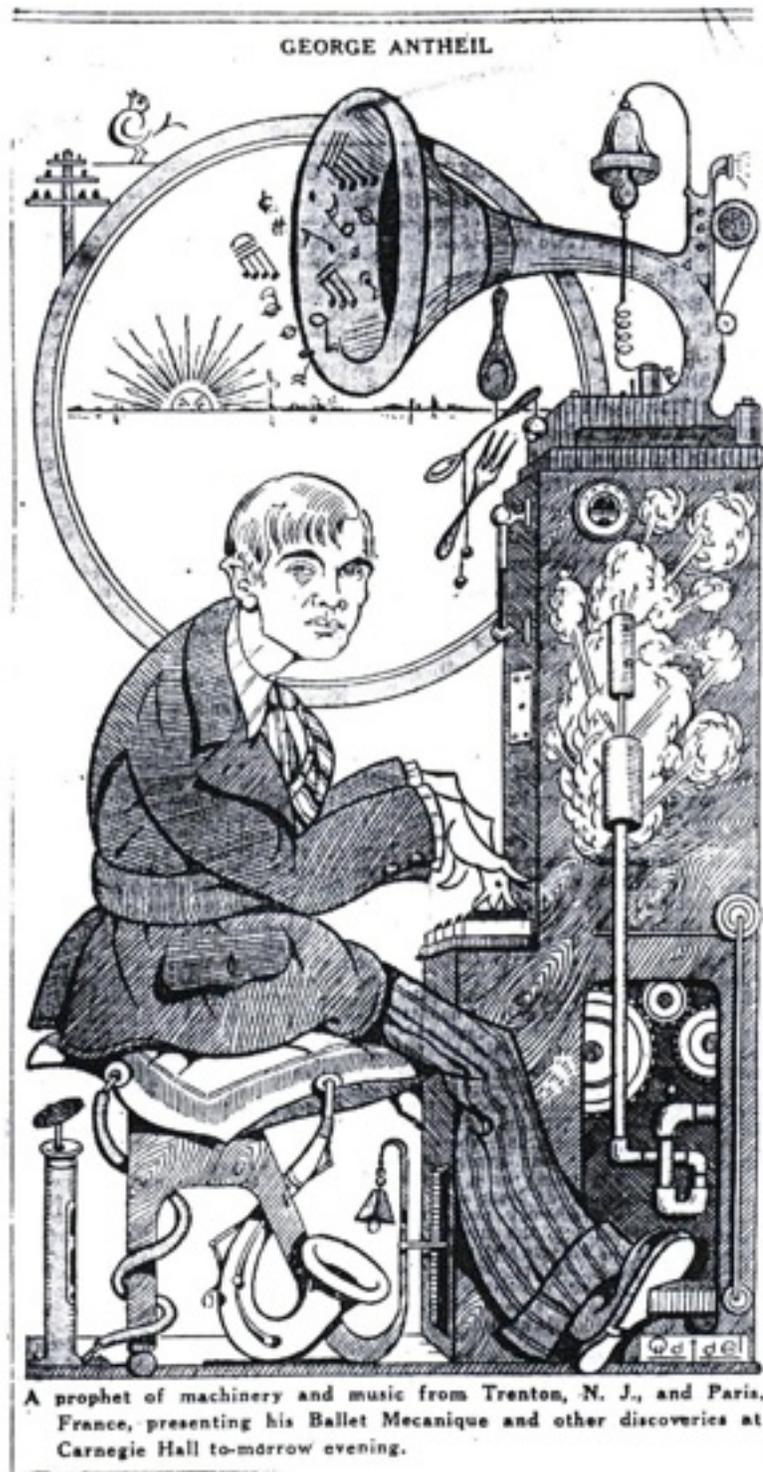
Figure 2.7: Antheil Caricature, 1927

Chapter 3: Stockpiling Memories: The Player Piano, the Phonograph, and Bergson's Two Modalities of Musical Memory

INTRODUCTION

Mechanical reproduction transformed the ways people accessed music in the early twentieth century. Instead of relying upon the household amateur, local musician, or concert hall professional, mechanical instruments, phonograph, and radio made the latest tunes available at a moment's notice. But capturing and storing music in a consumable format required a re-conceptualization of what a performance is, and which elements of it are expendable. In chapter 1 I gave the necessary background information to set up the subsequent chapters, including an overview of roll production, labor following the First World War, and the skills of an accomplished pianolist. In chapter 2 I wrote a brief history of the development of a musical topic of the mechanical. Then, I looked at mechanical music in the early twentieth century through a frame of labor practices and Taylorism as I outlined my three main categories of mechanical music: music written to sound like or imitate the machine, music written to showcase the virtuoso performer and the machine, and music written for the machine. These two chapters look at mechanical music diachronically and synchronically and they zero in on the early twentieth century, the time when mechanical music comfortably existed in two realms, one analog, and the other digital. In this chapter I compare reproduced performances as they differ on rolls and records. Instead of looking at mechanical music through a broad historical lens, or

culturally through several examples from the same time, this chapter compares performances as captured by different recording media.

Thus far I have discussed mechanical music as it is played by mechanical piano, such as Zez Confrey's novelty rags, the traditional or "silent" piano, such as Franz Schubert's *Gretchen am Spinnrade*, and mechanically influenced orchestral works like Joseph Haydn's "The Clock" or the scores for *Metropolis* and *Modern Times*. But here I take a slightly different approach, comparing recordings of the same work played by the same pianist in the same year but using two different recording media: reproducing piano roll and phonograph record. I speak of recording technology as a kind of memory-storage device, and I use Henri Bergson's kinds of memory to pull apart the differences between the data stored on roll or record. Moreover, I use sonic visualization software to compare the sound wave files, and draw conclusions regarding the storing and replaying of data in each device. In comparing the mechanical player piano to its main competitor, the phonograph, I explore the development of recorded music as something fundamentally different from the development of recorded sound. Both the reproducing piano roll and the phonograph record store a particular version of music, but as my analysis will show, the kinds of data captured and stored in each technology is very different. Looking closely at two contemporaneous recordings creates a unique vantage point for exploration into the theoretical differences between early twentieth-century recording media and what they store.

In recounting the history and development of sound reproduction, scholars tend to emphasize the phonograph rather than the player piano, an attitude which David Suisman

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captures when he describes scholarly treatment of the player piano as nothing more than a "historical also-ran, a postscript to the age of the piano, a foil to the more dramatic advent of the phonograph."[1] But the player piano in fact dominated the new musical marketplace, with its popularity peaking as late as the early 1920s and with some 2.5 million player pianos sold between 1900 and 1930.[2] So why is it that scholarly research so often glosses over or completely ignores the player piano when presenting the history of recorded sound? For starters, by 1930 the record's quality had improved so much that the phonograph all but took over the music reproduction scene, competing with radio rather than the player piano. Furthermore, the phonograph could record instruments other than the piano, and its familiar round disc evolves throughout the first half of the century, only losing popularity with the advent of 8-track and cassette recordings. Music enthusiasts still play records to this day; records are constantly in vogue. The same cannot be said for the bulky player piano, which fell completely out of the mainstream for nearly half a century, only to re-emerge through Yamaha's Disklavier line and through MIDI technology.

Perhaps due to the advent of MIDI and this renewed interest in self-playing pianos, researchers have become more aware of the historical importance of the player piano. But while scholars like Suisman, Mark Katz, Timothy D. Taylor, Arved Ashby, and others, acknowledge the player piano's significant role in sound recording history,

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[1]David Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure': Rethinking Musical Mechanization through the Phonograph, the Player-Piano, and the Piano," *Social Text* 102 (Spring 2010): 13.
[2]Arthur W.J.G. Ord-Hume, *Player-Piano: The History of the Mechanical Piano and How to Repair it* (New York: A. S. Baines, 1970), 34.

little work has been done in theorizing how these two technologies differ in storing and re-creating sound. Theorizing the differences between the storing and re-recreating of musical sound through record or roll presents a set of distinct challenges because the two technologies function differently, and perhaps even represent two different albeit related media. In this chapter I address these differences using the two kinds of memory put forth in Henri Bergson's 1896 work, *Matter and Memory* as a frame. Bergson's two kinds of memory — habitual memory, and the memory image captured in time — provide a theoretical basis that helps explain the differences between the kinds of work these recordings do. In addition, his obsessive fixation on memory as "the intersection of mind and matter,"[3] as something uniquely human and thus resistant to mechanical reproduction, provides a glimpse at the cultural environment that would inspire and ultimately embrace such technological developments. My discussion begins with an overview of Bergson's two kinds of memory. I use this as a launching point to my explanation of how Bergson's kinds of memory relate to the player piano and phonograph, especially when it comes to their different recording processes. From there, I discuss the results of my analysis of two recordings of Sergei Rachmaninoff's C# Minor Prelude as a case study, illustrating how the roll and record emphasize and embody different ideals with what they capture and store.

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[3]Henri Bergson, *Matter and Memory* (New York: Zone Books, 1991), 13.

EDITING MEMORY

As recording technologies, the player piano and phonograph shared a goal: to make a musical performance accessible long after its final chord fades. In capturing and storing a musical performance, the piano roll and phonograph record function as a kind of external memory device, holding a performance to be replayed again at a later time. The player piano and phonograph thus store *memory* in objects; they make memories external and tangible, and they transform performances from something impermanent to something that can be played back mechanically. But the performance preserved in records and rolls is not the same as an individual's recollection of a performance. Rather, the recording technologies present idealized human memories — memories uninfluenced by previous experience or present perception and thus separate from the remembering or perceiving human body. As memory devices, recording technologies become external prostheses through which humans store memories in static form.

The differences in what each device stores represent the differences in an individual's discernment, or an individual's conscious choice to take in or ignore particular stimuli. Bergson writes,

> Our representation of matter ... results from the discarding of what has no interest for our needs, or more generally, for our functions. In one sense we might say that the perception of any unconscious material point whatever, in its instantaneousness, is infinitely greater and more complete than ours, since this point gathers and transmits the influences of all the points of the material universe, whereas our consciousness only attains to certain parts and to certain aspects of those parts. Consciousness — in regard to external perception — lies in just this choice. But there is, in this necessary poverty of our conscious perception, something that is positive, that foretells spirit: it is, in the etymological sense of the word, discernment.[4]

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[4]Bergson, *Matter and Memory*, 38.

An individual, then, takes in certain stimuli and rejects others, depending on a given situation. While this makes it sound as if individuals are unable to take everything in and are thus missing some key piece to perception, Bergson argues that actually the ability to choose what one perceives is a good thing, that the ability to discern is in fact what constitutes consciousness. Thus for Bergson, an individual's ability to choose what to take in and what to ignore, this discerning poverty of perception, reveals and externally validates the consciousness of the perceiver. Machines lack the ability to discern; a phonograph recording takes in all of the sounds of a given performance, every cough and sneeze, while the player piano roll initially marks every note and then goes through an lengthy editing process during which editors manually discern for the machine. I will go into further detail regarding the editing process and what it entails, but for now suffice it to say this manual process acts as a kind of humanization of a given roll. Despite the fact that mistakes are edited out, the editor's choices regarding pitch doubling, lengthening the melodic tones, and pedaling and dynamics all add elements of human discernment to the roll, in a sense imbuing it with a fabricated consciousness.

Bergson's definition of consciousness serves well to explain what editors add into rolls once they have been punched, but he moves beyond consciousness in *Matter and Memory*, on to his two kinds of memory. Even though editing makes it seem as if the roll is given a false consciousness, its inherent falseness closes the door in terms of further theoretical explanation. The same cannot be said for his two kinds of memory, which map onto the piano roll and phonograph record and serve as theoretical models for the

reasoning behind the different recording media. Bergson's first kind of memory, habitual

memory, takes form in motor mechanisms, movements, and learned recollections. He

explains it by comparing it to a habit:

> Like a habit, it is acquired by the repetition of the same effort. Like a habit, it demands first a decomposition and then a recomposition of the whole action. Lastly, like every habitual bodily exercise, it is stored up in a mechanism which is set in motion as a whole by an initial impulse, in a closed system of automatic movements which succeed each other in the same order and, together, take the same length of time.[5]

A series of repeated actions form habitual memory, then. The mechanism holds the

series, ready to carry it out over any given period of time. As Figure 3.1 shows, habitual

memory aligns with the player piano, which captures and stores the imprint of a

performer's movements as they are taken in by the keys of a particular piano. Once

finished, the player piano mechanism reads the roll, translating the series of punched

holes into a re-enactment of the effects of the performer's movements over the recording

instrument.

Player Piano	Habitual Memory
Imprint of the performer's hands over the keys	Repetition of the same effort
Edited and Reconstructed to create the perfect performance	Decomposition and Recomposition of the whole action
Stored in the roll, a closed system of successive automatic movements	Stored in a mechanism, a closed system of successive automatic movements.

Figure 3.1: Player piano and Habitual memory

Bergson's second kind of memory, the memory-image captured in time, takes

form in independent recollections, perceptions of past actions reclaimed as a series of

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[5]Bergson, *Matter and Memory*, 80.

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successive images. The main difference between habitual memory and the memory-image captured in time is that the memory-image comes about not through repetition of an action, but all at once, in a single occurrence. While his definition of habitual memory is clear and concrete, Bergson's definition of the memory-image is somewhat ambiguous; his written definition begins with an explanation of what a memory-image *is not*, rather than what it *is*. He writes that the memory image

> has *none* of the marks of a habit. Its image was necessarily imprinted at once on the memory, since the other readings form, by their very definition, other recollections. It is like an event in my life; its essence is to bear a date and, consequently, to be unable to occur again. All that later readings can add to it will only alter its original nature; though my effort to recall this image becomes more and more easy as I repeat it, the image, regarded in itself, was necessarily at the outset what it always will be.[6]

The specificity of habitual memory's definition degrades that kind of memory, confining it to one particular thing, but the ambiguity of the memory-image's definition rhetorically marks it as superior. Bergson's privileging of the memory-image over habitual memory becomes a theme throughout *Matter and Memory*, much like scholars' favoring of the phonograph over the player piano in recounting the history of sound recording. As Figure 2 shows, despite its obscure definition, Bergson's imprinting of the memory-image sounds very much like the recording of the phonograph record; the memory that was "what it will always be" is like the sound recording on an unedited record.

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[6]Bergson, *Matter and Memory*, 80.

Phonograph	Memory-Image, Captured in Time
Unedited Take	All at once
Bears a date	Bears a date
Is, at the outset, what it always will be	Was, at the outset, what it always will be

Figure 3.2: Phonograph and the Memory Image

Editing is the key to the theoretical rationalization and differentiation of early phonograph records and piano rolls — piano rolls could be and were edited to perfection; phonograph records, captured all at once, often required several takes from the performer and even then a "perfect" take was impossible. Indeed, writing about the phonograph, David L. Morton, Jr. says, "From today's perspective, the toughest part of recording was probably the fact that a song or performance had to be 'perfect' the first time. It was not possible to edit the recording in any way. Nor was it possible to record part of a recording first and 'mix' in a second part later."[7] The recording process for phonograph was not well documented, and manuals or articles regarding the process are difficult, if not impossible to find. Katz details the process based on the few surviving accounts, and he writes:

> it is clear that the recording studio of the early twentieth century was not a congenial venue for making music. The room was usually cramped and hot, with the musicians playing for an audience of engineers and, before the advent of the microphone in 1925, a large acoustic recording horn (or many such devices— sometimes up to a dozen horns were used in a recording session).[8]

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[7]David L. Morton Jr., *Sound Recording: The Life Story of a Technology* (Westport, CT: Greenwood Press, 2004), 59.

[8]Mark Katz, Introduction to *Music, Sound and Technology in America,* ed. Timothy D. Taylor, Mark Katz, and Tony Grajeda (Duke University Press, 2012)*,* 23-24.

Engineers and recordists closely monitored performer's volume, as one too-loud note could cause the need to jump from its groove, and dynamics softer than mezzoforte were often difficult for the recording to pick up.[9] A given recording had to fall within 2-4 minutes in order to fit on the disc, and as previously stated, a given piece or movement had to be played in one continuous take; editors did not splice recordings together until methods switched to magnetic tape in the late 1940s.[10] Recording sessions required strict scheduling and complete silence before and after takes, and "demanded an extremely low tolerance for error."[11]

A September 1910 article titled "How Talking Machine Orchestras Operate," published in the monthly magazine *The Violinist*, details the recording process for an orchestral musician recording for phonograph.[12] The article writes of a sixteen-piece orchestra of "first-class musicians, receiving higher salaries than obtain in most of the great philharmonic orchestras," and who maintain steady work year-round.[13] Though the lead-in makes it seem as if these musicians have glamorous jobs compared to their live-orchestra colleagues, the article then describes the way the musicians are required to position themselves around the recording device, "perched on stools of varying height, some quite near to the ground and others stuck aloft on little platforms."[14] They were arranged as such because each instrument projects at a different volume level — once a

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[9]Ibid., 25.
[10]Ibid.
[11]Ibid.
[12]*The Violinist*'s subtitle describes the publication as "A magazine for teachers, students, makers, dealers and lovers of the violin." *The Violinist* Vol. 9, 5 (September 1910), 7.
[13]"How Talking Machine Orchestras Operate," *The Violinist*, 38.
[14]Ibid., 38.

recording was made it could not be edited, but moving and arranging the performer's

bodies allowed for a kind of pre-editing process.

The article follows this sample orchestra through a recording session, where

"everybody is warned not to whisper during the recording." Not long into the recording,

the conductor cuts the musicians off, claiming that a violinist attacked a note too soon.

The author writes:

> The fault was so slight that not one person in even a well-trained audience of a
> thousand would have noticed it, but these tiny mistakes come out magnified many
> times in the record. No concert or operatic performance is ever as perfect as a
> Victor record must be. Musicians are allowed on the stage an occasional
> infinitesimal error, but no matter how small it may be it would fairly shout from
> the talking-machine. It demands absolute perfection, and even the best of singers
> fail occasionally. Some fail frequently.[15]

If mistakes are caught quickly, then they are not expensive to remedy; however once the

record has been made, fixing an issue becomes very expensive. Conductors and recordists

were known to be quite ruthless in taking and re-taking, cutting off performances for the

slightest error in playing or the slightest noise in the studio.

In 1916 singer Yvonne de Treville described her experience recording for

phonograph, "I stipulated for an appointment at three and arrived promptly and gaily,

thinking that the ordeal would be over in an hour's time. To tell the truth, I had promised

to take a cup of tea with some friends at half past four, but it was nearer seven when I

gulped down that stale beverage, between the hurried narrative of my experience."[16] She

also describes the way musicians were arranged, seated in odd positions and odd places

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[15]Ibid.

[16]Yvonne de Treville, "Making a Phonograph Record," *Musician* (November 1916): 658. Reproduced in
Taylor, Katz, and Grajeda, *Music, Sound, and Technology in America*, 87.

in the studio. De Treville claims that when the recording light did not turn off

immediately after the first take, she exclaimed "Why, if I had known there was more

space on the cylinder I would have trilled longer," resulting in horrified expressions on

the faces of those around her. When they played the recording back, her exclamation

came through at the end and the recording had to be redone.[17] The orchestral recording

session described above, along with de Treville's tragic first take, are examples of how

the phonograph recording models Bergson's memory image, because each recording is its

own indivisible event. Each take is "at the outset what it always will be," and thus a

"perfect" recording comes only after multiple imperfect takes. Each take is its own

memory image, but only the best takes survive as master recordings.

Speaking from the conductor's perspective, Edwin MacArthur describes the

recording experience as grueling. MacArthur writes,

> Things can go wrong in any musical activity, of course—a missed cue, a wrong
> note, a momentary stray from pitch. In the concert hall these may occasion a
> passing twinge, but in recording, on the other hand, one is haunted always by the
> thought that the slightest slip-up will not only echo in the immediate listener's
> memory but will achieve actual physical immortality.[18]

But MacArthur champions recordings and argues against criticisms that recorded

performances are often too slow compared to live renditions, claiming that this effect

results from the recording's lack of distracting visuals. He also goes on to claim that

performances often sound better on disc than in live performance, and he praises the

technology for its ability to elevate even the most famous performers to new levels of

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[17]Ibid.

[18]Edwin MacArthur, "Conducting for Record," *Listen* (March 1941): 4-5. Reproduced in Taylor, Katz, and Grajeda, *Music, Sound, and Technology in America*, 92.

achievement.[19] And indeed, despite such onerous conditions, many famous performers and composers chose to record for phonograph, and as phonograph recording technology improved more of the burden for perfection shifted from the performer to the editor. As the record's editors gain more and more control over the post-production "fixing" of a given recording, the recorded commodity becomes less like Bergson's memory image and more like habitual memory, more like the recording process for the player piano.

The recording and editing processes for the record could not be more different from that of the piano roll, which often went through multiple rounds of editing before finally gaining approval for mass production. According to an article in the November 1927 issue of *Scientific American* covering the reproducing piano roll recording process, pictured in Figure 3, when the pianist sits down and plays the instrument, the mechanism takes notes, literally with a pencil, of the keys the pianist presses, along with tone coloring and dynamics. These separate data sets then go through a development process, which takes measurements of the markings, and then the measurements are transferred to a note sheet that indicates "to an unbelievable accuracy" the loudness of each note.[20] Thus as the artist plays into the mechanism, it breaks the performance down into separate data sets, which then become figures of measurement based, apparently, upon the discernment levels of the average human ear.

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[19]Ibid., 93.
[20]"Recording the Soul of Piano Playing," *Scientific American* (November 1927): 422.

Figure 3.3: Scientific American

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The *Scientific American* article then describes the painstaking editing process, shown in Figure 3.4 as something apparently carried out by women, through which the performance is put. First, a woman checks the pencil marks made by the mechanism against the score in order to eliminate and correct any wrong notes. Other women measure and examine the dots and lines taken during the recording, translating them into perforations on a roll.[21] Editors extend perforations connected to melodic tones so they sing out above the accompaniment, and then workers add dynamics to the roll based on the markings, hand perforating pilot holes to guide the automatic stencil-making machine. The automatic stencil-making machine cuts the first playable roll of the performance, but the editors still have not finished. An operator who is also a "finished musician" examines the trial roll, re-editing and checking earlier fixes while indicating new corrections. After the finished musician completes her edits and the roll is changed accordingly, "the record is an exact duplicate of the artist's playing, even in the smallest detail of light and shade, and is now ready for the artist to hear."[22]

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[21]Idem.
[22]Idem.

FIRST HEARING OF RECORD ▲

The first time a record is heard is when it comes from the automatic stencil-making machine. With only pilot perforations at the beginning and end of each note as guides, this machine has simultaneously cut a trial and a finished stencil. The stencil is three times the length of the trial record. An operator who is a finished musician takes the record at this stage and carefully examines every detail of the performance, checking up the result of the various stages in the long process of its completion. After the corrections indicated during this rigid inspection have been made, the record is an exact duplicate of the artist's playing, even in the smallest detail of light and shade, and is now ready for the artist to hear. Upon hearing the record, the artist becomes his own critic and if any further change is to be made, it is in deference to his wish to alter his performance

AUTOMATIC STENCIL MACHINE

This remarkable piece of automatic mechanism, which all but thinks, took more than five years to design and construct

▲ STENCIL CHANGES

A special table over which the record and the stencil pass at the right proportionate speeds facilitates the making of any changes in the stencil which the artist has indicated in the record after hearing its performance. Usually the changes suggested by an artist have to do with dynamic where he accented a note too much or too little or where one phrase had too much or too little contrast with another. He seldom touches the rhythm or the tone coloring. In a dance record, the rhythm is automatically checked and corrected in the stencil machine. After alterations are made the machine makes duplicates from this stencil and these in turn are used in the manufacture of the finished music rolls used in the reproducing piano. The actual music-cutting machines are duplex, cutting 30 rolls at a time in two groups of 15 each at the rate of three and one-half feet of finished record per minute of operation

Figure 3.4: Final Touches

The *Scientific American* article details the recording process for the reproducing player piano roll, which is one of the more advanced models of player piano and is the kind of roll I will use in my later analysis. Yet there are several kinds of player piano and many used simpler roll-punching techniques such as hand-punching rolls based on measurements and the musical score, or having a lesser-known or unknown pianist play in a piece to get the notes on the roll and then editing that performance to perfection. Early versions of the instrument involved push-up machines with mechanical fingers that played the keys of a traditional piano, but it was just before the turn of the twentieth century that the instrument started to gain popularity, when American engineer Edwin

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Scott Votey patented a version of the German Welte player piano and called it the Pianola. At this point in the player piano's development, the mechanism was inside the piano itself; built-in additional levers and pedals controlled tempo and dynamics and the player piano's operator could shift them to incorporate tempo changes and dynamic shifts into their performance. Eventually the entire player piano would switch from foot-treadle power to electricity, which allowed the instrument to self-regulate its performance and create something even more true to a live pianist. As the mechanism improves the irregular performances of early player piano models, with their oddly mechanistic rhythms and simplistic dynamic changes, transition into performances on the reproducing piano, the piano that purportedly recorded artists such as Claude Debussy, Sergei Rachmaninoff, Artur Rubinstein, Ignace Jan Paderewski, and George Gershwin.[23] The amount of labor required to make a reproducing piano drove up its price, and as such, these pianos were usually owned only by the wealthy. The price of the reproducing rolls, on the other hand, remained relatively low, which encouraged businesses and schools of music also to invest in reproducing models.[24] Indeed, reproducing pianos were often marketed as teaching pianos, and manufacturers claimed that these pianos in particular could help teach artistry, in addition to technique.[25]

Arthur W. J. G. Ord-Hume describes the reproducing piano as "simply a player-piano wherein the last vestiges of human control are mechanically performed. It is an

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[23]Michael Chanan, "The Player Piano," in *Piano Roles*, ed. James Parakilas (New Haven: Yale University Press, 1999), 73.

[24]Harvey N. Roehl, *Player Piano Treasury: The Scrapbook History of the Mechanical Piano in America* (New York: Taylor Trade Publishing, 2009), 49.

[25]Ibid., 58.

instrument which may be switched on and left to play a roll of music, with the self-same

certainty of the resulting interpretation as we have today [1970] when we switch on a

record player."[26] The record players of the 1970s are different from the models

contemporary with the reproducing piano in the 1910s and 20s; due to issues like poor

fidelity of record players of the time, the reproducing piano roll and early records would

not produce similar performances. The three common kinds of reproducing piano are

Aeolian Duo-Art, Ampico, and Welte-Mignon. The Rachmaninoff roll I will discuss later

is an Ampico roll, created for the American Piano Company. Ampico's system used

seven degrees of loudness, controlled by side perforations in the roll. In addition, the

system included a mechanism to achieve *crescendo* and *diminuendo* effects, along with

defined accents on single pitches.[27] Ampico's recording process involved two separate

sheets of paper that recorded all movements of the piano's keys and pedals, along with

precise measurements of hammer speed as it hit the instrument's strings. To track

hammer speeds, the recording mechanism used something called the "spark chronograph

technique, firing one spark through the sheet of paper as the piano hammer approached

the string, and a second spark in the final instant of travel before it struck the string."[28]

Skilled engineers then combined the data sets from the two sheets of paper, much in the

way described by *Scientific American*.

In sum, much like Bergson's description of habitual memory, recording a piano

roll involves decomposing and recomposing a performance. Editors analyze and break

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[26]Ord-Hume, *Player-Piano*, 193.
[27]Ibid., 203-4.
[28]Ibid., 98.

down data taken in during the playing, and then the recording passes from hand to hand, getting more and more polished as it moves through the process. The phonograph's uneditable format means that responsibility for the perfectly executed performance on a recording fell solely on the performer's shoulders, as recordists and technicians saw to the microphones and bells, not to fixing and editing away missed notes.

MODERNIZING MUSICAL LABOR

While *time* is an important ingredient in both kinds of memory and both kinds of recording, the phonograph, with its uneditable and unchangeable span of musical time, places a heavier weight on one particular time span, while the player piano leaves the span of a particular performance open to editing and perfecting. Suisman points out this same distinction in his discussion of "sound-in-time" versus "sound-in-knowledge." He claims that the phonograph conveys sound-in-time, "that is, sound as the ephemeral vibrations in the air produced by a specific instance of musical labor (or other sound-making activity)."[29] The player piano, on the other hand, represents sound-in-knowledge, "that is, information and instructions on how to make music. It inscribed and conveyed how to perform, over and over, the labor required to produce certain predetermined sounds." [30] Suisman's abstract terms provide labels for the equally abstract concepts underlying the process of recording for phonograph or player piano. The phonograph captures sound waves, the player piano instructions for labor. In other words, the player piano recreates the movements that result in a performance, the skilled knowledge behind

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[29]Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 24.
[30]Idem.

the actions that then create the sounds; the phonograph recreates the sound waves a performance emits, the vibrations that occur over a particular span of time. The player piano recreates cause, the phonograph effect.

Suisman's abstract terms also form a conceptual link between concrete musical device, phonograph or player piano, and the kind of memory stored, habitual or the memory-image. As shown in Figure 3.5, the player piano roll stores sound-in-knowledge as habitual memory. The roll animates the set of instructions programmed by the performer and editors in order to recreate a particular sequence of steps, a set of laboring actions. The phonograph stores sound-in-time as a memory image, a particular set of sound waves created within a set span of time through the labor of a specific body or set of bodies. The phonograph does not recreate the original performance's musical labor, it recreates the effects of that labor. The player piano, however, *does* recreate musical labor, but it does so without the presence of a laboring human body. Thus the main difference between the two technologies lies in the kind of action stored in the device, or how each approaches the labor behind a musical performance: the player piano mechanizes the movements that create sound, while the phonograph absorbs an imprint of sound waves, storing them amid the crackles and pops of a record's grooves. It is a difference of reanimation of movement versus time — the player piano reanimates the physical movements that lead to a performance, the phonograph replays stored sounds in time rather than creating them once again.[31] Carolyn Abbate asserts, "this distinction is not

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[31]David Suisman, *Selling Sounds: The Commercial Revolution in American Music* (Cambridge, MA: Harvard University Press, 2012), 93.

trivial. Phonographic recordings capture sound's impact on air and membrane, so if they suggest a body or body part, it is a fictional listener and his or her ear, someone sitting in a specific space and hearing a live performer, who is re-created within the real listener hearing the recording."[32] The phonograph, then, records from an observational standpoint, as if the recording bell is a mechanized listening ear. The player piano, on the other hand, takes in the physical movements of the performer on the instrument; the piano absorbs the imprint of the performer's movements and recreates them from it's own standpoint. The piano roll recording process breathes life into the instrument — the process animates the inanimate by bestowing upon the piano the previously human role of performer. In obtaining the human role of performer, the player piano essentially replaces a human laborer; the machine takes on attributes of the performer and eventually replaces him or her.[33]

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[32]Carolyn Abbate, "Outside Ravel's Tomb," *Journal of the American Musicological Society* 52, no. 3 (Autumn 1999): 497.

[33]For more on this, see the discussion of labor in Chapter 2.

Device	Suisman	Bergson
Player Piano	Sound-in-knowledge	Habitual Memory
Phonograph	Sound-in-time	Memory-Image, Captured in time

(arrows labeled "Stores" and "As" connecting columns)

Figure 3.5

In recreating labor without the human laborer, the player piano becomes a kind of musical allegory for early twentieth-century labor practices. As shown in Figure 3.6, the mechanization of labor into a series of tasks to be completed by relatively unskilled laborers sounds very much like a large-scale version of what the player piano does in transforming and reproducing the labor of one skilled body, the performing musician, into a commodity, the roll, mass produced by less-skilled workers. Moreover, Frederick Winslow Taylor's standardization of mass production, discussed in detail in chapter 2, is a kind of fixing and perfecting of habitual memory, when, like a habit, workers mindlessly repeat the same tasks again and again. The workers' labors combine to form a closed system of movements in a particular order, which then create a final product; the workers' efforts over time create the whole action, just like the perforated holes in the roll, in time, recreate the sequence of actions that make up a particular performance.

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Player Piano	Habitual Memory	Mechanized Labor
Imprint of the performer's hands over the keys	Repetition of the same effort	Repetition of the same effort
Edited and reconstructed to create the perfect performance	Decomposition and recomposition of the whole action	Decomposition of skilled work into a series of unskilled tasks
Stored in the roll, a closed system of successive automatic movements	Stored in a mechanism, a closed system of successive automatic movements	Recomposition of these unskilled tasks into a successive series of automatic movements
		Human laborers' efforts combine to create perfect final product

Figure 3.6: Player piano, habitual memory, mechanized labor comparison chart

In a fully realized industrial society, machines replace human labor. In the case of the player piano, the machine takes over as a kind of reification of habitual memory, a mechanized version of something once belonging to human consciousness. As a machine, the player piano stores habitual memory in static form in order to replay it; it reifies a series of actions made by the human laborer and translates them into a code that the device reads and carries out. Though the phonograph record also stores memory in static form, it bypasses the labor and jumps to the resulting product. The phonograph does not recreate the process of making music; it only recreates the aural effects of that process as if from the perspective of the listening ear, not the laboring body. Because of this difference, the phonograph theoretically reifies not action but experience. The phonograph takes something ephemeral and makes it concrete, it takes a segment of *time* and freezes it, storing it in the record as if it could be recreated exactly as it was recorded. The hypothetical thinking behind the record, then, is to allow the listener to stand in for

the microphone, rather than the microphone standing in for the listener. The memory-image held within the phonograph is necessarily different than the one captured by the microphone, but the idea behind it, that it is possible to capture and store a particular span of time, a particular sense or experience, is perhaps what has fascinated scholars much more than the concretization of action found in the player piano roll.

Jonathan Crary deals with similar issues in *Techniques of the Observer*, wherein he argues that the first half of the nineteenth century gives rise to a new kind of observer, a modernized observer. Crary paraphrases Karl Marx, saying, "modernization is a process by which capitalism uproots and makes mobile that which is grounded, clears away or obliterates that which impedes circulation, and makes exchangeable what is singular."[34] Like Crary's modern observer, the player piano and phonograph give rise to the modern listener, a listener used to hearing certain aspects of a performance from certain mechanical devices. Like a kind of sonic zoom lens, each technology filters and amplifies a performance by taking and storing certain aspects while discarding others. For example, neither the player piano nor phonograph reproduces the visual spectacle of the performer's laboring body over the keys. The phonograph provides only the aural portion of a performance, while the player piano roll's dancing keys indexically signify the movements of the performer's laboring hands and simultaneously draw attention to the empty bench, to the negative space where the performer's body should be.

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[34]Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (MIT Press, 1992), 10.

The player piano's moving keys indicate another difference between the player piano roll and phonograph record: the difference in the way the inscribed information on the roll or record interacts with the machine. While both instruments inscribe musical data, one in carved grooves on vinyl, the other in punched holes on a sheet of paper, the two technologies age very differently. Through repeated playings, the phonograph record's grooves change: each pass of the needle buries the engraved musical sounds deeper into the record, further veiling it with crackles and pops that form the sonic equivalent to grey hairs and laugh lines. The phonograph record's aging process seems organic compared to the player piano roll, which may become brittle or damaged over time and no longer play. If well stored, player piano rolls have an indefinite lifespan; the piano roll can play as long as its paper holds up. But through repeated playings and handlings paper will begin to yellow and tear, and small tears may distort the piano's performance. These distortions are different in kind from the way time and use veils the phonograph record. The phonograph record's sounds recede deeper into its grooves, as if the record swallows its own content. The player piano roll ages less gracefully, as rips in the paper render the roll unplayable.

Suisman summarizes the different aging styles of these two kinds of recording as a historical one. The phonograph record allows one to listen not only the past, but also

> the passage of time. . . . A vinyl LP record that has been played a hundred times sounds different — with its pops, clicks, and surface noise — than one whose historical journey has been shorter or less momentous. The stylus is like a plow in the furrows of the past, churning up sounds long since buried.[35]

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[35]Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 15. It is interesting to compare early recording processes, which capture a single span of time, to modern practices, which may layer

The player piano's marking features are inherent in the instrument, not the roll — its pedals and overly regulated rhythms, along with the "honky-tonk" and slightly out-of-tune sound are features one might associate with a saloon piano. The binary data inscribed on the roll can show signs of age, but these indicate mechanical flaws as opposed to serving as quaint reminders of an earlier technology. The roll does not lose its history, but rather it fails to record its own history in the way that the phonograph's auditory signals indicate its age. The roll's history lies in its playing, as a history of playing a recording on a specific device at a particular time. The phonograph record, on the other hand, continuously exhibits signs of its historical travels. The record's scratches, wear and tear, and loss of fidelity, indicate how often it has been played; these marks reveal the record's use. The unique and ambient sounds veil each playing behind a layer of time; it is impossible to play a record without also hearing the history of that particular record.

Beyond the record and roll, both technologies are at the mercy of the machines that play them, and over time new models of the phonograph replace the old as records evolve from 78 rpms to $33\frac{1}{3}$ rpm LPs and 45 rpm singles. Meanwhile, the Great Depression puts an end to the player piano (and threatened the record industry), as people tuned in their radios to hear the latest music. The reproducing piano was the furthest the player piano developed until its resurgence in the 1950s, when it reappeared as a kind of quaint technology, something to amuse newly affluent post-war Americans. The paper

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multiple tracks from various times. Rather than replaying a single span of time, then, these recordings replay an impossible span of time, an overlapping span that never actually happened.

roll has no part in the Yamaha Disklavier, which operates on MIDI data, and comparing the reproducing piano of the 1910s to the Disklavier is like comparing Edison's phonograph record to the modern MP3. Eventually most player pianos and phonographs themselves fall into disrepair, rendering the roll and record completely obsolete but for the museum showroom and collector's living room. The ambient sounds associated with the player piano — the noise of the pumping pedals, the shuffling paper, and the whooshing of air through the pneumatic mechanism — often go along with sounds that indicate additional mechanical issues, such as an overly bright or tinny timbre, or a constantly out-of-tune keyboard. The latter sounds have come to be associated with the sound of the player piano. Indeed, modern audiences would likely be baffled by the noise of the player piano's pedals, shuffling paper, and pneumatic mechanism. To modern audiences, the player piano's recognizable features are inextricably bound to the sounds of its heyday — the Tin Pan Alley, barroom honky-tonk, and slightly out-of-tune strains of sonic depictions of early twentieth-century society, most often seen in films and television shows. In other words, modern audiences identify with particular sonic markers of twentieth-century society that, while perhaps not always accurate, reflect sound as portrayed in television and film through systems based more explicitly on the phonograph's recording history. The speaker systems of television and film connect directly back to the phonograph's horn, and these speakers portray their early digital counterpart, the player piano, in a quaintly inferior manner: out of tune, awkward and mechanical.

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The theory outlined above only can only go so far without any kind of concrete evidence of the different ways the player piano and phonograph store musical memory. In order to see how Bergson's kinds of memory differ in their concrete realizations, I conducted a sonic analysis comparing two recordings, one roll one record, of Rachmaninoff's C# Minor Prelude made by Rachmaninoff in 1919.[36] I found that the closing of the B section with its cascading triplets most clearly illustrates the theoretical differences between the two recording technologies and the philosophical distinctions between Bergson's kinds of memory. As the score in Example 3.1 shows, the hands break each triplet between them, and the accents that mark each new triplet switch hands with each successive beat, beginning in the right hand on beat three then darting into the left hand for beat four only to immediately shift back to the right by the downbeat of the next measure. Marked *fortissimo* with an indication to *crescendo, poco et poco*, the hands descend through the triplet pattern to the piano's middle range. The shift in register brings the pianist's hands to the center of the body, thereby allowing the full weight of the player's arms to drop onto the keys from above to violently strike the repeated vii°^{7}-i progression. Most players interpret the passage with an unwritten *accelerando*, often beginning at very fast speeds and ending in a cacophonous, pounding blur when the

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[36]In his article on "mechanical fidelity," Nick Seaver gives an account of the Ampico roll of Rachmaninoff's C# Minor Prelude, which played in the window of the American Piano Company's (AMPICO) New York storefront in 1927. According to Seaver, "mechanical fidelity" is "a rhetoric of faithful repetition that was built in laboratories, treating the predictable materiality of the reenacting apparatus and the piano's 'action,' or internal machinery, as both symbols and guarantors of objective reproduction." Nick Seaver, "'This Is Not a Copy': Mechanical Fidelity and the Re-enacting Piano," *Differences: A Journal of Feminist Cultural Studies* 22, nos. 2 and 5 (2011): 55.

crescendo peaks and the triplet oscillation stalls on a four-octave *sforzando-fortississimo*

hit on♭ $\hat{6}$, A, as part of iv^6.

Example 3.1, Rachmaninoff C# Minor Prelude, mm. 35-44

In Rachmaninoff's 1919 Edison Diamond Disc recording of the Prelude, these

frantic triplets blur the beat so much that they are impossible to hear distinctly in time;

the *crescendo* and unmarked *accelerando* create an effect of spinning out of control that

translates into the pianist's near loss of metrical control as his hands push aggressively

through the triplets. The momentum builds as the pianists' hands expand and contract,

pushing out away from the center of his body for vii$^{\circ 7}$ and contracting back in for tonic in

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a laboring display akin to the performer's breath — a breath that is noticeably absent when the record plays. In Rachmaninoff's Ampico reproducing piano roll, made for the American Piano Company, the triplets are easier to track, the beats clearer, each articulation placed just so, creating an affect of controlled chaos.

In order to confirm this difference, a difference of a literal loss of control in the phonograph record and a staged re-enactment of a loss of control in the piano roll, I analyzed each recording using Sonic Visualizer, a program designed to aid scholars in visual representations of audio data. Both recordings used for my analysis are MP3 files which creates an additional, unavoidable layer of mediation. Example 3.2 shows the full sound wave file of each recording, marked with measure lines.
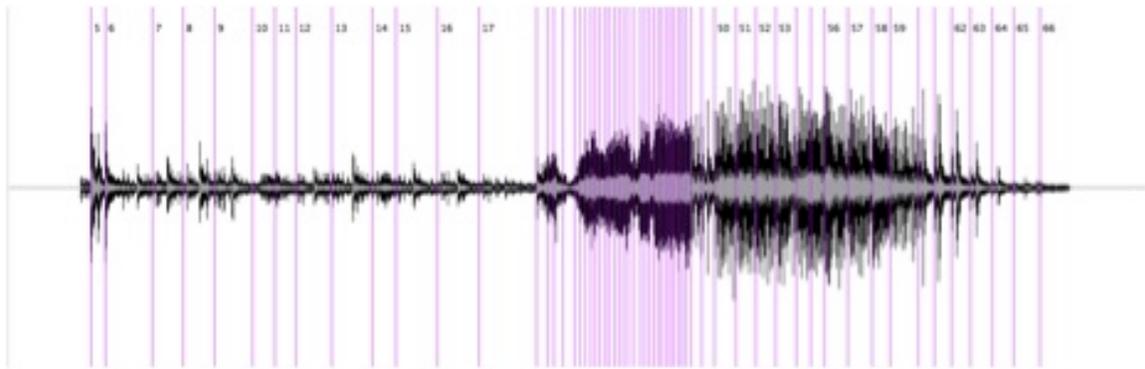
Example 3.2a: Sound wave of Edison's Diamond Disc, marked with measure lines
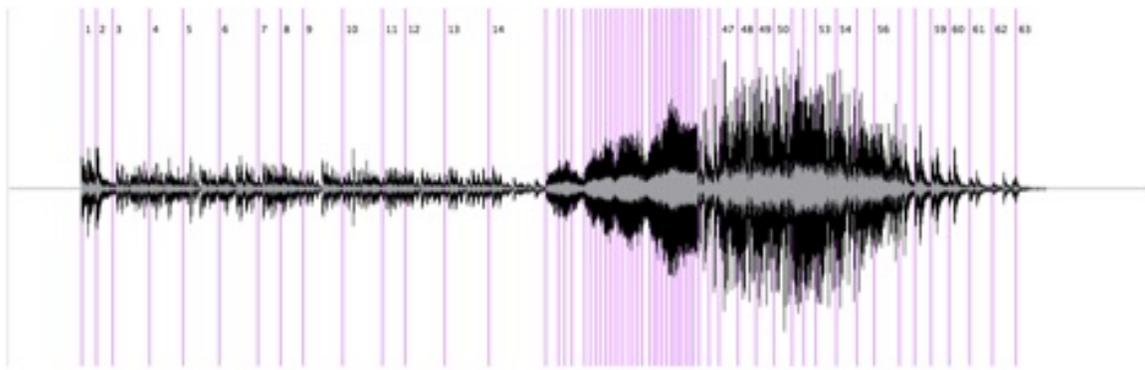
Example 3.2b: Sound wave of Ampico Reproducing Roll, marked with measure lines

Initially, I slowed the B section of the 1919 phonograph recording in order to accurately place bar lines onto the sound wave. I found that slowing the playback to -250% allowed me to keep count without losing the line in the distorted sound. I was all but completely unable to keep track of the triplets without this feature. I assumed the same would be true for the piano roll, and it was — to a point. When I slowed the same section of the 1919 piano roll recording, I noticed that the sound between the two was quite different, and not only because of the poor sound quality of the 1919 phonograph recording. The triplets were markedly easier to count in the recording of the piano roll,

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and I needed to slow the recording much less (-160%) in order to track the beats and accurately mark bar lines. The piano roll's impossible evenness unwittingly disclosed its mechanical origin.[37]

Rachmaninoff made these two recordings in the same year, and while we would obviously not expect them to be exactly the same, we would expect certain similarities in interpretation. Yet, the piano roll editors' normalization and regulation of the ragged triplets of the B section establishes an underlying order to the apparent chaos, or measure to the unmeasured. In so doing, the player piano roll strips the section of its untamed nature, of the illusion that the roll performance can function as a memory image. The collapse of the B section on the piano roll, then, is not a collapse but a staged rendition, necessarily different in kind from the live performance. The distinction between the B sections on these two recordings is subtle, and yet it makes all the difference in how they function as storage devices that document the interpretations of an expert. While this comparison requires a slowed-down analytical hearing, the normalization of the B section in the player piano roll makes for a much cleaner rendition than the phonograph record. The additional auditory layers of crackles and snaps inherent in the phonograph record perhaps have a more direct influence on a regular hearing, but the player piano's normalization of the B section carries through into a playing that is technically cleaner than the phonograph record, and that technical clarity adds an element of showmanship or

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[37]Oddly enough, when I took measurements of the space between bar lines in each example to figure out an exact amount for measure-length variance, the two recordings came up with very similar results. Example 3 shows the B section of the sound wave for each recording; the vertical lines mark the measures and the spaces between which I took measurements. Both recordings had a difference of +/- .2 centimeters at the most — a surprising result considering the difference in the level of difficulty when it came to marking the bar lines onto the wave.

false virtuosity to a supposedly authentic performance. Or, to turn that argument around, by retaining an element of showmanship in its performance, the player piano version is actually more like a live performance than the phonograph's aural rendition. Even though the extra virtuosic element comes from the editor's hand rather than the pianist's, it adds an additional layer of meaning to the player piano version that the phonograph's does not have. In manufacturing artistry, the player piano perhaps creates something more true to the original.

In my comparison of the recordings, I used the sound software to look at several factors — dynamics, tempo, tempo peaks, and beats per minute — to look for any other salient differences between the two. Yet as previously discussed, the smoothed triplets of the B section revealed the differences between the recordings on a slowed-down, analytical level. But there are more obviously differences between the two recordings, differences that sound clearly without the need of any additional analytic software. The background noise of the Edison record veils the sound of the piano, creating a layered sonic barrier through which the listening ear must pass in order to get to the musical content. What's more, the background noise of the phonograph changes slightly throughout the recording — it is not a harsh white noise, but a soft series of crackles that ebb and flow with the rotation of the record. The crackling in time with the record's rotation can be jarring when the tempo of the piece does not align with the speed of rotation, and in this case the two tempi never align. This odd beat-behind-the-beat adds an audible presence of the present in the phonograph recording — the crackles are metrically regular to the mechanism but irregular with respect to the musical content,

creating a kind of meta-metric dissonance. This is not to say such dissonances never occur in player piano performances. Indeed, it is quite the opposite as the pumping pedals and whooshing pneumatic mechanism of many common player pianos would create metric dissonances akin to the phonograph's spinning record. It is unlikely that such issues would materialize with the reproducing piano; barring the occasional shuffling of paper, the reproducing piano's mechanism runs relatively quietly, with a smooth whirr of a modern machine rather than the crackling beat of the phonograph's needle. The phonograph makes its mechanism known aurally by nestling the recording behind the etched veils of previous playings, and the player piano's mechanism aurally emerges through advanced sonic analysis, through a slowed-down and therefore unrealistic hearing of a performance. Thus the reproducing piano's invisible player inadvertently reveals the instrument's mechanism, while the phonograph's mechanism comes through visually and aurally, with the irregular beating of the needle and groove.

CONCLUSION

Even perfect performances falter under the figurative sonic microscope. The piano roll normalizes and regulates the ragged triplets of the B section of Rachmaninoff's C# Minor Prelude, bringing measure to the unmeasured and creating a kind of staged rendition of the work, rather than a live performance. The end of the B section in the phonograph recording sounds more out of control because it is more out of control — editors were not waiting in the wings to erase and re-punch any irregularities. The subtle distinction between the B sections on these two recordings makes all the difference in

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how they function as storage devices for each of Bergson's kinds of memory. As a reification of action, the player piano roll stores habitual memory in concrete form, and as a reification of experience, the phonograph record presents a particular version of Rachmaninoff's performance, taken in from a fixed point and made static in the record's grooves. The player piano maintains an element of the laboring body, absenting it but for a trace trapped in its uncanny keys. But the phonograph completely loses sight of that laboring body, erasing a crucial component behind the phonograph's sounds. Rachmaninoff made these two recordings in the same year, and yet the resulting recordings are quite different in how they present his playing and in how they store sound. The crackling phonograph nestles a realistic capturing of his playing behind the auditory veilings of time, but the player piano roll's perfected perforations refine Rachmaninoff's playing into its idealized form and stage a kind of dramatic reenactment. In so doing, the player piano maintains an element of Rachmaninoff's presence with its visual connection to his laboring body, while the phonograph completely erases his body, storing only the impression of the sounds of his performance on the recording microphone. Despite its editing and perfecting and despite its capturing of what Bergson may have considered a "lesser" kind of memory, the player piano provides a presence the phonograph never can. Its animated keys mark the presence of an absence, nostalgically nodding to the performer, remembering him through rose-colored glasses.

Chapter 4: Phantom Fingers at Work: Selling the Player Piano in a Changing Musical Marketplace

INTRODUCTION

Up until this point this dissertation has focused on how the sound of the machine influenced music (chapter 1), the kinds of mechanical music and sounds of the early twentieth century as evidenced through examples from film scores, popular music, and the concert hall stage (chapter 2), and how Henri Bergson's theory of memory can aid in a discussion of how different recording media produce different products for the consumer (chapter 3). This chapter takes a slightly different approach, in that it looks at advertisements and marketing for the player piano rather than the instrument's music, setting, or development. Looking at how the player piano was marketed, and to whom, reveals much about the inner workings of early twentieth-century musical culture.

Playing the piano was part of a well-to-do woman's Victorian upbringing; the culture of the time followed the work hard, play hard model, and laboring several hours in practice at the keyboard each day was an admirable way for women to pass their time.[1] The gender divisions of musical labor demarcate men's playing as having monetary value, as a way for men to make money selling their skills, while women's keyboard skills are often dismissed as just a part of the required high class female's social graces. If a woman wanted to make money off of her keyboard skills — something likely frowned

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[1] Craig H. Roell, *The Piano in America 1890-1940* (The University of North Carolina Press, 1989), 9.

upon as a kind of prostitution by the upper classes but relevant to the middle and lower ones — it was much more probable she would become a music teacher than a virtuosic performer. But for a wealthy Victorian woman, her skills must appear effortless; as if piano playing, letter writing, and entertaining are innate to her and require no labor at all. Men marketed their *bodies*, their labor — intellectual and skilled for the higher classes, or manual and unskilled for the lower — to make money. High-class women marketed *themselves*, through music, conversing, or dancing, to gain a husband. As I will show using several examples, the different roles men and women occupied in the early twentieth-century musical marketplace are one frequently highlighted theme in early twentieth-century advertisements, which often treat men as highly skilled and women as delicate and fashionable.

A *New Republic* editorial describes the status of women in the musical marketplace in the early twentieth century, explaining that even though most music instructors were women, most male musicians did not think women should be allowed to pursue music professionally.[2] But in the late nineteenth century, professional performers, predominantly males, gained a place in the market when publishers started to push for public performances. Some publishers went so far as to create courses to teach pianists to play certain works, which they would then go around performing and thus promoting. Performers, already highly skilled on their instrument, became highly skilled at a second kind of labor. Performers were selling their performances to consumers on the one hand, but also acting as middlemen for publishers, selling the publishers' works through highly

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[2]"Women as Musicians," *New Republic* 95 (July 13, 1938): 263.

skilled performances. Through sheet music sales and copyright restrictions, music's

commodification gained new territory in the nineteenth century as publishers promoted

the sale of certain works through their own army of performers.

The new market of consumers who paid to hear professional performances stems

from what Michael Denning terms the "'proletarianization' of American culture, the

increased influence on and participation of working-class Americans in the world of

culture and the arts."[3] Denning continues,

> this was largely the result of a remarkable expansion of what is usually called
> mass culture: on the one hand, secondary and higher education; and on the other,
> the industries of entertainment and amusement. There was a laboring of American
> culture as children from working-class families grew up to become artists in the
> culture industries, and American workers became the primary audience for those
> industries.[4]

In the eighteenth and nineteenth centuries the professional musician became a visible part

of the division of labor and furthermore, concert hall admission charges imply that music,

or the experience of listening to music, was a commodity to be sold and consumed.[5]

Later, sheet music sales confirm music's commodity status and signal the surging

musical marketplace to come, the musical market of the early twentieth century, saturated

with phonograph records and piano rolls. Even though composers and performers gained

a foothold of their own in the market of the nineteenth century, by the early twentieth

century large music publishing houses and record companies took power from composers

while phonographs and player pianos usurped the role of many laboring performers,

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[3]Michael Denning, *The Cultural Front: The Laboring of American Culture in the Twentieth Century* (New York: Verso, 1997), xvii.
[4]Ibid.
[5]Jacques Attali, *Noise*, trans. Brian Massumi (University of Minnesota Press, 1985), 57.

providing relief for laboring women, but taking work from paid performers. The commodification of music relies upon these technologies; as Timothy D. Taylor argues, "music could not exist as a commodity without the technologies involved with its making and transmission."[6] Of course Taylor refers not only to the player piano and its mechanism and rolls, or the phonograph and its records, but also to all of the technologies that go into producing a record, roll, player piano, and phonograph. The production and reproduction of a given musical recording involved layers of technology and layers of labor. The layering of technologies and labor present in the early twentieth-century musical marketplace indicates a wider trend in markets of the time. Moreover, the pursuit of entertainment that helped bolster the newfound market of middle-class workers was in part a market of young women, who often populated dance halls, amusement parks, and movie theaters.[7] "Commercialized recreation," as Kathy Peiss calls it, "fostered a youth-oriented, mixed-sex world of pleasure, where female participation was profitable and encouraged."[8] This was not the buttoned-up Victorian culture that forced young women to sit and labor at the keyboard; mechanical instruments could take on the musical entertainment portion of women's domestic role, and thus many advertisements appealed directly to the lady of the house.

Writing about broad changes to American labor, market, and business institutions made in the nineteenth century due to the rise in middle management, business historian

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[6]Timothy D. Taylor, "The Commodification of Music at the Dawn of the Era of 'Mechanical Music,'" *Ethnomusicology* 51, no. 2 (Spring/Summer 2007): 283.

[7]Kathy Peiss, *Cheap Amusements: Working Women and Leisure in Turn-of-the-Century New York* (Temple University Press, 1986), 5.

[8]Ibid., 6.

Alfred D. Chandler, Jr. penned *The Visible Hand: The Managerial Revolution in American Business* (1977), a work that focuses on "the changing processes of production and distribution in the United States and the ways in which they have been managed."[9] Obviously citing Adam Smith's famous "invisible hand" metaphor in his title, Chandler argues that in the years between the 1840s and 1920s managerial laborers (middle management) gradually replaced the individual laborers of the eighteenth century.[10] The traditional business model Smith commented on involved a single-unit business enterprise that Chandler explains as an enterprise wherein "an individual or a small number of owners operated a shop, factory, bank, or transportation line out of a single office."[11] The market then monitored the activities of these individual businesses. This is very similar to the individual musicians who essentially marketed themselves as performers, composers, conductors, and teachers. Highly skilled in their trade, these musicians capitalized upon their skills and sold musical performances and scores much

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[9]Alfred Dupont Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge: Harvard University Press, 1977), 1.

[10]Eighteenth-century economist Adam Smith"s *Wealth of Nations* includes the following famous passage:

> As every individual, therefore, endeavours as much as he can, both to employ his capital in the support of domestic industry, and so to direct that industry that its produce my be of the greatest value; every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it … He intends only his own gain; and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for society that it was no part of his intention. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good.

Smith's term caught on among economists who claim the "invisible hand" — a thinly veiled reference to the hand of God — guided the labor relations in the free market capitalist economy. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) vol. 4 (London: T. Nelson and Sons, 1852), 184.

[11]Chandler, *The Visible Hand*, 3.

like a cobbler would shoes. By contrast, modern enterprise involves many different units "managed by a hierarchy of salaried executives."[12] Each unit acts as an individual business in the traditional sense, but the unit is absorbed as part of the larger enterprise. This is more similar to the publishing houses and record companies of the early twentieth century, businesses that hired multiple performers and composers under the umbrella of a larger enterprise. While earlier businesses affected the market for the better accidentally, invisibly, modern enterprise internalized economic activities between units and salaried employees monitored and coordinated them. Rather than the invisible hand of God, the visible hands of middle management guided the market.

Chandler explains how mass production emerges as a result of technological improvements and he gives detailed analyses of corporations and the machines that powered them, from discussions of rubber, tobacco, and metals, to the steam engine, railroad, and automobile. In chapter 2 I detailed Frederick Winslow Taylor's system of scientific management, a method that champions the re-organization of industry into a one that promotes efficient productivity. The chapter allegorically connected Taylor's system to the rise of the player piano in the early twentieth century, with its mechanical storing and reproducing of musical labor. Chandler's discussion of the automobile similarly captures the rapid changes to production due to scientific management. He explains that after a gradual start, in October 1913, the moving assembly line completed its first car, cutting production time from 12 hours and 8 minutes to 2 hours and 35 minutes per vehicle. By the following spring production time dropped to just 1 hour and

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[12]Ibid., 1.

33 minutes.[13] As Chandler writes, "the moving assembly line quickly became the best-known symbol of modern mass production."[14] This speedy form of production slashed manufacturing costs and prices for consumers, while also increasing the need for managerial workers.

As Chandler makes abundantly clear over hundreds of pages of examples and figures detailing various businesses and products, this shift from the traditional small business model to larger enterprises of somewhat independent units controlled by a new managing class was widespread. The musical marketplace, as it were, was not immune to this shift. Indeed, as Jacques Attali writes, music "is *prophetic*. It has always been in its essence a herald of times to come."[15] The processes of mass production used to make the player piano and its rolls are somewhat similar to those used in the production of automobiles and other goods, but the transformation of labor as it plays out on the player piano projects a particularly vivid image. Although Chandler's managerial labor becomes the visible hand controlling production in the early twentieth century, several player piano advertising campaigns center on the invisible hands of its player. The market's visible hands create an instrument that then renders its own player invisible as the player piano absorbs more than its own units of production, it absorbs the laboring performer's body into its production model. While the visible hands of moderately skilled managers shape products for consumption, the highly skilled hands of the pianist fade away,

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[13]Ibid., 280.
[14]Ibid.
[15]Attali, *Noise*, 4. Italics in the original.

specters of a lost model of production. These phantom hands are then put to work, not only in playing the player piano, but also in selling it.

In this chapter I discuss different advertising approaches for the player piano as evidenced through several print advertisements, primarily from American magazines and newspapers. I rely upon American examples because, as Reebee Garofalo explains,

> technological advances and the economic power that drives them have been historically centered in industrialized nations (primarily Great Britain, Western Europe, and the United States) . . . [and] at key points in the development of the mass media, the industrialization of popular music has been defined disproportionately by the dominant and often controversial practices of the United States.[16]

Almost all of the advertisements date from the player piano's heyday, beginning in roughly 1900 and culminating with the stock market crash of 1929.[17] I organize them into four categories, all based on the primary representation of labor in each. The first category, perfect labor, highlights advertisements appealing to people through the machine-like perfection of the player piano's performances; the second, gendered labor, player pianos as a labor saving replacement for women's labor at the keyboard; the third, educational labor, or the player piano as an educational instrument, capable of teaching children to play the piano; and finally fourth, stored and reproduced labor, the player piano as a device that stores and reproduces musical labor as an own-able, and stockpile-

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[16]Reebee Garofalo, "From Music Publishing to MP3: Music and Industry in the Twentieth Century," *American Music* 17, no. 3 (Autumn, 1999): 318.

[17]Some models remained in production into the late 1930s. According to Harvey Roehl, "a few machines [were] built in the early thirties, and the late model Ampico Reproducing grand pianos were built as late as 1936 and perhaps even later on special order. A few hundred of the Ampico spinet model reproducers were built in the very late thirties, but this was the last of any players in America until the Aeolian Company introduced its key-top Pianola in 1950." Harvey N. Roehl, *Player Piano Treasury: The Scrapbook History of the Mechanical Piano in America* (Maryland: Taylor Trade Publishing, 2009), 40.

able commodity. Among the advertisements, many draw from two or more categories in order to appeal to a broader audience, and each category highlights a different aspect of the cultural attitude toward labor. Moreover, the presence or absence of a laboring human body — or laboring ghostly figure — reveals much about musical labor and its value in this time of rapid change, mass production, and mechanical reproduction.

PERFECT LABOR

In his article on music, leisure, and work, Karl Miller writes about "the idea that music should appear effortless — that its execution should not require work."[18] He cites Florence Hartley's late nineteenth-century etiquette guide, wherein Hartley considers music "a social blessing" that, when recreationally pursued, is "gentle, rational, lady-like."[19] Her guide is for women, and as most in-home performers were ladies, it gives a good idea of parlor performances in the late nineteenth century. Hartley advises women to perform compositions that are "less aspiring" in order to avoid a performance that might be compared with that of the "most eminent" performers, against which the parlor performer will inevitably be regarded as second-rate.[20] Moreover, a more virtuosic score with "page after page of black, closely printed notes, will drive those who see them from the piano. They … are not suited to general society."[21] She advises ladies to learn these virtuosic works but not to perform them, and when a lady does play the piano she should

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[18]Karl Miller, "Working Musicians: Exploring the Rhetorical Ties Between Musical Labour and Leisure," *Leisure Studies* 27, no. 4 (2008), 428.
[19]Florence Hartley *The Ladies' Book of Etiquette, and Manual of Politeness: A Compete Handbook for the Use of the Lady in Polite Society* (Boston: Lee and Shepard Publishers, 1873), 185-86.
[20]Hartley, *The Ladies' Book of Etiquette,* 187.
[21]Ibid., 189.

avoid moving her body: "swinging the body to and fro, moving the head, rolling the eyes, raising the hands too much, are all bad tricks, and should be carefully abstained from."[22] The performer is to avoid any kind of movement that might suggest a musical performance was a kind of work; her body should display no signs of labor. As Miller puts it, "don't let them see you sweat."[23]

Hartley advises these young performers to play works that require only moderate skill, for "it is better to play the simplest airs in a finished, faultless manner, than to play imperfectly the most brilliant variations."[24] Parlor performances of the late nineteenth century, then, demand perfect execution of relatively simple works by a performer who does her best to hide her body behind her playing. Miller writes, "denied ghostly status by their very lifeblood, young women had to work hard to make themselves invisible at the piano."[25] Mechanical instruments, by contrast, make that invisibility a reality when the performer finally achieves the ghostly status Miller mentions. The player piano is not limited by societal fears of pretension; the machine can and should be perfect in its execution of simple and virtuosic works. Indeed, one prominent feature of player piano advertisements is the odd juxtaposition of humanity and mechanical perfection in marketing the rolls. Most advertisements use the word "perfect" at least once, referring to things like the piano's recording abilities or its technical execution — features that stem from the mechanical aspects of the instrument.

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[22]Ibid.
[23]Miller, "Working Musicians," 428.
[24]Hartley, *The Ladies" Book of Etiquette,*189.
[25]Miller, "Working Musicians," 431.

Yet many advertisements also cite the perfection in the player piano's human-like performance or artistry, features not typically associated with machines. The advertisements strive to construct the player piano as combining the best of both worlds: technically perfect mechanical performances with artistically perfect interpretation. Moreover, this perfection is achievable with very little skill or exertion on the operator's part; advertisements refer to the instrument's usability and claim "anybody can play anything" because the mechanism is so easy to operate. While the actual ease of playing the instrument varies between models, a large percentage of advertisements used the ease of operation as the focus of their advertisements and combine this with its ability to perfectly re-enact human performances. The player piano becomes a stand-in, substituting capital investment for what originally required skilled labor as the instrument works tirelessly to recreate technically and artistically perfect performances. In its tireless perfection with a humanistic interpretation the player piano is a kind of ultimate realization of industrialized labor practices.

A Kohler & Campbell advertisement for the pianista piano player (a push-up model), shown in Figure 4.1, claims the instrument "knows no technical difficulties" and that its "perfection in execution is without a peer."[26] This particular advertisement dates from a 1903 magazine, printed during the brief time when these push-up models were popular. They were limited in range and had easily-broken wooden fingers — note that while the drawing of the pianista in this advertisement shows that it does not cover the very bottom of the piano's range, the upper register is hidden and the angle of the

[26]*The Music Trade Review* 37, no. 19 (Nov. 7, 1903): 49.

drawing makes it unclear as to whether the pianista can reach the top of the keyboard or not. Harvey Roehl claims "the advertising for these machines fails to point out that they usually played only sixty-five of the normal 88-note piano scale, and that this, in turn, meant that the original composers' scores all had to be rearranged — (and in many cases mutilated) — to fit this range."[27] These push-up models were also heavy and cumbersome, difficult to move to and from the piano's keyboard — moving and aligning the pianista for use required hard, manual labor. Due to these challenges, pianistas were popular for only a few years, roughly from 1900 to 1905.[28] In light of the above, Kohler & Campbell advertisement's claim that the pianista piano player knows "no technical difficulties" seems disingenuous, yet many other pianista advertisements made similar claims. Moreover, the lack of specificity in the advertisement's claim that the pianista has no peer excludes not only other models of mechanical instruments, but also live professional and amateur pianists. This claim speaks volumes regarding human labor and mechanical labor — the first half of the statement, "perfect in execution," puts the pianista at a level unachievable to human players, and the second half of the statement about its lack of peers eliminates not only its mechanical competition but also any human player. While on the surface the advertisement is selling pianista piano players, a deeper reading reveals a marketing of mechanical labor as superior to its human counterpart.

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[27]Roehl, *Player Piano Treasury,* 12.
[28]Ibid.

Figure 4.1: Kohler & Campbell, Pianista, *The Music Trade Review,* 1903

A 1915 advertisement in *McClure's* magazine for the Emerson Automatic, shown in Figure 4.2, states "the supreme goal of the Player Piano — perfect reproduction of hand-playing is realized in the Emerson Automatic, the newest, most artistic and *human* of Player Pianos."[29] The accompanying image shows a young woman singing while the piano plays her accompaniment. The advertisement claims that the roll sounds just like "accomplished hands playing the keys" without any sort of "Mechanical touch." Rather, the instrument "*reproduces* the interpretations of the great artists as they themselves played that particular music." While the woman in Emerson's advertisement exerts labor through singing, her accompaniment seems effortless — what once would have required two laboring bodies (or one skilled individual who could both play and sing) now requires only one. The advertisement claims that with the Emerson Automatic piano singers can accompany themselves on the piano with minimal effort — the woman in the picture is not even looking at the piano, she simply holds the control in her hands and

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[29]*McClure's* Front matter, October, 1915.

piano plays the roll while she sings. The only human labor visible in this process comes from the woman, but her posture presents her singing as if it were effortless. She looks up and over to her left, suggesting that she performs for an audience of some kind, and her dress and pearls, the large area rug, and the spaciousness of the room suggest that she lives a financially comfortable lifestyle.

THE EMERSON AUTOMATIC PLAYER PIANO

The supreme goal of the Player Piano—perfect reproduction of hand-playing is realized in the Emerson Automatic, the newest, most artistic and *human* of Player Pianos.

In the Automatic one receives the impression of accomplished hands playing the keys. "Mechanical touch" has disappeared. It *reproduces* the interpretations of the great artists as they themselves played that particular music.

One of its unique delights is the ability to regulate and phrase the music from a distance. As shown in the illustration, the singer is *playing her own accompaniment*. With very little practice the accompaniment can be played in this manner with far better effects than if played by hand.

The experience is yours as soon as you will—at any Emerson dealer's.

Dealers in Principal Cities and Towns
Send for Catalog

EMERSON PIANO COMPANY   Established 1849   BOSTON, MASS.

Figure 4.2: Emerson Automatic, *McClure's* 1915

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Some advertisements capitalize purely on the perfection of the recording and performing of the instrument. For example, one advertisement for the Ampico player piano, shown in Figure 4.3, shows Sergei Rachmaninoff at the keyboard superimposed in front of the first line of the score for his *C# Minor Prelude*.[30] The advertisement ran on the cover of the March 19, 1927 issue of *Presto-Times*, part of The American Music Trade Weekly serving the music trade and industry.[31] Not only does the advertisements' headline use the word "perfect" but it uses it twice, the second time with emphasis. This repetition subtly recalls the mechanical nature of the instrument and its own ability to perfectly repeat stored performance. The Ampico company claims that only its brand of reproducing piano "accurately records the playing of the artist," and it lists the piano brands that work with the Ampico mechanism. The advertisement draws on some of Rachmaninoff's cultural capital — it not only has a photo of Rachmaninoff and the score to his prelude, but it also includes a quote by him saying "'I have played my works for the Ampico exclusively because of its absolute faithfulness of re-enacting and its capacity to preserve beautiful tone painting.'"[32] In layering Rachmaninoff's image, his music, a quote, the notion of a perfect recording of his playing and then a perfect re-enactment of it, this advertisement sells Ampico rolls and the Ampico mechanism by giving consumers the chance to own a piece of Rachmaninoff, of his labor — the only missing piece is his physical body in consumers' parlors. In a way, this advertisement commodifies

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[30]For more details regarding Rachmaninoff and the player piano, see chapter 3.
[31]*Presto-Times*, Chicago, March 19, 1927: 1.
[32]Ibid.

Rachmaninoff, marketing his invisible presence as a commodity that can be captured and

sold to paying consumers.

Figure 4.3: Rachmaninoff and Ampico, *Presto-Times,* 1927

Yet the advertisement is exaggerated — Ampico rolls are not exact re-playings of

Rachmaninoff's labor because, as discussed in Chapter 3, the rolls are usually edited and

any mistakes are fixed and re-punched. The "perfect re-enactment" claim made by the company does not stand up to scrutiny. But the notion of a perfect performance — of an ideal performance without any errors but with all of the expressive and interpretational choices — that is what Ampico is selling, disguised behind the words "perfect re-enactment" and the image of the artist laboring over the keyboard. Consumers were interested in the novelty of owning a piece of Rachmaninoff's labor, and of the instrument playing itself to such a degree of technical proficiency that it by far exceeds the ability of the average amateur. Perfection was an option with the player piano, so why not take advantage? In addition, Rachmaninoff now has thousands of pianos playing perfect performances in his name, increasing his ubiquity as a pianist. People could easily put a Rachmaninoff roll into their reproducing piano, sit back, and relax while the piano does all the work.

The Ampico advertisement is one of many that emphasize the ease and perfection of the player piano. An advertisement for the Telektra, shown in Figure 4.4, depicts an intimate dinner party of four in one room with the player piano shown through the doorway, playing in another room; the piano plays by itself entertaining guests while they enjoy their dinner. The advertisement states, "The wonderful Telektra will play your piano with perfect musical expression while you and your guests are gathered around the dinner table." The advertisement's use of the word "perfect" connects to its perfect technical execution but in saying "perfect musical expression" it emphasizes the musicality of the piano's playing rather than fidelity to a particular performance. Not only can the instrument carry out challenging piano works with ease, but it can do it without

any labor input of its owner, beyond the loading of a roll and the flip of a switch. Another advertisement for the Euphona Home Electric piano, this one from a February 1917 issue of *The Cincinnati Enquirer*, claims consumers need only "insert the music roll of your choice and to press a lever. Then you may dance, you may sing, converse or listen as you choose. No need to give further heed to the piano. For it will play every composition ever written for the piano as perfectly as the most accomplished musician."[33] The Euphona Home Electric, according to its advertiser, is "as easy to operate as the turning on of a light." These advertisements all emphasize perfection and ease, selling the player piano as a kind of appliance, something that conveniently provides entertainment with minimal involvement from the operator.

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[33]*The Cincinnati Enquirer*, February 11, 1917: 7.

At the dinner table

Without any assistance on your part the wonderful Telektra will play your piano with perfect musical expression while you and your guests are gathered around the dinner table. You may turn to the transmitter at any time and by a mere turn of the wrist vary the interpretation to suit either your guests or your own particular musical fancies. Regardless of where in the house your piano may be situated, this distinctive Telektra feature enables you to easily and comfortably enjoy the luxury of the most artistic piano playing while you "let good digestion wait on appetite and health on both."

Figure 4.4: Telektra Dinner Party, *The Cincinnati Enquirer,* 1917

GENDERED LABOR

As touched upon in the discussion of Hartley's etiquette manual, while music lessons were a requirement for all women of good education and social grace in Victorian culture, amateur pianists often played poorly. As Craig H. Roell writes, "commentators lamented the frequent inability among girls and women to play even simple things on the

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piano well, and cited such depressing ratios as '94 percent' and 'nine-tenths' as the dropout rate among piano students."[34] Fathers lamented the hundreds of dollars poured into piano lessons, the return of which often meant one poorly played piece — even after several years. But this poor playing was rarely due to lack of effort or labor on the young woman's part; cultural standards of the late nineteenth and early twentieth century lauded hard work and many females spent countless hours a day at the piano.[35] The cultural emphasis on hard work "affected if not burdened the lives of countless musical amateurs," and these amateurs were almost always female. The work they put in at the keyboard was extremely similar to that of factory workers, toiling endlessly, but culturally it was treated quite differently.

Miller differentiates between two kinds of work; the first "defines work as physical or emotional exertion towards a goal. The second defines work as a means of making money."[36] The latter was off limits when it came to women and musical performance, at least for a young woman of good upbringing in a Victorian home.[37] In addition, Miller discusses the differences between masculine and feminine performances at the keyboard. Females were expected to perform on command, but her skill was not to "suggest music was more than a fanciful pastime;" her performance should appear easy and demonstrate her amateurism.[38] Male musicians, on the other hand, were professional musicians — working musicians. These gender roles carry beyond the silent piano of the

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[34]Roell, *The Piano in America*, 37.
[35]Ibid., 9-10.
[36]Miller, "Working Musicians," 430.
[37]Ibid., 428.
[38]Ibid., 427-28.

stage and parlor into the player piano advertisements' portrayal of male and female bodies. Women in the advertisements use the player piano to enhance the domestic space, as a decorative piece of furniture, a sign of her wealthy status and the leisure it affords, as she no longer needs to practice the keyboard.

A Welte-Mignon advertisement from 1923, Figure 4.5, shows a young woman and her parents; she has just received the reproducing piano as a graduation gift.[39] There is a larger image of a baby grand piano in a large room with a large window, all features implying the family is well to do. The parents look on as the daughter reacts to her gift, clutching her diploma in one hand and holding her mother's hand with the other. The extravagant purchase "expresses [her parents'] love and pride"; the image suggests wealthy parents surprise their daughters with the same gift and also suggests young women of some accomplishment should want a reproducing piano of their very own, something to "cherish for years to come." That the reproducing piano is the ideal graduation gift for the *daughter* rather than *son* of the home stems from the silent piano's connection to family and home, a domestic, female space. Moreover, in this advertisement the connection between mother, daughter, and piano, visually aligns the three within the confines of the room, the domestic space. The father stands next to the mother without touching her and his gaze is directed outside of the room as it is pictured; while the mother looks at her daughter and the daughter at her gift, the father seems deliberately disconnected, leaving the matters of the home up to the women.

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[39] Albert Shaw, Ed., *The American Review of Reviews* 67 (1923), 74.

This advertisement is one of many focused on females and domestic space, on the player piano as something that not just helps the female of the home by alleviating some of her domestic work, but it improves upon the amateur performances she would have given by reproducing perfect performances given by experts. By lifting some of her burden and improving the performance quality, the player piano appeals to both the male and female of the home — she has less to do, he enjoys better music when he gets home from work. And the beautiful room within which the family stands also represents a particular trope from player piano advertisements — marketing social status and standing. As Timothy Taylor writes, "player piano advertisements emphasized the social status offered by the player piano by depicting instruments in beautiful houses, with well dressed people enjoying themselves."[40] The family in this advertisement is attractive and well dressed and the room is well appointed with large windows, floor length curtains and a fringed lamp. More than selling the piano, this advertisement indicates the reproducing piano as an integral part of a certain kind of lifestyle; wealthy, fashionable people own reproducing pianos.

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[40]Taylor, "Commodification of Music at the Dawn of the Era of 'Mechanical Music,'" 288.

Figure 4.5: Daughter and the Reproducing Welte-Mignon, 1923

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Many other advertisements attempt to capitalize on the player piano as a fashionable instrument, as a mark of success and affluence, while ignoring or at least barely highlighting upon the instrument's role in music reproduction. For example, an advertisement for the Behr Piano Player, shown in Figure 4.6, claims "beauty and fashion are captivated by the Behr Piano Player."[41] The advertisement includes a small photo of the push-up instrument, but more interestingly, it also includes a large photo of a woman in a feathered hat and fur coat. She exudes high society, even looking down on the camera as it captures her image. The small image of the piano and the small size of the text describing it shrink beside the text size for "Beauty" and "Fashion," and the woman's image is as large as the entire box encasing the player piano and its information. The woman in the photo hardly presents herself as a working housewife; rather, she seem the kind of woman who has things done for her. She is not particularly young, and it is likely that while she was young she might have studied the piano, but once she became an established lady of her own household there was little need for her to labor over the keys. For her, the player piano is a kind of fashionable accessory, much like her fur coat, that inconspicuously showcases her wealth.

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[41]Roehl, *Player Piano Treasury*, 10.

Figure 4.6: Behr, Beauty & Fashion

While most advertisements appealed to the lady of the house, there were still some advertisements aimed at men for male spaces. For example, Figure 4.7 shows a 1912 advertisement from the *Chicago Daily Tribune* instructing young men to "buy a 'petite' for your club — it's the musical marvel of the age."[42] In addition to proclaiming the instrument's status as a "musical marvel," the advertisement emphasizes the Petite Player Piano's practicality due to its small size, small price tag, and 30-day free trial.

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[42]*Chicago Daily Tribune* (February 18, 1912), 3.

Interestingly, the Petite player piano has no keyboard, unlike the models marketed at women that were push up models that worked on traditional pianos, devices that could be installed into traditional pianos, or player pianos that doubled as traditional piano. This advertisement makes no reference to labor saving or to the traditional role of the pianist in the home. While some advertisements targeted men indirectly — depicting women who were delighted to receive the player or reproducing piano as a gift — some, such as this one, targeted men directly, selling the player piano as something to enhance men's clubs, libraries, and dens.

Figure 4.7: The Petite Player Piano in Young Men's Clubs, *Chicago Daily Tribune,* 1912

Piano students in the late nineteenth and early twentieth centuries usually had to follow Siegmund Lebert and Ludwig Stark's demanding "Klavier Schule" method, which "became standard in the United States as German pianists drilled in the method came to this country seeking disciples."[43] The Victorian work ethic when applied to music instruction meant that young women spent countless hours at the keyboard, a process that Gerald Johnson likens to the torture of Chinese foot binding.[44] Piano teachers were trained to teach piano as "a professional and performing art. Even the first lesson emphasized execution."[45] Needless to say, students rarely looked forward to their music lessons and practice sessions. Piano students of the time were primarily women because music was considered "the most spiritual of the arts [and] is a natural possession of the finer sex."[46] The connections between music and women extended into the church and schoolhouse as well, and so advertisements that featured the educational aspects of the player piano were often targeted at or featured women.

A 1925 advertisement from *The Saturday Evening Post*, shown in Figure 4.8 has an image of a woman looking over a little girls shoulder as she sits at the player piano. Beneath the image a caption reads, "'I *like* my music lessons.'" The advertisement claims a player piano equipped with the Standard Player Action "encourages children in the study of music." The company sells educational music rolls — rolls that don't replace the

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[43]Roell, *The Piano in America*, 8.
[44]Gerald W. Johnson, "Excerpts from *A Little Night Music*,'" *American Home* 21 (December 1938): 22, 77.
[45]Roell, *The Piano in America*, 10.
[46]"Woman and Music: Twin Souls of Civilization, *The Etude* 47 (Nov. 1929): 793.

music teacher but rather enhance and simplify her work. In their simplification, the educational rolls are labor saving, reducing the amount of labor required of the piano teacher. Moreover, the advertisement suggests an awareness of the tediousness of piano lessons for most students, and claims to transform the lessons into something enjoyable for teacher and student.

Figure 4.8: Standard Player Action, *The Saturday Evening Post*, 1925

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An advertisement for the "Baby Ampico" calls the piano an "ideal instrument for classroom work in schools." The advertisement includes an image of a man standing at the piano and a caption that reads "Dr. Sigmund Spaeth, conducting a musical appreciation class with the Baby Ampico." The advertisement mentions the low top of the piano, which allows the teacher to easily see over the top, and the compact instrument's convenient portability for its relocation to different classrooms.[47] A similar advertisement for the Baby Ampico shows the instrument in the dance studio of Alexis Kosloff and suggests it to dance teachers as "the perfect accompanying instrument." The Baby Ampico comes with a "brilliant repertoire" and is "always at hand" to "supply at a moment's notice whatever music may be required. . . . It is easily moved from place to place. It is always available. It can play anything. As it draws no salary its possession means a large eventual saving to the dancing teacher."[48] Thus the player piano had a place in the music appreciation classroom and in dance studios, where it eased the burden of music teachers or provided endless and valuable accompaniment to dance students.

Beyond using the player piano as an accompanist, aid to the music teacher, or in the music classroom, one 1922 pamphlet titled "The De-Assification of Music: A Propagandist Magazine of One Number, Containing News of Importance to all Music Lovers, Especially to all Owners of Player Pianos," by Carroll Brent Chilton, suggests the use of what Chilton calls the "universal music reader." Indeed, the entire magazine is one giant advertisement for the mechanism and the player piano as a valuable performer and

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[47]Roehl, *Player Piano Treasury*, 59.
[48]Ibid., 66.

instructor. The music reader turns the piano roll and its mechanism so it unrolls from right to left, rather than up and down. The roll, in addition to the regular piano roll punches, also contains the composer's "original text," and a "critical description and appreciation of the music being sounded." Chilton claims that using the universal music reader will "transform the player-piano from a toy and entertainer into a practical instrument of precision for musical education."[49] Towards the middle of the magazine, Chilton compares the old player piano to the player piano fitted with the universal mechanism. As shown in Figure 4.9, the former appears in a grainy photo with a caption deeming it "ordinary," the latter has an excited (and wealthy) looking woman clasping her hands in delight as she watches the roll go by in the "modern way."[50] The universal music reader combines the score, the roll, lyrics, and biographical commentary in a kind of ultimate realization of the piano roll's educational potential.

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[49]Carroll Brent Chilton, *The De-Assification of Music* (Tompkin's Square, NYC: 1922), 3.
[50]Ibid., 25.

UP-TO-DATE MUSIC SCORES

Audiscript "Living" Music Scores for The Universal Music Reader—An Improved Up-to-date Player-Piano and its Educational Music Scores—A Study in Musical Efficiency—Illustrations of Player Development
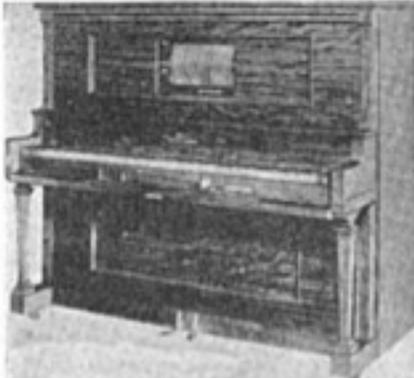
ORDINARY PIANO-PLAYER OF PRESENT DAY CONSTRUCTION AND EQUIPMENT

A Giant In Chains

The above illustration shows the player-piano of 1897 to date. This invention was a gigantic stride ahead. It has accomplished wonders. But its shortcomings were many—it was never really applied to the music education and so has remained a giant in chains.

Nº 13,017   A.D. 1912

Analyzing the New Form of Player-Piano

"Outs" in present-day player construction.

I. The roll travels in the wrong position for reading, i. e., towards the player instead of panoramically, from right to left. A fundamental fault in construction.

II. Absence of Notation—The present roll lacks the composers' notation or text—the indispensable basis of authority in music.

III. No Playing Directions—It has no hint to teach the player how the music should be interpreted.

IV. It does not even tell the Key of the Music which he is to play.

V. It has no time signature.

VI. It tells you nothing of the composers' life or of the time and circumstances in which the work was written, or of its place in history. It gives no analysis of the content of the music as a guide to interpretation.

VII. It does nothing for the eye or for the mind and presents a mere patchwork of slots without educational value to eye or mind, both of which are indispensable to musical understanding and memory.

VIII. Lastly—No system of orderly intelligible knowledge has ever been compiled for it. Yet we love it for what it has done and till now there was nothing better. It is a giant in chains.

THE MODERN WAY—READING MUSIC ALOUD FROM THE ROLL

Above—the improved player-piano— the Universal Music Reader and its Audiscript Score—the piano-player and music score of the future.

Note that the music sheet is still on the music-rack but that it is now wound upon a roll which can play the music.

Figure 4.9: Ordinary meets Modern in the Universal Music Reader,
The De-Assification of Music, 1922

Despite Chilton's valiant efforts, the mechanism never caught on to replace the

traditional vertical roll, and Chilton's magazine survives more as a testament to some

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people's loyalty to the mechanical instrument as the future of music instruction and

performance. The educational roll and the player piano in schools saw a quick and early

peak. While many schools including the Paris Conservatoire, the Royal Academy in

London, the Eastman School of Music, Harvard University, UCLA, and many public

primary and secondary school districts purchased player pianos in the mid-1920s, they

were quickly rendered obsolete by recorded music.[51] Moreover, the wear-and-tear on the

rolls made them less practical for classroom use. Still, some pianists learned from

watching and imitating the keys of the player piano. For example, Fats Waller and Duke

Ellington both learned stride pieces by mimicking piano rolls.[52] Writing of Waller, Ed

Kirkeby describes:

> Lifting his hands, he gave the pedals a slight pump and a new chord was struck on
> the piano. Again his hands went to the keyboard and he fitted his hands to the
> keys, shaking his head as he found he was unable to span the distance with a
> single hand. Then he disconnected the locking mechanism and played the two
> chords by himself, or as much as he could reach with his short fingers.[53]

The player piano's educational value far outlasted its marketing appeal. While the

advertisements claimed it would ease the labor of instructors while making students'

labor more enjoyable, the player piano's educational success came from those who went

to it out of necessity, to learn pieces otherwise unreachable to willing fingers. Ironically,

the player piano's labor saving educational goals inspired a new round of laboring jazz

pianists, rather than permanently alleviating some of the workload for music teachers.

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[51]Roehl, *Player Piano Treasury*, 76.
[52]An account of Duke Ellington learning from piano roll appears in Arnold Shaw, *The Jazz Age: Popular Music in the 1920's* (Oxford University Press, 1987), 80.
[53]Ed Kirkeby, *Ain't Misbehavin': The Story of Fats Waller* (New York: Da Capo Press, 1966), 32.

STORED AND REPRODUCED LABOR

Advertisements that focus on the storing and reproducing of labor most often center on the storing or reproduction of particular works or performances by particular famous individuals. Many of these advertisements claim that the piano roll stores and the player piano re-enacts the work as the composer intended, thus indirectly suggesting that any at-home amateur performance is somehow an inauthentic rendition of the work and that roll editors somehow have a more accurate idea of the (often long-dead) composer's intent. Many advertisements also invoke the images of dead composers to lend their piano rolls credibility; combining images of well-established composers in the Western canon with the more modern image of the player piano and its roll softens the modernity of the instrument, de-modernizing it, in a sense. Or, the advertisement may claim a particular performer's version of the work as ideal, superior in interpretation and virtuosic skill. Advertisements in this category represent the labor of a particular performer as superior to the labor of any amateur, even when mediated through the piano roll. They draw on quotations from performers attesting to the roll's accuracy in storing transmitting their performance, or from live composers attesting to the roll's accuracy in storing and transmitting the work as they intend it to be played.
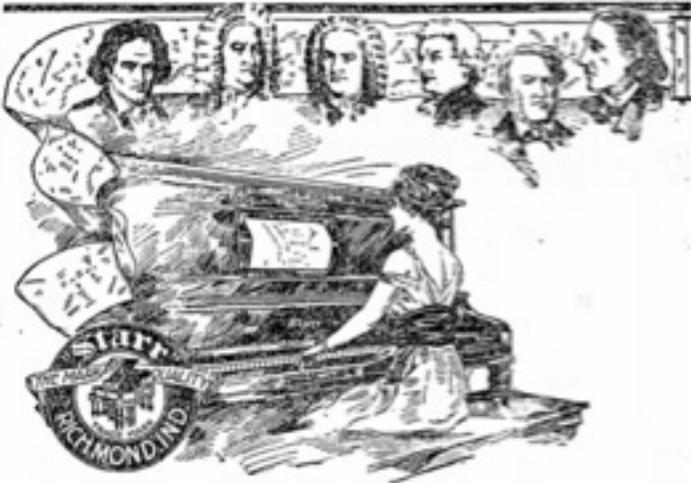
Figure 4.10: Performing the "Music of the Masters," *The Tennessean*, 1913

Figure 4.10 shows one 1913 example of an advertisement that focuses on the

storing and reproduction of a kind of authentic labor. It advertises the Starr Piano

Company and shows a woman at the pianola with a roll sprawled above the picture,

studded with pictures of Ludwig van Beethoven, George F. Handel, J. S. Bach, Joseph

Haydn, Richard Wagner, and Franz Liszt. Starr claims their player piano "removes every

barrier of technical inability and gives you access to all the music of all time."[54] While

"all the music of all time" is more than a stretch, the looming busts of the masters lend

the player piano performances credibility within the musical economy, as representations

not of performance labor but of compositional labor. In offering consumers a library or

museum of musical works, the player piano roll becomes the ideal performance because

it is the only kind of performance capable of capturing the intentions of the genius behind

each score.

In another example, Figure 4.11 shows an advertisement for the Apollo

Reproducing piano that uses Beethoven's ghostly image to sell piano rolls. The

advertisement claims, "If Beethoven could be heard by us today playing his sonatas, what

would we not give to know the master's own interpretations?"[55] Below the text is a grand

piano with a ghostly Beethoven at the bench and the opening of the score to his Op. 27,

No. 2 "Moonlight Sonata." This advertisement presents a "what if" situation — what if

we did have access to Beethoven's interpretations? Obviously the Apollo reproducing

piano cannot recreate works as Beethoven would have played them, and yet in using his

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[54]*The Tennessean,* December 18, 1913, 4. Similar advertisements also ran in the *Winston-Salem Journal,* April 5, 1914, 2, and April 11, 1914, 6.
[55]*House & Garden* 41, March, 1922, 76.

Moonlight Sonata, his name, and his ghostly image, the advertisement suggests just that.

The advertisement says "today, the works of composers are preserved exactly as played by them; also the works of the classicists as interpreted by living masters." The ghostly Beethoven has little to do with the reproducing piano's actual capabilities; a more realistic image would be of a living composer at the piano recording his or her performance on piano roll, or of a famous pianist recording a classic work such as Beethoven's sonata. The impossible situation presented in the advertisement evokes a longing in the audience, who, ideally for the advertisers, think: if only the reproducing piano had been around during Beethoven's lifetime!

Figure 4.11: Beethoven's Ghost at the Apollo Keyboard, *House & Garden*, 1922

Figure 4.12 shows a 1909 Cecilian Player Piano advertisement from Putnam's

Magazine that also uses a ghostly Beethoven.[56] This advertisement asks consumers to

imagine playing Beethoven's Moonlight Sonata "as you would like to play it." It

references the inferiority of the average amateur pianist and suggests that a better

performance, like that of the player piano, imbues the work with Beethoven's inspiration.

This particular advertisement makes it seem as if the roll conjures Beethoven's spirit as it

plays; he casually leans on the piano, enjoying — and apparently approving of — the

player piano's rendition of his work. In terms of labor, the invisible hands guiding the

performance are Beethoven's own, overseeing the interpretation and technical execution

of his work. The headline claims the Cecilian plays with "the inspiration of the master,"

and a man sits at the bench with his hands on the keyboard and feet on the pedals. In this

case, it is significant that the image features a man, rather than a woman. Man as superior

to woman in terms of productive labor gives the roll not only the stamp of approval from

Beethoven, but also from the modern man. The man laboring at the bench — or, rather,

the man's moderately skilled labor that then reproduces the recording pianist's highly

skilled labor, captured in the roll — looks straight ahead, seemingly unaware of

Beethoven's presence. Additionally, the rocking chair next to the instrument remains

empty, implying he labors at the instrument for his own enjoyment.

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[56]*Putnam's Magazine* Front Matter V, no. 7, March 1909.

Figure 4.12: Beethoven Inspires through the Cecilian, *Putnam's Magazine*, 1909

Angelus released an advertisement centered around composer Pietro Mascagni,

shown in Figure 4.13, who calls the Angelus "a wonderful virtuoso-pianist" that is

capable of "marvelous means of expression [that can] give the complicated pieces more

life and *soul* than any other instrument of its kind is able to give."[57] And below

Mascagni's quote, instead of a literal signature as in the Welte-Mignon ads, it reads

"(Signed) PIETRO MACAGNI." By including the quotation and affixing Mascagni's

quoted signature to the advertisement, Angelus places more value on Mascagni's labor as

reproduced by the player piano than the human labor expended by the amateur performer

in a live performance. Indeed, the ad includes one photo of Mascagni and another of a

young woman at a push-up pianola with a treble-clef score just above her head. The

young woman's photo, along with the simplistic treble-clef melody on the score, touches

on the player piano's easy-to-play nature without overtly playing up its ease. Oddly

enough, the score pictured would take very little training to play — it hardly illustrates

the difficult passages Mascagni and the player piano were capable of carrying out. Yet,

while the Angelus can carry out more complex pieces, the woman need not understand

even the most basic line. The same point comes through in Mascagni's quote, when he

cites the "complicated pieces" that perhaps the pictured woman would not be able to

play. Another point hidden in this advertisement is that Mascagni's quote does not equate

the Angelus's performance to that of a live pianist; he simply says it is the best of its

kind. In other words, it cannot play as well as he can, but its abilities surpass those of the

woman in the picture.

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[57]Albert Shaw, Ed., *The American Monthly Review of Reviews: An International Magazine* 26 (New York: The Review of Reviews Company, July-December 1902), 179.

Figure 4.13: Pietro Mascagni, 1902

Much like the Mascagni's advertisement for the Angelus, many other companies

used the words of famous pianists to sell their player pianos. Theodor Leschetitzky

played for Welte-Mignon, Victor Herbert for the Duo-Art, J. Milton Delcamp, for

Ampico, and Edvard Grieg, Rudolph Ganz, Ferruccio Busoni, and Ignacy Jan Paderewski

appear in ads for multiple companies including Apollo, Ampico, Sohmer, Duo-Art, and

Welte-Mignon. In other words, multiple large companies used the same pianists to lend credibility to their instruments and rolls. Advertisements featuring pianists and composers tend to take one of two approaches: first, list several names — one Sohmer advertisement lists Grieg, Paderewski, Richard Strauss, Ossip Gabrilowitsch, Xaver Scharwenka, and Teresa Carreño as pianist-composers and then Josef Hofmann, Vladimir de Pachmann, Rudolph Ganz, Busoni, Josef Lhévinne, Theodor Leschetizky, Ernö Dohnányi, and "a host of others" as performers — or second, to feature one pianist in a manner similar to the Mascagni advertisement discussed above.[58]

Some pianist-focused advertisements make little mention of the recordings themselves beyond a concluding sentence of he/she "records exclusively for Ampico," or whatever the company happens to be.[59] Other pianists' advertisements mention the interpretational features of the recordings, for example in a supposed interview, Ganz asserts he "had no difficulty in getting the tone results I wanted in my records. The climaxes are worked up just as I played them. The distinction between voices, between theme and accompaniment, are practically perfect. The intonation and phrasing add the last convincing touch of personality and the tone-production pleases me much." And he calls the instrument's tempo and phrasing "perfect — true to my performance. My typical rhythmical characteristics, my rubati, my most personal ways, are exactly duplicated."[60] Yet, the falseness of origin regarding the intonation, phrasing, and tempi show through in Ganz's assertions. He says the distinctions are *practically* perfect, not perfect, and he

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[58]Roehl, *Player Piano Treasury*, 78.
[59]Ibid., 67.
[60]Ibid., 53.

calls the intonation and phrasing "convincing," as if the roll had to prove something to

him. Moreover, says that the roll *duplicates* his personal way of playing — the roll is a

copy of the original playing, but is not an original in and of itself. He concludes by saying

"the Duo-Art should present the pianist at his best" — but this is the best that a machine

can achieve, which is perhaps technically superior to a live human performance.[61] Ganz's

choice of terminology here undermines his allegiance to Duo-Art; while he may believe

Duo-Art Pianola to be an excellent reproducing device, his word choices still relegate

player piano performance to a status lower than that of live performance.

Beyond ghostly composers or live performers, other advertisements feature

famous composers whose lives overlapped with the player piano, for example Figure 4.14

shows one advertisement with a photo of and quotation by Grieg and another featuring

Debussy, both of whom recorded piano rolls. The first advertisement calls Grieg

"Norway's greatest composer" immediately, connecting Grieg with greatness and

establishing his position as a musical authority. The next clause calls him "a pianist of

remarkable poetic individuality," establishing his authority as more than someone who

knows about music, but someone who specifically knows about piano music. The first

sentence of Debussy's feature is similar, calling him the "most strikingly original of

modern French composers" and then citing his origins as a pianist in Paris. Debussy's

write-up also includes a sentence about the piano rolls, which are a "rare treat" that allow

listeners insight into "his own playing of his piano pieces." Each advertisement then

includes a quote by the composer about the Welte-Mignon, the player piano brand that

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[61]Roehl, *Player Piano Treasury*, 53.

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remains unmentioned until the named by the composers, who seem to thereby conjure it into existence. The Welte-Mignon logo or name does not appear elsewhere; it is as if the advertisements are mini-features on the composer pianists, rather than copy selling player pianos. Grieg calls the Welte-Mignon an "ingenious invention [that] struck me with admiration [and] surpasses all other essays in the way of artistical pianos." Debussy cites the instrument's perfect reproduction, claiming "I am happy to assure you in these lines of my astonishment and admiration at what I heard."[62]

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[62]Roehl, *Player Piano Treasury*, 48.

EDVARD GRIEG

NORWAY'S greatest composer, Edvard Grieg was also a pianist of remarkable poetic individuality, and as such made many successful professional tours of Europe. He was born at Bergen, in 1843, and died there in 1907. He was one of the most original composers of the nineteenth century, and his shorter piano pieces (known to every music-lover) are among the most charming and beautiful works of their kind.

"This ingenious invention, 'The Welte-Mignon,' or the idea to use the electrical power in the service of the intelligence, struck me with admiration; it surpasses all other essays in the way of artistical pianos."
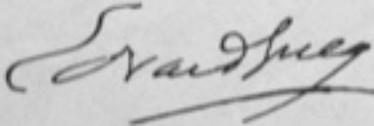
CLAUDE DEBUSSY

CLAUDE DEBUSSY, most strikingly original of modern French composers and leader of the impressionists in music, began as a pianist. He was prepared for the Paris Conservatory by Mme. de Sivry, a pupil of Chopin; was admitted at the early age of eleven, continued to study piano with Marmontel, and won many prizes. He was born near Paris in 1862, and died in that city on March 26, 1918. To hear his own playing of his piano pieces is a rare treat.

" It is impossible to attain a greater perfection of reproduction than that of the 'Welte-Mignon' apparatus. I am happy to assure you in these lines of my astonishment and admiration at what I heard."
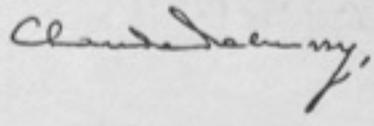
Figure 4.14: Grieg and Debussy Sign Off on the Welte-Mignon

By using established names in the musical community, these advertisements rely on Grieg and Debussy's celebrity status and the weight of their names to sell player pianos. Moreover, the advertisements add credibility to the storage and reproduction of Grieg and Debussy's labor and works through the piano roll. The fact that Welte-Mignon

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appears only once in each ad, within the quotes given by the composers, make it seem as if they are not selling anything, that the fact that the composers specifically named Welte-Mignon was unplanned and coincidental, as if that brand is truly the best. Grieg and Debussy's literal signatures appear at the bottom of each advertisement, assigning a certain weight of authenticity to the information therein. And Welte-Mignon was not the only company to draw on the cultural capital of famous composers; Duo-Art printed an ad featuring George Gershwin who "records his piano playing exclusively for the Duo-Art."[63] By selling Gershwin, Grieg, or Debussy's performances of their own works, Welte-Mignon capitalizes on the labor of a few highly skilled individuals, reproduced in an industrialized labor setting akin to Chandler's large enterprise system. The hands of Gershwin, Grieg, or Debussy, though literally invisible at the player piano, are visible through their signatures both in advertisements and on the rolls themselves. The roll mass-produces their labor and makes it visible while also obscuring the laboring hands of the roll editors and manufacturers.

Thus in terms of mechanical performance as it compares to live performance, these advertisements fall into two categories — those that attest to the superiority of the mechanical instrument over live performance, and those that describe it as a competent stand-in for the concert pianist. In either case the player piano comes off as a more capable performer than the amateur. As demonstrated by these advertisements, the player piano renders at-home piano playing, including the labor required to gain a certain level of passable proficiency at the keyboard, irrelevant because the average amateur has little

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[63]Roehl, *Player Piano Treasury*, 51.

chance of reaching the level of the concert pianist and only a concert pianist can outperform the mechanical instrument. In terms of labor, then, these advertisements ascribe a sense of irrelevance to the average performer, the outdated small enterprise performer. If player piano rolls are second only to concert pianists and piano rolls capture and reproduce the performances of those pianists to be played on any piano equipped with the proper machinery, what need is there for the amateur to labor over the keys?

The value and demand for the skilled performances of a few high-ranking musicians, like Paderewski, Ganz, or Debussy, recorded on piano rolls creates a market akin to the large enterprise model of Chandler's visible hand theory. Pictures in magazines advertise the visible hands of Paderewski, Ganz, Debussy and consequently conceal the laboring hands of the workers who edit, reproduce, and manufacture the rolls. The performers are the highly skilled laborers and their products are controlled by middle management, a class of workers that according to Chandler came to be because of the creation of large corporations. The invisible hand that guided earlier musicians to success through their effort as individual players becomes impossible as the road to success inclines sharply upward and celebrity virtuosos, through international distribution and marketing, become that much more removed from the average individual. Rather than many individual musicians laboring and achieving success in a controlled area, like in the small enterprise model, the player piano sells the labor of a select few as marketed to the whole through the management and backing of a larger corporation in an illustration of Chandler's visible hand model of twentieth-century business management.

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CONCLUSION

Through several examples of player piano advertisements, this chapter examines four approaches towards marketing the player piano within the industrialized labor economy of the early twentieth century. The first pushes the instrument's perfect technique, its flawless execution of the most difficult and intricate combinations of keys. The perfect performances delivered by the player piano alleviate some pressure from young Victorian women who were expected to play moderately difficult pieces perfectly, and difficult pieces only in practice. The player piano has no such limitations and can reproduce as if played by the ghostly hands of a concert pianist. Indeed, some advertisements included images of those ghostly fingers, large masculine hands, the phantom hands of the established pianist. The second approaches advertising from the woman's perspective, reducing her duties at the keyboard and appealing to her sense of fashion and beauty. The third section addresses the player piano as pedagogical assistant, or even as a teacher in some cases, aiding music instructors or teaching young students to play the piano through imitation. In the final section I discussed advertisements that use the player piano as a device to store and reproduce highly skilled labor, labor often initially recorded by a male pianist or composer. These advertisements often featured quotes from living performers or even the images of long-dead composers such as Beethoven, Bach, or Handel, silently giving their approval to the mechanical performance.

In each category, the labor inherent in the roll is an invisible labor, a labor that is programmed into the roll and reanimated by the mechanism. The roll appears ready-made

in the store, the labor used to produce it carried out by the invisible hands of editors and roll-punchers. Many rolls included the signature or name of the performing pianist, especially on reproducing piano rolls, and the pianist then becomes the visible figure of production. The pianist's laboring hands become the visible synecdoche of the labor of all of the other hands — which are themselves synecdoches for the laboring bodies — that also helped produce that roll. His hands then become more than human as they absorb the labor of multiple workers, striving towards the image of God's invisible hand. In the home, piano rolls took work from young women who previously were expected to act as in-home entertainment centers, providing conversation, dancing, and music. In the classroom or private piano lesson the player piano assisted teachers, and in the right hands the piano roll even acted as teacher, inspiring students to learn through imitation. As these examples of twentieth-century player piano advertisements show, the musical labor went through a dramatic shift with the advent of mechanical reproduction. It served as a replacement for the amateur pianist, an alternative to the concert pianist, an enhancement to teachers, and a teacher to the ambitious.

While the player piano did not survive the Great Depression, its effect on musical labor carries through to today. By the 1930s and 40s, recording technology overtook the musical marketplace, quickly overwhelming the bulky player piano with small cabinet victrolas, tabletop phonographs, and slim records. These ever-shrinking technologies act as early indicators of the obsession with portable, tiny gadgets in the late 1990s and early 2000s. Moreover, music's space on the shelf diminishes from score to roll, record to CD, and CD to MP3. The machine fully absorbs the musical product, rendering musical labor

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completely invisible to consumers but for its aural evidence, often edited and altered far

beyond the manual labor of its performers. In the end, Smith's invisible hand — God's

hand — is the modern ghost in the machine.

Chapter 5: "So Old it's New": Absolute Music and Three Snapshots of the Player Piano

Figure 5.1: Pianola in *A Touch of Evil*

In Orson Welles' *Touch of Evil* (1958), scored by Henry Mancini, corrupt American police captain Hank Quinlan (Orson Welles) investigates a murder in a Mexican border down. Following an unfruitful interview he walks into the street and hears a waltz ("Tana's Theme"). "Pianola. Tana's still open for business?" (16:22), he asks aloud. The scene then cuts to the pianola (Figure 5.1) as it scrolls through the roll (16:32). The wall next to the instrument has large cracks and missing chunks of plaster and the wooden frame shows through, indicating that the room, much like the pianola,

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has seen better days. Quinlan walks toward the music, limping with his cane as he chews a candy bar. He opens the door to Tana's brothel as the phrase closes on a perfect authentic cadence before entering the piece's B section. He wanders through the house until he finds Tana (Marlene Dietrich) who takes a drag of her cigarette before telling Quinlan "we're closed" (17:18). "Have you forgotten your old friend?" Quinlan asks. The two chat and he says "that pianola sure brings back memories." Tana responds: "the customers go for it. It's so old it's new. We've got the television, too. We run movies" (18:18).

Later, Quinlan, a recovering alcoholic, sits at a bar and "Tana's Theme" enters, this time played by an accordion and woodwind ensemble (49:16). He absentmindedly takes a drink of bourbon only to realize he has just broken his sobriety. The music drops out (50:54). Quinlan returns to Tana's and sits listening to "Blue Pianola" on Tana's player piano, shown in Figure 5.2, a bottle of liquor directly beside him (1:21:37). The screen shifts to Tana, smoking and working on her accounts, and her theme from earlier returns. Quinlan stumbles drunkenly toward her and asks her to tell his fortune (1:22:11). She looks sadly at him and says he has no future: "Your future is all used up. Why don't you go home?" Her fortune telling proves accurate when Quinlan leaves the brothel and meets his demise. After he dies she appears accompanied by her theme on pianola (1:35:18). She describes Quinlan, saying "he was some kind of a man. What does it matter what you say about people?" The film ends as she walks away.

Figure 5.2: Quinlan drinking in front of the pianola

In Welles' *A Touch of Evil*, the pianola functions as a nostalgic reminder of Quinlan's past. The piano's just slightly out of tune tinkling, the haphazard way the rolls are thrown onto the shelves, and the chipped and damaged plaster on the walls indicate that the house is past its prime. Pianist and composer Dick Hyman describes the pianola's role in this film in a 2006 interview, stating: "what they used there was the very grave sound of a player-piano playing a very jolly Mexican waltz. It was so opposed to the grim action that was taking place on the screen that it lent everything a very ironic cast. And sometimes composers and directors will spot an opportunity to do that."[1] Tana even says the pianola is "so old it's new" — the novelty of the pianola as a new technology had

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[1] Andrew Ford, *The Sound of Pictures: Listening to the Movies, From Hitchcock to High Fidelity* (includes an interview with Dick Hyman), (Collingwood Vic: Black Inc., 2010), 68.

worn off and been replaced by the novelty of a technology so out of date it was quaint.[2]

Moreover, the instrument's quaintness rests on the fact that it is a returning technology,

one that has been out of the popular market for many years but not so long as to be

forgotten. Tana keeps the television atop the instrument and it looks small and modern in

direct contrast against the pianola's bulky frame. And Quinlan looks bulky and old next

to Tana, who was initially unable to recognize Quinlan because he had gained so much

weight since their last meeting. After chiding Tana for not recognizing him Quinlan tells

Tana she is "sure lookin' good" (18:05). Welles created Tana's role for Dietrich, who

maintains her German accent despite playing a Mexican prostitute.[3] Naremore calls

Dietrich a "'cameo' player" and explains her role is meant to "break the surface of

illusion" because we see Dietrich instead of her character.[4] The combination of a

German-accented Mexican prostitute and the outdated pianola blur Quinlan and Tana's

scenes, making it seem as if the pianola conjures Quinlan's flawed memory of Tana,

resurrecting her from his past. The waltz the pianola plays is outdated, but so is the

pianola itself, along with its setting in a run-down brothel. The pianola — like Quinlan,

like Tana — is obsolete.

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[2]Nick Seaver writes, "from our contemporary perspective, populated by the descendants of the phonograph, the player piano seems a self-evident failure, intrinsically inadequate." He continues, "as a 'failed' or 'obsolete' technology, the automatic piano lacks the inevitability and transcparancy we grant retroactively to the ponograph." Nick Seaver, "'This Is Not a Copy': Mechanical Fidelity and the Re-enacting Piano," *Differences: A Journal of Feminist Cultural Studies* 22, nos. 2 and 5 (2011): 58.
[3]John Stubbs, "The Shooting Script(s): The Evolution of Orson Welles's *Touch of Evil* from Novel to Film," in *Touch of Evil: Orson Welles, Director,* ed. Terry Comito (Rutgers Films in Print Volume 3, 1998), 192.
[4]James Naremore, *The Magic World of Orson Welles* (Southern Methodist University Press, 1989), 171.

The player piano carries an air of nostalgia in *Touch of Evil* because by the 1950s

it was well past its prime; sales of the player piano peaked in 1923, thirty-five years

before the film's release.[5] Despite its status as an antiquated technology, the player

piano's visible mechanics re-entered the niche music market several times throughout the

1950s and 60s, even finding a small measure of success with American and English

consumers.[6] Its nostalgic power comes from the player piano's importance in establishing

music as a consumable object in early twentieth-century culture, an importance that

historian Craig H. Roell argues carries more weight than that of the phonograph or

motion picture. Roell writes of four factors that helped establish music as a commodity:

> the contagion of ragtime music, and the invention of the mechanical player piano
> the phonograph, and the motion picture. While each of these inventions in time
> effected change (however minimized by the invention of the radio), it was the
> player piano — with its significant link to Victorian culture, its superior fidelity,
> and its mass-production by an influential industry already entrenched in American
> musical and industrial life — that was the most powerful force toward
> establishing a musical democracy in the Victorian twentieth century.[7]

Touch of Evil does not reveal Quinlan's age but he looks middle aged, certainly old

enough to remember the player piano when it was popular. He likely would have been

young and healthy in the 1920s, and based on the way he reacts to Tana and to the

pianola he remembers the pre-Depression era fondly. That *Touch of Evil* chooses to use

the player piano, not the phonograph or radio, to convey a sense of nostalgia and longing,

is worth noting. Unlike the phonograph or radio, the player piano is an obsolete

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[5]Kevin McElhone, *Mechanical Music* (Buckinghamshire: Shire Publications, 2004), 26.
[6]Arthur W. J. G. Ord-Hume, *Player-Piano: The History of the Mechanical Piano and How to Repair it* (New York: A. S. Barnes and Company, 1970), 42-43.
[7]Craig H. Roell, *The Piano in America 1890-1940* (Chapel Hill: University of North Carolina Press, 1989), 32.

technology. It did not improve with time, but rather it fell quite rapidly after its peak.

With the rising success of the phonograph following its conversion to electrical recording

equipment in 1924, the player piano started to succumb to the competition.[8] Additionally,

phonograph companies allied themselves with radio companies, combining the two

machines into a kind of "radio-phonograph." Radio technology improved quite a bit in

the 1920s including improvements in amplification that then carried over into

phonograph technology; the sale of radios and phonograph records quickly crippled

player piano sales.[9] Much like those of phonograph records, sales of player pianos and

their rolls fell drastically after the 1929 stock market crash, and unlike the records, the

player piano market never recovered. The Depression essentially eradicated player pianos

from the musical marketplace, firmly turning consumers' ears toward records and radios.

To some the 1920s were the "decade of prosperity," but while other industries

thrived the piano industry dwindled and many large piano manufacturers shut their doors.

Only brands that adapted to the changing times by making smaller models and promoting

the piano's nostalgic place in the home — played by members of that home — survived

the Depression.[10] The player piano — the skilled, mechanical, and more-expensive sister

to the silent piano — did not survive, or at least not in the mainstream market. Indeed,

Roell goes so far as to claim that "the piano industry in general has not recovered the

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[8]Roell, *The Piano in America 1890-1940*, 330-31.

[9]The reproducing piano system peaked slightly later, in 1925, but it saw the same rapid decline as the player piano, especially once the stock market crashed in 1929. Neal Peres da Costa, *Off the Record: Performing Practices in Romantic Piano Playing* (New York: Oxford University Press, 2012), 13. See also: Theodor W. Adorno, *Currents of Music: Elements of a Radio Theory*, trans. Robert Hullot-Kentor (Cambridge: Polity Press, 2009). James Lastra, *Sound Technology and the American Cinema: Perception, Representation, Modernity* (New York: Columbia University Press, 2000).

[10]Roell, *The Piano in America 1890-1940,* 330-331.

production nor the market that it enjoyed from 1909 to 1923."[11] Previous scholars have devoted little attention to the aftermath of the player piano's fall from popularity, focusing instead on the phonograph or on the player piano in its heyday. Yet the player piano's use before, during, and after the 1920s can tell us about the musical culture and ideals of its consumers and the market's response toward analog technology once it, too, had become ubiquitous.

In this chapter I address the player piano and its music across three stages: first with an example from 1917, before its highest sales peak in the early 1920s, second with a few examples from the instrument's heyday, and third from the 1940s, once it had mostly disappeared from the mass market. I set up my discussion with an overview of what Carl Dahlhaus calls "the idea of absolute music" and how the player piano fits in unexpected ways with the concept. Absolute music, which Dahlhaus defines as "independent instrumental music …[that] purely and clearly expresses the true nature of music by its very lack of concept, object, and purpose … as pure 'structure,'" has an interesting role in light of recording technology because it allows for a more "independent" instrumental performance — a performance that lacks the present, laboring body of a human performer.[12] I then analyze original works for player piano, divided into three primary time periods: Igor Stravinsky's *Étude pour Pianola* (1917) for a pre-1920 example of the compositions from before the instrument's prime, then several works from the 1920s when the instrument peaked including works by Alfredo Casella,

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[11]Ibid.

[12]Carl Dahlhaus, *The Idea of Absolute Music*, trans. Roger Lustig (University of Chicago Press, 1989), 7.

Paul Hindemith, and Ernst Toch, and finally Conlon Nancarrow's *Study No. 2* (undated, but likely from between 1948 and 1960)[13] as an example of a work composed for the player piano when it was no longer popular. Brief analytical glances at the mechanistic features of Stravinsky's *Étude*, the 1920s works by Casella, Hindemith, and Toch, and Nancarrow's *Study* illustrate how the musical content suits the mechanical performer.

ABSOLUTE MUSIC

Stravinsky, Casella, Hindemith, Toch, and Nancarrow composed for player piano at different stages of the instrument's history. Working in 1917, Stravinsky wrote his *Étude pour Pianola* at the tail end of the First World War and several years before the instrument's peak in the early 1920s. Casella, Hindemith, and Toch composed during the machine age, a term historians use to refer to the period of great technological and mechanical change between 1918-1945.[14] And Nancarrow, who likely composed his *Study no. 2a* sometime in the 1940s, falls well after the player piano's decline — he used the instrument primarily for its practicality and convenience. But before I get into the particulars of what using a mechanical performer might have meant at each of these points in time, I need to provide some background on absolute music along with some theoretical speculation regarding absolute music's implications in the age of mechanical performance.

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[13]Kyle Gann, *The Music of Conlon Nancarrow* (Cambridge: Cambridge University Press, 1995), 68.
[14]Joel Dinerstein, *Swinging the Machine: Modernity, Technology, and African American Culture between the World Wars* (Boston: University of Massachusetts Press, 2003), 5.

Each of these composers exploits the player piano as a mechanical performer, a performer that, theoretically, functions as a medium for a composer's musical intentions rather than a subject with free will. I say theoretically because a mechanical performance contains its own aural markings, such as the whirring of the mechanism or whooshing of the rolls. Nevertheless, the mechanical performer is unlike a human performer who layers his or her interpretational choices onto a given work through performance. The role of the performer in recreating a musical work in traditional performance practice changes dramatically with mechanical reproduction; removing the live performer also removes the active, laboring, human middleman between the work and listener. Removing this interpretive middleman, then, makes it seem as if the performance issued is closer to what the composer imagined it to be. Removing the middleman — the changeable human performer — and replacing him or her with the mechanical constant theoretically makes absolute music possible.

> Absolute music is a complex concept with what Roger Lustig describes as
>
> many facets: the supremacy of music above other arts; the belief that words, instead of being an essential component of a piece of music, are either irrelevant to or even distracting from its meaning; the quasi-religious function of listening, whereby proper hearing of sublime music can afford the listener a glimpse of the infinite, or of the Beyond, or at least produce an esthetic experience above mundane ideas, images, and things; and the formalist view of music that equates form and content.[15]

The term "absolute music" comes from Wagner (who, ironically, acted as its main challenger), and the concept first took hold in Germany in the early nineteenth century

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[15]Roger Lustig, translator's introduction to Dahlhaus, *The Idea of Absolute Music*, viii.

and spread into France by the end of the century.[16] In the nineteenth century, absolute

music competed with what Dahlhaus calls the "older idea of music. . . the concept,

originating in antiquity and never doubted until the seventeenth century, that music, as

Plato put it, consisted of *harmonia*, *rhythmos*, and *logos*."[17] While eighteenth-century

instrumental music accompanied the higher art of vocal music, nineteenth-century

romanticism flipped the two. Instrumental music became the model for autonomous

music, as philosophers believed instrumental music represented itself not as something

beneath language but something above it.[18] As Mark Evan Bonds defines it, "'Absolute

Music' . . . manifests itself most clearly in compositions that have no text to be sung and

no titles or accompanying descriptive terms that might in some way suggest what a

particular work might be 'about.'"[19]

Composers like Stravinsky and Nancarrow were drawn to the player piano at least

in part because it allowed for new pianistic executions unlimited by any real performer's

technique. Indeed, Stravinsky openly criticized performers both for their physical

limitations and interpretational choices. He writes,

> In order to prevent the distortions of my compositions by future interpreters, I had
> always been anxious to find a means of imposing some restriction on the notorious
> liberty, especially widespread today, which prevents the public from obtaining a
> correct idea of the author's intentions. This possibility was now afforded by the
> rolls of the mechanical piano.[20]

And in a 1925 interview, Stravinsky said: "There is a new polyphonic truth in the player-

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[16]Dahlhaus cites an 1895 essay by Jules Combarieu. Dahlhaus, *The Idea of Absolute Music*, 3.
[17]Ibid., 8.
[18]Ibid., 8-9.
[19]Mark Evan Bonds, *Absolute Music: The History of an Idea* (New York: Oxford University Press, 2014), 1.
[20]Igor Stravinsky, *An Autobiography* (New York: W. W. Norton & Company, 1962), 69.

piano. There are new possibilities. It is something more. It is not the same thing as the piano. . . . It shares the soul of the automobile."[21] David Suisman claims that "in the 1910s and 1920s composers Igor Stravinsky, Paul Hindemith, Ernst Toch, and others approached the player-piano as a novel tool of musical expression — that is, as a means to create new sounds not available through conventional composition and manual instrumentation." [22] Suisman then lists Nancarrow as the "greatest of these experimentalists" because he wrote works that "played faster and with more notes than any human could execute, in intersecting rhythmic patterns of vertiginous, mathematical complexity that showered auditors with cascading waves of sound."[23] Nancarrow also shared Stravinsky's dream of "getting rid of the performers."[24] Stravinsky and Nancarrow, in their use of the player piano as compositional tool and mechanical performer, aimed to achieve an unmediated musical statement, a music about music, unlimited by human technique. For them, the player piano was an instrument that could conjure absolute music, drawing its spirit out of the instrument to occupy the empty bench.

The notion of the spirit or spark within a piece or its performer was not a new concept in the early twentieth century. Indeed, the concept appears almost a century before Nancarrow when the notion of "music for music's sake" sparked Eduard Hanslick's 1854 pivotal formalist essay on absolute music called *The Beautiful in Music*.

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[21]Vera Stravinsky and Robert Craft, *Stravinsky in Pictures and Documents* (Hutchinson, 1979), 44.
[22]David Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure': Rethinking Musical Mechanization through the Phonograph, the Player-Piano, and the Piano," *Social Text* 102 (Spring 2010): 29.
[23]Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 29.
[24]Stravinsky, *An Autobiography*, 69. For more on Stravinsky's relationship with the player piano, see chapter 4. Conlon Nancarrow, quoted in Charles Amirkhanian, "Interview with Composer Conlon Nancarrow," in Nancarrow *Selected Studies for Player Piano*, ed. P. Garland (Berkeley, 1977), 15.

The role of the performer in recreating the musical work in a traditional performance sets up the cultural practices that change dramatically with mechanical reproduction; if the performer's presence at the bench was never mandatory for the transmission of a meaningful work then the performer's ultimate absence would be irrelevant. Hanslick inveighs against "feeling-theory" (what theorist Leonard B. Meyer calls "expressionist") in favor of a formalist model of musical meaning. Meyer defines the formalist way of thinking as "the meaning of music lies in the perception and understanding of the musical relationships set forth in the work of art and that meaning in music is primarily intellectual." Expressionists, on the other hand, "would argue that these same relationships are in some sense capable of exciting feelings and emotions in the listener."[25] For Hanslick, musical meaning reaches its full potential in instrumental music, which he claims is the only music that can be absolute. He writes, "Of what *instrumental music* cannot do, it ought never be said that *music* can do it, because only instrumental music is music purely and absolutely."[26] Hanslick claims that composers' ideas are purely musical ideas, and these ideas are musical content.[27] In his oft-cited third chapter on beauty in music he famously writes, "the content of music is tonally moving forms," which summarizes his formalistic standpoint toward musical form and musical content — for Hanslick, the two are the same.[28] While Hanslick goes on to address the roles of composer and listener — he initially skips over the performer — he says that the

[25]Leonard B. Meyer, *Emotion and Meaning in Music* (Chicago: Chicago University Press, 1956), 3.
[26]Eduard Hanslick, *On the Musically Beautiful* (1854), trans. Geoffrey Payzant (Indianapolis: Hackett Publishing, 1986), 15. Italics in the original.
[27]Ibid., 10.
[28]Ibid., 29.

"autonomous artwork turns out to be in fact an efficacious mediator between two kinetic powers, its whence and its whither, i.e., the composer and the hearer."[29] The artwork mediates, then, not the performer.

When Hanslick addresses the performer's role he mandates an ethics: the performer should reproduce a musical work (i.e. be true to the score's indications) and imbue it with the necessary "spark" that then brings the work to life. The composed piece — regardless of whether or not it is performed — is the artwork in itself, but for a performance the artwork relies upon the animating performer's spark. He writes that in a performance the performer "is granted to release directly the feeling which possesses him, through his instrument, and breathe into his performance the wild storms, the passionate fervour, the serene power and joy of his inwardness."[30] Hanslick's phrasing inadvertently foreshadows the player piano's ghostly performer when he describes the work possessing the performer. In addition, he compares the composer and performer as opposites: the composer works slowly, the performer in "impetuous flight;" the composer for the future, the performer for the present; the composer forms the work, the performer creates an experience.[31] In other words, Hanslick's definition of the performer is someone who is *present* — in the moment, active, passionate. Yet in light of mechanical reproduction, issues of presence and absence become less black and white. A question arises: can a performer's *spark* be present if his or her body is not? The player piano's ghostly performer suggests just that — the player piano literally mechanizes or electrifies

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[29]Ibid., 45.
[30]Ibid., 48-49.
[31]Ibid., 49.

key elements of a musical performance so that its reproduction becomes possible without the performer's present body. The player piano separates the spark from the body, then, and allows the performer's spirit, the absolute spirit of the work, to play.

For Hanslick, a kind of magic lies in the reproduction of a musical work — the performer reproduces the work and "coaxes the electric spark out of its obscure secret place and flashes it across to the listener." The performer's playing must in fact be more than technically accurate. Indeed, the performer's spirit animates the work, and thus is a necessary part of musical reproduction. Hanslick goes so far as to describe the overly technical or unfeeling performer as "the most artistically contrived music box [that] cannot move the hearer," while the spirited performer, even if just the "simplest street singer," can move the hearer if "he is heart and soul caught up in his song."[32] In sum, while Hanslick considers instrumental music to be the purest of absolute music, it still requires the spirit of a performer to reproduce the work. The performer, then, is not possessed by the composer's spirit like a mindless body temporarily enchanted by the work, but rather a moving recreation of a musical work requires the performer's interpretive input.

Hanslick's essay, along with writings by philosophers and scholars such as Kant, Goethe, and Hoffmann, created a niche for absolute music and formalism in music criticism and scholarship that continues to this day. In his comprehensive summary of absolute music in writings from Richard Wagner to E. T. A. Hoffmann and Hanslick to G. W. F. Hegel, Dahlhaus traces the concept as it changes through romanticism and the

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[32]Ibid., 49.

nineteenth century, but his definition of absolute music is independent instrumental music because, as quoted earlier, it "purely and clearly expresses the true nature of music by its very lack of concept, object, and purpose… as pure 'structure' [that] represents itself."[33] Another theorist who writes on absolute music, Jean-Jacques Nattiez defines the musical work as "not merely what we used to call the 'text' it is not merely a whole composed of 'structures' . . . Rather, the work is also constituted by the procedures that have engendered it (acts of composition), and the procedures to which it gives rise: acts of interpretation and perception."[34] Nattiez goes on to claim that a particular musical work is more than a performance, its perception, its sound, or the score.

But the performer's interpretive input is problematic whether it is present, as with a live performer, or absent, as is the case with piano rolls punched directly from the score. Edited rolls, where editors change a performer's interpretation into an idealized version of a performance, a version that never happened live, present an even more complex rendition of the work and its interpretation. The musical score is a visual object, a visual representation of a sonic object. The visual score is, in a sense, stunted — Daniel K. L. Chua writes, "the score grasps the totality for the individual ego, enabling it to possess the music as a commodity which it owns *but cannot play*."[35] The score contains, visualizes, and commodifies; the performer reproduces, interprets, and plays. The performer is to gaze at the notes until they transform into original manuscripts,

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[33]Dahlhaus, *The Idea of Absolute Music*, 7.
[34]Jean-Jacques Nattiez, *Music and Discourse: Toward a Semiology of Music*, trans. Carolyn Abbate (Princeton: Princeton University Press, 1990), ix.
[35]Daniel K. L. Chua, *Absolute Music and the Construction of Meaning* (Cambridge: Cambridge University Press, 1999), 55.

manuscripts made manifest in "seismographic curves left by the very body of the music through its gestural tremors."[36] A musical performance, if it is to be a "true reproduction," requires the subjective spontaneity of the performer; through this spontaneity the performer transforms musical form into musical content. The validity of a performer's interpretation depends on what philosopher Theodor W. Adorno calls the performer's "precision and focus… first in the analysis of the written score, and then in its retranslation into sound."[37] Nonetheless, the performer — even an inferior one — is still a necessary component of musical reproduction. But what of these mechanical performances, where the player piano plays itself without a present, skilled performer? Can these performances still be "true" reproductions? And, to delve into murkier waters, are reproductions, by nature, already something less than an original?

For Hanslick, the performer's job is to be present, active, and passionate — to provide the spark. The reproduction of a musical work requires the performer's spirit. But Hanslick also claims that the artwork mediates between composer and listener; the performer's role in this mediation is less than clear. So, if the artwork mediates and a mechanical instrument can effectively deliver the composer's conception of the artwork then the performer's role becomes unnecessary. Yet Hanslick also claims that in order for a performance to reproduce a musical work the performer's spirit must "coax the electric spark" out of the work to flash it to the listener. Either the mechanical instrument must have its own spirit or it is nothing more than a contrived music box, incapable of moving

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[36]Ibid., 186.
[37]Adorno, *Towards a Theory of Musical Reproduction* (Cambridge: Polity Press, 2006), 204.

the listener. It is interesting to note that while Hanslick elevates the composer, the hearer, and the work into a kind of communicative web, he demotes the performer to a role very similar to a mechanical instrument, enlivened by an electrical spark. Possessed by the roll and its reproducing mechanism, the player piano mediates between composer and hearer, reproducing the work. This possession requires an animate presence in the player piano, thus firmly placing a kind of spirit within the reproducing mechanism, a ghost in the machine. Perhaps for Hanslick, the player piano presents the opportunity for a passionate performance complete with the performer's heart and soul. As the roll rotates within the body of the player piano it conjures the performer's invisible fingers to press the keys and coax the music's electric spark from the perforated paper, where it lies dormant.

Dahlhaus's definition of absolute music as instrumental music that purely and clearly represents musical structures works well with mechanical instruments; indeed, it works better than a live performer in a way, as in theory the mechanical performer's interpretation does not impede upon the translation of musical form to the listener. However when the mechanical elements of the instrument — the roll whirring, the pedals pumping, the sounds of the inner workings of the machine — along with the mechanical elements of its rendition — its overly-exact rhythms and in some cases oddly-emphasized melodies — influence the musical content of the piece, the live performer and mechanical performer fall onto a more even playing field, as each obstructs the communication of musical form. Thus for Dahlhaus, the performing ghost at the player piano bench is as intrusive as the visible, live performer.

While for Hanslick the mechanical performer could present a possible ideal, and for Dahlhaus the mechanical is just as problematic as the human, Nattiez reduces the performer's role to little more than the music box of which Hanslick was so critical. Nattiez specifically writes "the performer does not strictly speaking create the work, but instead gives it access to a sonorous existence."[38] Nattiez also writes of the performer's interpretation as having two meanings: the first in performing the work, the second in personally selecting interpretants.[39] If the performer is there just to give sound to the work and to choose what parts of a work to bring out, then the machine easily replaces Nattiez's performer. Editors programmed the reproducing roll, in particular, to deliver certain interpretations to the listener, and indeed it is the performer, not the listener, that the player piano mechanized. The listener's obligation to interpret a performance carries through in both situations. Whether human or ghost, Nattiez places the actualization of absolute music squarely onto the shoulders of the listener, and thus he, perhaps unintentionally, circumvents the theoretical issues of mechanical performance.

For Dahlhaus and Nattiez, then, mechanical performances do little to change the music itself; the absolute content of the music remains the same whether played by man or machine. Hanslick, writing decades before the player piano and machine age, writes a theory of musical aesthetics that specifically cites the music box as something incapable of delivering a meaningful presentation of the work. But the player piano's performances, while mechanically modeled on the music box's rotated tined barrel, effectively transmit

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[38]Nattiez, *Music and Discourse: Toward a Semiology of Music*, 72.
[39]Interpretant is a Piercian term Nattiez uses to describe what the performer chooses to emphasize or de-emphasize in a given performance. These choices then influence the listener's interpretation of the work.

the work in a way that fits Hanslick's requirements. When Hanslick promotes the composer and listener to a level above the performer, the opposite is also true — he demotes the performer into a kind of automaton, a mechanical body awaiting possession by the meaningful work. Moreover, the performer's "spark" is similar to the power provided to the player piano, whether through pumping foot pedals or electricity. Bonds writes that "Hanslick's view of music as a wholly self-contained art . . . would figure prominently in several currents of modernist aesthetics in the early twentieth century." Hanslick's theory influences musical culture in the early twentieth century, Bonds continues, "even if figures like Schoenberg, Stravinsky, and Hindemith had no desire to be associated with a critic from a previous generation whose reputation was that of a hard-boiled reactionary."[40] Reading theories of absolute music, especially Hanslick's work, in light of mechanical performance shows how the two areas overlap. The mechanical performer serves as the ideal mechanical realization of Hanslick's musical aesthetics — the music roll contains a kind of performing spirit complete with passionate interpretational meaning, capable of coaxing the work's electric spark. The spirit of the roll, present and active with the artificially polished passion of a live performer, articulates absolute music in a perfect realization of instrumental music. Freed not only of the human voice but also of its producer, the human body, the player piano recreates absolute music in a way the live performer never could. And composers like Stravinsky and Nancarrow latch on to this possibility, removing the performer from the live equation.

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[40]Bonds, *Absolute Music: The History of an Idea*, 3.

THE PLAYER PIANO AND THE CUTTING EDGE

Stravinsky composed his *Étude pour Pianola* in 1917, at the tail end of World

War One. The general mechanization of labor and production influenced musical

production after the War, especially regarding the recording and distribution of

phonograph records and piano rolls. But the recorded object itself as a kind of

commodified perfect performance presented editors and composers with a unique

opportunity to bypass the performer as laborer and also to reproduce and distribute

versions of a work that supposedly fit the composer's intent. The performing machine

presented two unique opportunities: first, to show off the skills of a particular

composer/performer, or second to compose music that is unlimited by a performer's

hands. Earlier chapters address the first opportunity through examples by composers such

as Felix Arndt and Zez Confrey, who composed novelty rags and then recorded rolls of

(or editors hand-punched transcriptions of) their own performances, marketing not only

the work but their particular renditions,[41] or examples by famous composers like Claude

Debussy, Sergei Rachmaninoff, and George Gershwin who recorded rolls of their own

versions of their works.[42] This section focuses on the player piano's other opportunity,

however. Through a discussion and analysis of his *Étude pour Pianola*, I examine how

Stravinsky, in particular, composed for the player piano. Although piano rolls allowed

almost unlimited access to the keyboard, Stravinsky's *Étude* is rather conservative, only

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[41]Novelty rags are discussed more thoroughly in chapter 2. Rex Lawson claims George Gershwin and Igor Stravinsky's music rolls were in fact hand-made transcriptions of their performances, rather than rolls recorded while the artist played. Rex Lawson, "What Should Librarians Do with Piano Rolls?: A Tentative Solution form the IAML Conference in Götenborg, Sweden," *Fontes Artis Musicae* 53, no. 4 (October-December 2006): 356

[42]An analysis of Rachmaninoff''s work, in particular, is in chapter 3.

pushing the work slightly beyond the capabilities of a solo pianist.

Stravinsky's fascination with the player piano led to a relatively high-paying contract with the Pleyel Company of Paris, a contract that the Aeolian Company in New York bought out in 1924.[43] His contract stipulated that he would transcribe his complete works for the Pleyel mechanical piano, and he arranged *The Firebird*, *Petrushka*, *The Rite of Spring*, *Pulcinella*, *Les Noces*, and others. [44] Stravinsky only wrote one work specifically for player piano, his *Étude pour Pianola*, and when he described why he was drawn to the instrument, Stravinsky wrote: "Aeolian wrote me during the war and offered me considerable 'payola' for an original piece for pianola. The idea of being performed by rolls of perforated paper amused me, and I was attracted by the mechanics of the instrument."[45] His *Étude pour Pianola* serves as an early example of music written for player piano and it models what composers might have thought as pushing the boundaries of composition and mechanical performance in the 1910s.

In his book *Stravinsky and the Piano*, Charles M. Joseph writes that even though Stravinsky dedicated "'hundreds of hours of work' in preparing as many as 77 'pleyelization rolls,' as he referred to them, [the rolls are] a part of the composer's

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[43]Once he signed the contract with Pleyel, Stravinsky lived in the piano factory and was given his own workshop. This was a highly lucrative contract for the composer — according to Robert Craft, Stravinsky's contract with Pleyel was probably worth between $2,000 and $4,000 annually at a time where the average worker's income was closer to $600. Robert Craft, *Conversations with Stravinsky* (London: Faber & Faber, 2011), 164.

[44]Describing his lucrative contract, Stravinsky writes: "Aeolian wrote me during the war and offered me considerable 'payola" for an original piece for pianola. The idea of being performed by rolls of perforated paper amused me, and I was attracted by the mechanics of the instrument." Igor Stravinsky and Robert Craft, *Expositions and Developments* (Berkeley: University of California Press, 1981) 70.

[45]Igor Stravinsky and Robert Craft, *Expositions and Developments* (Berkeley: University of California Press, 1981) 70.

productivity that continues to remain only on the periphery of his biography."[46] Beyond

their apparently low biographical value, pianolist Rex Lawson speculates,

> Pleyel cannot have made much money from the sale of Stravinsky's rolls, for they
> paid the composer on five counts for each and every roll of his that they
> manufactured, whether or not it was subsequently sold. The payments were for the
> mechanical copyright, for exclusivity (since the rolls represented the very first
> 'recordings' of the works concerned), for the arrangement of the work for music
> roll, for the performance of the work (even though Stravinsky did not actually
> record any of the rolls at a keyboard), and for the musical copyright of the original
> work.[47]

Needless to say, Stravinsky's contract with Pleyel did not last its expected length even

after the Aeolian Company bought it in 1924; in 1925 he went to America to record for

the Duo-Art system. With the stock market crash of 1929, many of the Duo-Art

arrangements were lost. Stravinsky's loyalties shifted from player piano to gramophone as

he became disenchanted with the instrument's performance both musically and

economically, but the rolls he left behind document a time when mechanical instruments

offered exciting new compositional and performance options to early twentieth-century

composers.

　　Stravinsky was open in his desire to remove the human performer from the bench,

but the player piano was not without its flaws, and he wrote around its weaknesses while

composing the *Étude*.[48] The Pianola Piano, the most popular player piano of the time,

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[46]Charles M. Joseph, *Stravinsky and the Piano* (Ann Arbor: UMI Research Press, 1983), 93.

[47]Rex Lawson, "Igor Stravinsky and the Pianola," accessed December 17, 2014,
http://www.rexlawson.com/index.html?nancarrow.html&1.

[48]Stravinsky primarily interacted with player pianos in the British, French and American tradition, rather
than the German Welte-Mignon. Though the Welte-Mignon operates by perforated music roll, it does not
require the foot-pedaling of early player pianos and is usually a keyboardless instrument more similar to a
sideboard than silent piano. Rex Lawson, "Stravinsky and the Pianola" in *Confronting Stravinsky: Man,
Musician, and Modernist,* ed. Jann Pasler (Berkeley: University of California Press, 1986), 284.

came from the American-based Aeolian Company, known in Britain as the Orchestrelle

Company until roughly 1920.[49] When Stravinsky visited London's Aeolian Hall in 1914,

the Pianola (a push-up device) and Pianola Piano (a piano with a built-in roll-playing

mechanism) led Britain's player piano market.[50] And operating the device was not nearly

as easy as people thought. In addition to foot pedals, and hand controls for tempo and

sustaining, each Pianola featured one of two possible systems: the Metrostyle or the

Themodist. The Metrostyle involved red wavy lines, many of which were inaccurate and

poorly done, on the roll that the pianolist traced to phrase a particular performance. The

Themodist allowed for the accenting of important tones in the melody by splitting the

keyboard into treble and bass (the split occurs between E4 and F4). A skilled pianolist

could control the amount of suction given to treble or bass at a given point and thus cause

certain notes to sing out above the accompaniment; a poor pianolist would likely create

very uneven and oddly-accented performances.[51] In France, the Aeolian Company

operated from the Salle Pleyel in Paris and manufactured the Pleyela and Autopleyela.

The Pleyela also split between E4 and F4 but it included a device called the "Chanteur,"

which was a less-effective version of the Themodist. The Autopleyela was a kind of

simple reproducing piano,[52] but research thus far has not uncovered any evidence of

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[49]The Aeolian Company first marketed the Pianola in 1897, and it was a push-up device with felt-covered wooden fingers that played the keys of an ordinary piano. It was not until roughly 1902 that pianos were manufactured with a built-in roll-playing mechanism. The built-in devices were known as player pianos, but the Aeolian Company called theirs Pianola Pianos. Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky*, 284.

[50]Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky,* 286.

[51]Ibid., 286-87.

[52]For a detailed discussion of the reproducing piano and how it recorded and operated, see chapter 3.

Stravinsky's works on the Autopleyela system.[53] According to Mark McFarland, most of

Stravinsky's other rolls were hand-punched by copy editors and were not played in by the

artist himself.[54] According to Lawson, Stravinsky's *Étude* uses the Metrostyle method and

was inspired by his recent trip to Spain.[55]

While visiting Rome in 1917, Stravinsky received a postcard from Swiss

conductor Ernest Ansermet. The postcard shows a small photograph of the Naples shore

surrounded by segments of hand-written Spanish dance music.[56] Stravinsky wanted to

capture the sounds of the busy streets and Mediterranean popular music of Madrid and

Naples, and Lawson describes the work as "deliberately mechanical in sound, full of

fragmented Spanish dance tunes, overlapping and competing with each other as

Stravinsky sought to capture the atmosphere of the Madrid streets, which he had

experienced firsthand during a visit in 1916."[57] In *After the Rite*, Maureen Carr uses

Stravinsky's Sketchbook V to trace these melodic patterns through the piece, calling

Ansermet's postcard a "'singing telegram' [that] could have served as a 'musical conduit'

for Stravinsky's sketch of a melodic line that appears in isolation on the earliest known

sketch page for the *Étude*."[58] She describes the piece as looking forward and a looking

back; she connects it back to the blocks and layers of his primitive works and forward to

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[53]Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky*, 287.

[54]Mark McFarland, "Stravinsky and the Pianola: A Relationship Reconsidered," *Revue de Musicology* 97, no. 1 (2011): 108.

[55]Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky*, 290.

[56]Chapter 4 ("Stravinsky's Improvisatory Style") of Maureen Carr's *After the Rite* reprints an image of the original postcard. Maureen Carr, *After the Rite: Stravinsky's Path to Neoclassicism (1914-1925)* (Oxford: Oxford University Press, 2014), 125.

[57]Rex Lawson, "Stravinsky and the Pianola," in *Confronting Stravinsky*, 290.

[58]Carr, *After the Rite*, 124.

his use of the rag.[59] Both Carr and Lawson write of piece's blocked texture, which emphasizes a texture the player piano can often project onto a non-block work. This piece comes together in block form, a structure Stravinsky scholar Jonathan Cross defines in the following: "each block, once defined, remains unchanged; there is no sense of a directed (linear) motion through it."[60] The *Étude* pastes together fragments of Spanish dance music and, inspired by busy city streets, it exhibits Stravinsky's first flirtations with a more improvisatory style. More importantly for the context of this chapter, the elements that give the piece its "mechanical" sound — its odd rhythms and overlapping scalar passages — highlight the strengths of the player piano as performer.

The *Étude* opens with high-registered bright chords spread over three voices, and the unison rhythm and high register (D4 is the lowest pitch) spotlight the sparkling harmonies. The only notes in mm. 1-6, shown in Example 5.1, are D, E, F♯, G♯, and A, and the top voice holds steadily on G♯, E, and A while the lowest voice primarily moves in neighboring parallel fifths of D-A and E-B. The middle voice carries the melody, which Carr calls "chant-like," moving in embellished neighboring octaves motion first creating a neighbor group around G♯ before stuttering on the upper and lower neighbors in turn.[61] Finally, in m. 4, the middle voice breaks away from G♯, F♯ and A and after E in the middle voice line stalls on F♯. Overall, then, even the "melody" only ranges a perfect fourth from E-A.

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[59]Ibid., 123-24.
[60]Jonathan Cross, *The Stravinsky Legacy* (New York: Cambridge University Press, 1998), 10.
[61]Carr, *After the Rite*, 124.

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Example 5.1: Stravinsky's *Étude pour Pianola*, mm. 1-6

Carr's connection of Stravinsky's opening melody to chant supports her claim that the piece looks back to his primitive works but the turn figure in m. 6, while also based on a neighbor motion, sounds more like something from a rag tune. Voices 1 and 3 first carry the turn figure in m. 6. It quickly becomes a recognizable gesture that will appear several times throughout the piece, and its unison occurrence here (spaced over two octaves) marks its first incidence as significant. As Carr points out in her analysis, the turn figure introduced here comes from Ansermet's 1917 postcard and later shows up in Stravinsky's Sketchbook V. The turn figure has a similar neighbor-based shape to the chanting opening melody in voice 2 — F♯-G♯-F♯ as an upper neighbor figure followed by E as an

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incomplete lower neighbor to F♯ — but its triplet-based syncopation aligns it with the contemporary rag tunes Stravinsky will soon embrace.

After this six-measure introduction, voices 4-6 join in and a *tutti* ascending scale section plays what will become transitional material throughout the *Étude*. Different voices carry different scales — F major, D major, and B major, accompanied by a chromatic scale beginning on G and a non-scalar collection of arpeggiations in the final voice. The scales move between voices, as shown by the dotted lines in Example 5.2. Voice 3 carries an odd collection of pitches, and it is notably the only voice that is not moving through some kind of recognizable scale; Elliot Kermit-Canfield describes the pitches in this voice as moving through "octatonic arpeggiations."[62] But looking at voice 3 in more detail, it initially moves through an F major triad, and after falling back to the third of the chord it ascends a perfect fourth to arpeggiate through a B major triad, which then also falls to its third. F and B are a tritone apart, and by juxtaposing them against one another Stravinsky arpeggiates his Petrushka chord (1911). After arpeggiating the Petrushka chord, the line briefly ascends through F♯-G♯ in brief parallel fourths with the B major scale in voice 5. B♯ disrupts the parallel fourths, and as the line shifts into voice 3 it falls to A♮. A♮-C-D-F♯ leads to two perfect fifth dyads, which are reminiscent of part 3 in the opening of the piece, and they then lead into the cadential E♭'s, marked by what distinctly sounds like $\hat{3}$- $\hat{2}$- $\hat{1}$ in the top line.

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[62]Elliot Kermit-Canfield, "Mechanical Music: Igor Stravinsky and the Player Piano," accessed December 11, 2014, http://www.personal.psu.edu/efk5016/website/files/PianolaPaper.pdf, 11.

Example 5.2: mm. 7-10

These scalar transitional passages occur at several points in the *Étude*, and if written for a solo human pianist they would probably prove the most technically challenging. Rhythmically, the live pianist would undoubtedly struggle with the complex combinations of sections like mm.13-15, shown in Example 5.3, which only uses four of the six possible voices. The challenge comes in the layering of a sextuplet melody (voice 2) over steady eighth notes (voices 3 and 4) and the syncopated sixteenth notes of voice five throughout. In m. 14 it only gets more difficult as the sextuplet becomes a septuplet. This section repeats in an expanded form in mm. 19-25 after another scalar transition. It gets even more complex in its repetition, tacking on triplet quarter notes and then eighth note triplets in m. 22 followed by sixteenth note septuplets with alternating octave

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doublings, all after the original sextuplet-septuplet-pentuplet pattern.

Example 5.3: *Étude* mm. 13-15

Something akin to a grotesque waltz begins in mm. 26 of the *Étude*, shown in

Example 5.4, with a distorted oom-pah-pah rhythm in the lowest voice. This section is the

most tonal-sounding, though it is a tonality that regularly shifts and changes, both between

voices and within the same line. Voice 6 carries the limping waltz rhythm, occasionally

stuttering and getting stuck on beat one. The turn figure from the piece's opening carries

through, interjecting in various lines as the melody shifts between voices. For example,

the melody is initially in voice 3 where it moves between E♭ and F, finally climbing to A♭

for the turn figure. Voice 1 enters as voice 3 turns in m. 32, and voice 1 walks down in

ornamented thirds before echoing the turn, which triggers the melody to transfer back to

voice 3 in m. 34. The melody politely transfers between voices like partners trading bows

at a formal dance. After another turn, the melody shifts back into voice 1 and voice 2

chimes in with long trills on B♭. These add to the ironically sentimental tone of this

section — the limping waltz, the extreme range, the folk-like pitches of the melody that

always seem just a bit off. The section sounds like it is trying to be tonal, but things

always go somewhat awry, when $\hat{7}$ is lowered or $\hat{4}$ is raised. At times it seems to be in E♭

mixolydian, not major, though it does not ever settle into an area.

Example 5.4: Grotesque Waltz, mm. 26-33

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The form of the work moves through five main blocks, labeled A-E in Figure 5.3, and the example's visual mapping shows how the form moves forward from A through E and then returns back to A, moving through a recapitulation of each section as it goes and with each section getting gradually shorter. The *Étude*'s block form highlights the player piano as a machine, as a performer that can easily switch between rhythms and melodic ideas. Nonetheless, doubling the number of notes on the same keyboard and with the promise of steady, machine-like rhythmic accuracy, Stravinsky's *Étude pour Pianola* is a clear result of the early twentieth-century's machine-driven culture.

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mm. 1  7   11  15  19  26      47      61  64                  103     112     121 122

 A  ---                        -------                                             --

 B      ----    ----                        -----                          ----

 C          ----    -----                                           --------

 D                      -----------                         ----------

 E                                      ----------------
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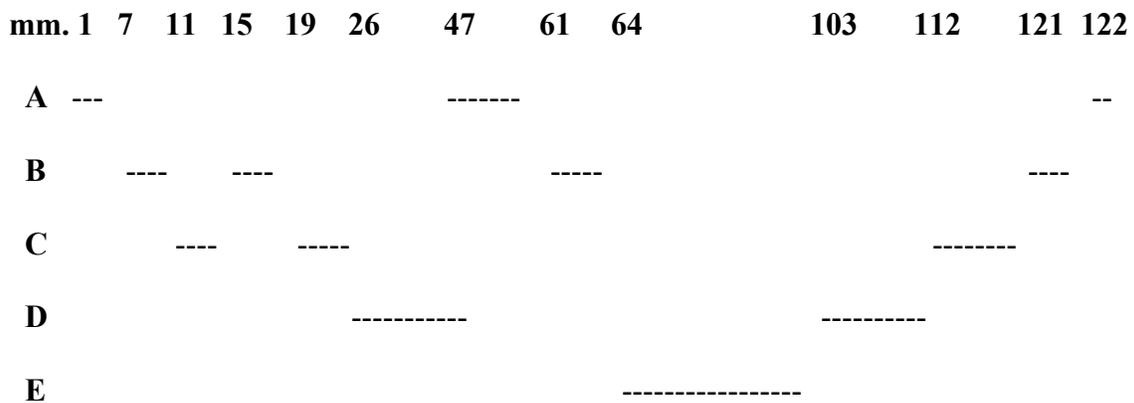
Figure 5.3: Formal Map of *Etude pour Pianola*[63]

Stravinsky was not able to hear his *Étude pour Pianola* for quite a long time after its composition because it took roughly two years to produce a finished roll.[64] During

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[63]Figure based on Kermit-Canfield's Figure 2, a formal diagram of the *Étude*. Kermit-Canfield, "Mechanical Music: Igor Stravinsky and the Player Piano," 10.

[64]Rex Lawson, *Étude pour Pianola* by Igor Stravinsky," *The Pianola Journal* 5 (1993): 5.

June of 1919, Ansermet listened to and corrected the piece in London, but it was not publicly performed until October 1921. After Ansermet heard the piece, he wrote a letter to Stravinsky reporting that the pianola rendition was not very good.[65] What Stravinsky did not know — what Ansermet would find out for him in a few short years — is that while recording on the player piano may lead to mechanical perfection, that perfection comes with its own effects. The noise of the instrument itself — the rhythm of its whooshing pedals, or the cracking of the paper as it rolls over the barrel — along with the instrument's somewhat limited dynamic controls made for a less than desirable result. Ansermet's letter includes criticisms of the mechanical strength of the instrument, its inability to accent particular notes, and that the instrument requires one half of the keyboard get more emphasis than the other (the choice is up to the player piano operator).[66] Ansermet writes, "one feels the intervention of the performer, hence the necessity of an intelligent intermediary," a point which by itself could have convinced Stravinsky that the player piano was not all he hoped. Ansermet essentially tells Stravinsky that his hope of removing any interpretation has failed, as an aural mark of the mechanism supplants the performer's interpretation of the work. And as a final strike against Stravinsky's dream of a perfect performance, Ansermet criticizes the pianola's rhythm, saying it should be "much more rhythmic and vigorous," citing the one musical area for which Stravinsky was known to be very particular. Stravinsky hoped for mechanical precision regarding the rhythms of his piece, but the slower passages suffered

[65]McFarland, "Stravinsky and the Pianola," 94.
[66]Ibid., 97.

due to the somewhat inexact mechanics of the instrument, creating "swung eighths."[67]

Stravinsky's goal of a purely instrumental music — absolute music in its most reified

sense — falls short in its mechanical realization.

After hearing from Ansermet on the status of his *Étude*, Stravinsky abandoned

parts of his mechanical plans for *Les Noces*, which he had started to score immediately

after selling the *Étude* in 1917. He had planned to score *Les Noces* for four pianolas, two

cimbaloms, electric harmonium, and assorted percussion, but he stopped working on this

version of the score in 1919.[68] He claimed the reason for this was mechanical — it would

be too difficult to align mechanical instruments with one another and also with human

performers.[69] While the mechanical alignment of multiple player pianos would have been

difficult, it was certainly not impossible with the available technologies of the time, but

McFarland insists that this reasoning is false and the true reason that Stravinsky

abandoned the project was because of Ansermet's report upon hearing the *Étude*.

Stravinsky's dissatisfaction with the mechanical rendition of the piece led to his

orchestration of the *Étude* as *Madrid* in 1928 and then eventually to his son Soulima

Stravinsky's two-piano transcription of *Madrid* in 1951.[70] For ease of visibility, I will use

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[67]Ibid., 101. McFarland is quite critical of Lawson's performance of the piece and obviously prefers human performance to performances on the pianola.

[68]After attending a performance of three Stravinsky Ballets, Eric Walter White recounts: "I was particularly thrilled by *The Wedding*, although I had to admit that the effect of the two Pleyel double-pianos on the stage with their shabby cases like coffins, was not altogether satisfactory from the point of view of the stage spectacle." Eric Walter White, "Listening to Stravinsky's Music in the 1920's," *Tempo* New Series 81 (Summer 1967), 33.

[69]McFarland, "Stravinsky and the Pianola," 93.

[70]Lawson, "*Étude pour Pianola* by Igor Stravinsky," 6.

Soulima Stravinsky's transcription to point out the areas that changed between Stravinsky's original *Étude* and *Madrid*.

In Soulima Stravinsky's two-hand piano transcription of *Madrid,* the opening of which appears in Example 5.5, the music changes meter almost every measure and the first piano's right hand maintains the somewhat awkward spread of a minor ninth between G♯ and A, divided by E's in the middle. The first piano's left hand moves through parallel fifths, while the second piano part simply maintains the melody in octaves. Again, this music is quite obviously playable by a live pianist, but it is hardly pianistic in its spacing. The constant wide-handed harmonies become a theme throughout the arrangement, and these harmonies would certainly get to be draining on the pianists' stamina. The player piano, on the other hand, would have no trouble carrying out constant relentless chords — indeed, the player piano struggles with more pianistically arranged tunes because of their musicality, while these driving rhythms are more mechanical.

Example 5.5: Soulima Stravinsky's *Madrid* transcription, mm. 1-6

The scalar transitional passages that occur at several points in the *Étude*, if written

for a solo human pianist, would probably prove the most technically challenging. Shown

in Example 5.6b (Example 5.6a shows the corresponding section from the *Étude*),

Soulima Stravinsky's transcription of mm. 7-10 keeps the F major scale in the top voice of

piano I's right hand and puts a section of the D major scale beneath it. On beat 2 of m. 7,

the D major scale shifts into the upper voice of the second pianists' right hand for just

over one beat before it shifts back into the lower voice of piano I's right hand line. Piano

I's left hand carries a chromatic line while the Piano II's right hand covers the Petrushka

arpeggiations of voice 3. Piano II's left hand covers a simple B major scale. This passage

would certainly be challenging to execute, especially with a mechanistically exact

rhythms and even pitches. The second piano part requires some awkward hand

movements, such as the major seventh between F♯ and E♯ on the downbeat of m. 8.

Example 5.6a: *Étude* mm. 7-10

Example 5.6b: *Madrid*, mm. 7-10

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Doubling the number of notes on the same keyboard and with the promise of steady, machine-like rhythmic accuracy, Stravinsky's *Étude pour Pianola* is a clear result of the early twentieth-century's machine-driven culture. Stravinsky's son's four-hand arrangement of the work helps preserve it as a keyboard work, available to those without player pianos. In an odd reversal akin to what Richard Taruskin calls "time-travel nostalgia," a creative re-imagining of the past wherein musicians recreate, play, and perform a work that was never intended for human performer, the *Étude,* which never belonged to the human performer, finds new worth through human performance.[71]

THE PLAYER PIANO'S PEAK

By the time the player piano peaked in the 1920s, machines and their technologies fueled western societies in the public and private spheres. People operated machines at home and at work. Architecture historian Reiner Banham suggests that "the true 'ghosts in the machine' of the Twentieth Century" are the "echoes of a far from faint-hearted epoch when men truly tried to come to terms with 'the Machine' as a power to liberate men from ancient servitudes to work and exploitation."[72] Adorno writes about coming to terms with the machine, claiming it "is an end in itself only under given social conditions — where men are appendages of the machines on which they work."[73]

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[71]Richard Taruskin, "On Letting the Music Speak for Itself: Some Reflections on Musicology and Performance," *The Journal of Musicology* 1, no. 3 (July 1982), 342.

[72]Reiner Banham, *Theory and Design in the First Machine Age* (London: The Architectural Press, 1960), 12.

[73]Theodor W. Adorno, "On Popular Music," in *Cultural Theory and Popular Culture: A Reader*, Ed. John Storey (Pearson Education Limited, 2006), 83.

Musically, most mechanical performers provided a kind of spectacle for audiences, and the public's interest was not lost on composers of the age. Indeed, interest was so great amongst the composing community that in July 1926 the Donaueschingen chamber music festival included a concert of *Originalkompositionen für mechanische Instrumente*.[74] The concert featured works such as Toch's *Der Jongleur* arranged for Welte-Mignon and Hindemith's *Toccata für das Mechanisches Klavier*, both of which I discuss below. In addition to the works premiered at Donaueschingen, piano companies often commissioned works for player piano, for example the Aeolian company commissioned Italian composer Alfredo Casella to compose his *Cinque Pezzi* per pianola.

Casella was an Italian pianist and composer who studied piano first with his mother, then at the Paris Conservatory where he studied composition with Gabriel Faure. He began teaching at the Paris Conservatory in 1912 before returning to Italy to teach at the Musical Academy of St. Cecilia. He had a reputation as a leader in the Italian school of modernism.[75] His *Trois Pièces pour Pianola*, released on rolls by the Aeolian Company of London in 1921, received their first performances under pianolist Reginald Reynold at Aeolian Hall. In a 1918 edition of Italy's *Critica musicale*, G. M. Gatti writes of *Cinque pezzi* per pianola: "the writing is so complicated it can only be performed by the mechanical piano; it utilizes the full sound of the instrument to the maximum degree."[76] Indeed, the work sounds dense and complicated from its start. The "Prélude"

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[74]Erica Jill Scheinberg, "Music and the Technological Imagination in the Weimar Republic: Media, Machines, and the New Objectivity" (PhD Diss., UCLA, 2008), 45.

[75]Charles David Smith and Richard James Howe, *The Welte-Mignon, its Music and Musicians* (Vestal Press, Vestal, NY: 1994), 348.

[76]G. M. Gatti, "Alfredo Casella," *Critica musicale* I (1918), 143. Translation mine.

begins with a cluster of notes that slides up and down the keyboard in three large waves followed by an ascending three-voice line that crashes into a five-note low-register ostinato. A heavily voiced melodic section then begins over the ostinato, before the wave pattern returns moving from top to bottom instead of bottom to top. After another melodic section the *Prélude* ends with an intense flourish that utilizes most of the keyboard in a seemingly impossible way as nearly the entire keyboard dances in a display of the machine's virtuosity. Example 5.7 shows the roll for the lead-in to the extremely dense texture of the Prelude's concluding flourish.
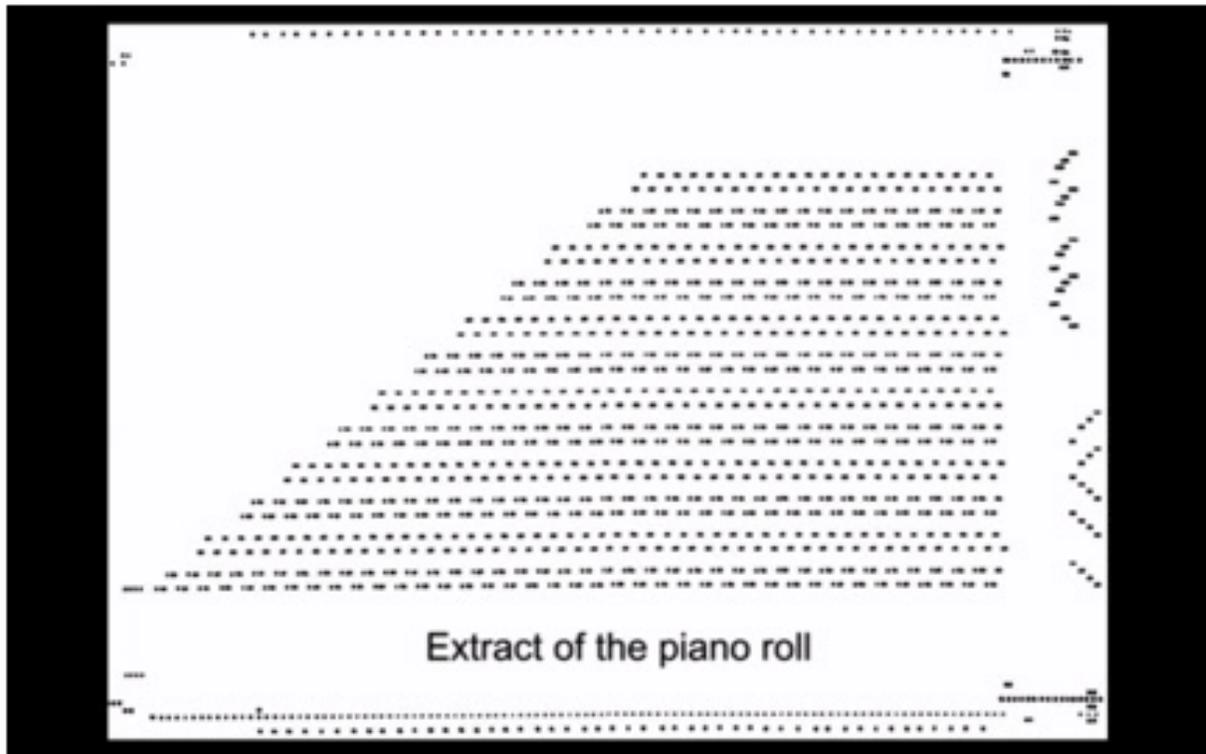
Example 5.7: Roll from the dense flourish from the end of Casella's "Prelude" [77]

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[77]This screen shot and the music from which all transcriptions were taken come from a youtube performance on a restored Bösendorfer Ampico grand.
"Alfredo Casella – Trois Pièces pour PIanola" by Juergen Hocker, Accessed October 21, 2015, https://www.youtube.com/watch?v=nwULPxr_h7k

The second piece, "Valse," begins with a basic C major waltz accompanimental pattern and then a jagged single-voice melodic line enters, shown in Example 5.8. The melody serves as the first half of what turns into an antecedent phrase, part of a parallel period structure. The "Valse" includes a B section in D♭ major over the C pedal and ostinato harmony. The waltz accompaniment continues as expected throughout most of the "Valse," oscillating between C major and G dominant-seventh harmonies, only occasionally including pre-dominant pitches. At the movement's end the roll stalls and restarts, shown in Example 5.9. The waltz accompaniment skips a few beats and enters again and the jagged melody comes in a bar too late and the accompaniment's dropped out. The music stutters and resets as if the roll were a practicing live pianist who has had a memory slip, or a machne winding down. The melody gives up after the fermata — the ostinato returns and the right hand ascends through a multi-voiced chromatic line to end the piece unconventionally, as if with a question.

Example 5.8: "Valse" opening, transcribed by author

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Example 5.9: "Valse" winding down, transcribed by author

After the "Valse" comes "Ragtime," which begins with a flurry of trills and polyphonic ascending and descending chromatic lines that sound as if they are imitating strong gusts of wind. Then the "rag" starts — several voices layer at once around the main syncopated melodic line, shown in Example 5.10. The rag layers the melody's syncopated swing against an accompaniment reminiscent of stride piano, emphasizing beats one and three with bass notes while beats two and four carry the harmonic accompaniment. Stride as a piano style developed in Harlem in the 1910s and was known for its virtuosic demands — it took the syncopated rhythms of ragtime at much faster

tempos.[78] Peter Gammond claims the style earned its name in the 1930s when pianists like Fats Waller and James P. Johnson included a "striding" left hand pattern in their playing, often using intervals of a 10th or more instead of the normal octave doubling in the bassline.[79] Unlike the clear singing lines of Zez Confrey's novelty rags, discussed in chapter 2, in Casella's "Ragtime" it is difficult to tell exactly which is the accompaniment and which the melody; with so many notes at one time, only occasional melodic snippets pop out of the thick texture. The middle section is even more clearly written in the stride style, and one simple, descending melody in F major sings through in the upper voice over a relatively simple waltz accompaniment. The sparse passage does not last long though, as soon more voices layer in until the texture is as thick as it was in the first section, which eventually returns after the F major melody repeats gradually moving into the lower register of the piano. The opening wind gusts and melody return and the work ends with an ascending chromatic flurry and octave low-register Cs.

Example 5.10: "Ragtime" melody, transcribed by author

Casella's *Trois Pièces pour Pianola*'s texture is much denser than that of a typical solo piano work, and the piece is as showy visually as it is aurally. The thick, clustered

[78]*Grove Music Online*, *Oxford Music Online*, s.v. "Ragtime," by Edward A. Berlin, accessed August 1, 2015.
http://www.oxfordmusiconline.com.ezproxy.lib.utexas.edu/subscriber/article/grove/music/A2252241.
[79]*The Oxford Companion to Music*, s.v. "Stride," by Peter Gammond, ed. Alison Lantham, accessed August 1, 2015,
http://www.oxfordmusiconline.com.ezproxy.lib.utexas.edu/subscriber/article/opr/t114/e6502.

harmonies spread across the keyboard seem impossible to ears accustomed to traditional piano works, and the keyboard with so many notes pressed at once looks a bit like a magic trick. Casella's work is virtuosic throughout and would be highly demanding on the live pianist. Moreover, with so many notes happening simultaneously, the work would likely need to be arranged for at least two pianos to achieve the same effect. Casella's *Trois Piéces* highlight the mechanism by taking advantage of the unlimited number of notes it can play and its mechanistic exactitude in executing complex rhythms. The work has a "mechanical" sound in so far as the sheer volume of notes is impossible for a solo pianist. Beyond that, the work bears few markings of the "machine" in the industrial sense, lacking any kind of whirring or clanking.

Ernst Toch was a Viennese composer and pianist who, throughout the 1920s, served as director for the Mannheim Conservatory.[80] He composed for mechanical instruments as one would for any other instrument, explaining "the music that is in question here is not any music reproduced by a mechanical instrument, but it is music for a mechanical instrument, just as there is music for 'violin and piano' or music 'for orchestra."[81] Toch, then, lacks the fervor of George Antheil, who composed music specifically for machines and proclaimed to have discovered a "new FOURTH DIMENSION of music."[82] Toch was not drawn to the player piano because of its unlimited technical ability, but rather as its own instrument that happened, also, to play

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[80]Paul A. Pisk and Manton Monroe Marble, "Ernst Toch," *The Musical Quarterly* 24, no. 4 (October, 1938), 439-440.

[81]Werner König, "Über frühe Tonaufnahmen der Firma Welte und die Werke für as Welte-Mignon-Reproduktionsklavier," *Jahrbuch des Staatlichen Instituts für Musikforschung Preußischer Kulturbesitz* (1977), 37.

[82]George Antheil, "My Ballet Mécanique: What it Means," *Der Querschnitt* 5 (1925): 791.

without need for a human performer. Indeed, Scheinberg writes that Toch "maintained a less revolutionary stance, welcoming the innovations of mechanical music but defending the value of music composed for live instrumentalists."[83] Toch's work premiered almost ten years after Stravinsky's composition of the *Étude*. His Welte-Mignon (a player piano company) arrangement of *Der Jongleur*, the third of his three *Burlesken für Klavier*, was played at the Donaueschingen concert and in comparing the roll performance to the score for live pianists it is not overly different. Writing in 1929, K. Laux describes Toch's *Der Jongleur* as a "capital piece" that Toch placed "unaltered on the roll of the mechanical piano thereby proving himself effective both materially and motively."[84] While Laux claims that the roll follows the score, in looking at the score and listening to the roll and watching the piano keyboard move, this is in fact not the case. Toch adds octave doublings at times to the roll, and embellishes certain passages with ornamentational chromaticism, but overall the most mechanically impressive part of listening to the roll of Toch's *Der Jongleur* is the sheer rhythmic relentlessness of the machine. Indeed, the work is a barrage of almost constant eighth or sixteenth notes, shown briefly in Example 5.11, and while there is very little syncopation compared to Casella's "Ragtime" or Stravinsky's *Étude*, it sounds impressive because of its rhythmic invariance.

[83]Scheinberg, "Music and the Technological Imagination in the Weimar Republic," 45-46.
[84]K. Laux, "Ernst Toch: a Musician of our Time," *Pro Musica Quarterly*, vii, no. 1 (1929): 27.
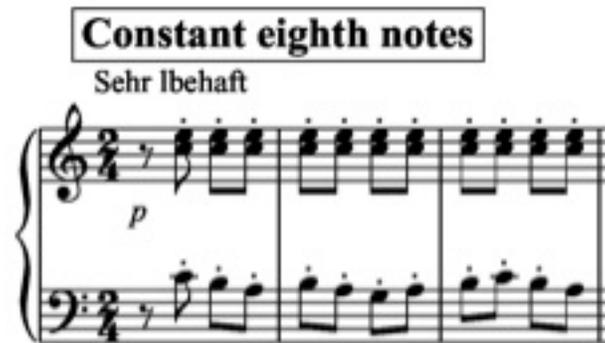
Example 5.11: Opening of Toch's *Der Jongleur*
Ernst Toch DER JONGLEUR, OP. 31 NO. 2
Copyright © 1957 by Schott Music, Mainz, Germany
Copyright © renewed
All Rights Reserved
Used by permission of European American Music Distributors Company sole U.S. and
Canadian agent for Schott Music, Mainz, Germany

Hindemith was a German violinist, composer, and theorist who, during the First

World War, played in a string quartet intended to provide relief for officers. Following

the war Hindemith resumed his position as concertmaster of the Frankfurt Opera until he

resigned in 1923 after successfully negotiating a monthly salary with publisher Schott

and Sons as a composer.[85] Andrew Fraser writes of Hindemith leading a group of young

polyphonists in Germany and claims Hindemith's turn toward the mechanical is

unsurprising in light of the performance indications on his Suite for Piano, op. 26,

entitled *1922*. Hindemith tells performers to "play this piece wildly, but always in very

strict time, like a machine. Consider the piano here as an interesting kind of instrument of

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[85]Eventually, Hindemith emigrated to the United States and, after a time, became professor of music theory
at Yale University, before returning to Europe as professor of musicology at the University of Zurich. Ryan
R. Kangas, "Paul Hindemith," in *Musicians & Composers of the 20th Century*, ed. Alfred W. Cramer
(Pasadena, CA: Salem Press, 2009), 625.

percussion."[86] Fraser then concludes "Hindemith, later, carries it to its logical conclusion by dispensing with the variable personal equation of the performer and composing directly for the mechanistic pianola."[87] Hindemith's *Toccata für Mechanisches Klavier* begins loudly — in Lawson's 1996 transcription of the work, the descending lower two voices move in a wedge against the ascending upper voices, all carrying some combination of fully or half diminished seventh chords with minor ninths.[88] The opening is dense, and at times the four voices play up to twelve pitches at once, as shown in Example 5.12. In addition, the voices take advantage of the keyboard's range — for example, take note of the octave clef differences between lines 1 and 4. Although rhythmically challenging because of its use of triplets, septuplets, and meter shifts between simple quadruple and simple triple, the work is not overly complex rhythmically. Triplets and septuplets usually occur in all voices rather than creating any kind of syncopation or metric dissonance between the voices, as shown in Example 5.13.

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[86]Andrew A. Fraser, "Paul Hindemith," *Music & Letters* 10, no. 2 (April 1929): 170.
[87]Ibid., 171.
[88]Rex Lawson, "Hindemith: Toccata für das mechanische Klavier, Specially transcribed for the Pianola Journal" *The Pianola Journal*, no. 9 (1996), 19-28.

Example 5.12: Dense harmonies in four-voice texture of Lawson's transcription
of Hindemith, mm.1-2

Example 5.13: Simultaneous Rhythms

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Each of these examples of music for player piano represents a different facet of the performing machine in the 1920s. Casella's *Trois Piéces pour Pianola* and Hindemith's *Toccata für Mechanisches Klavier* each take advantage of the player piano's unlimited access to the keyboard — unlike the pianist's ten fingers, the player piano mechanism can hit dozens of keys at a time, providing composers with a dense harmonic palette. Toch was subtler in his arrangement of *Der Jongleur* for player piano — through simple octave doublings and enhanced ornamental passages Toch embellishes his work to take better advantage of the mechanical player. These examples from the peak of the player piano's popularity demonstrate a unique take on how composers can use the player piano. Through the player piano, Casella put on an aural and visual spectacle, with wave patterns built into the roll and into the shape of the line and impressively thick doublings and harmonic settings. Casella used the player piano as a technical marvel and he layered familiar musical tropes such as waltz or ragtime to create a musical hybrid, a mechanical depiction of traditional musical styles. Toch treated mechanical instruments as just another instrument, one without a live player. Toch's perspective on the mechanical instrument, then, is perhaps not of an instrumental performance free from mediation, but instead with a different kind of mediation. But for Hindemith, the player piano allowed a high degree of control that brings to mind the philosophy of absolute music; Mark Katz writes that for Hindemith "the advantages of mechanical music included 'the possibility to define absolutely the will of the composer' and the 'extension of technical and timbral possibilities.'"[89] Hindemith's approach to the player piano realizes the ideal for absolute

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[89] Katz quotes Hindemith here, citing "Möglichkeit der absoluten Festlegung des Willens des

music set forth by Hanslick: for Hindemith, the player piano allowed for the transmission of his musical material as he intended it to be played.

OUTMODED MECHANICS: THE PLAYER PIANO IN THE 1940S AND 50S

By the 1940s the player piano had, for the most part, passed its prime, having been stifled by the Depression on the one hand and the growing popularity of radio, electrical recording, and the talkies on the other.[90] Suisman writes that "beyond the 1920s, the significance of the player-piano has been difficult to perceive," that the market takeover by radio and phonograph coupled with the stock market crash and Great Depression essentially buried the player piano so well that its ending seems historically irrelevant.[91] Thus by the time Nancarrow was composing, the player piano's moment at the cutting edge of musical technology had passed. The instrument and its familiar mechanical ringing gained a sentimental patina, the nostalgic meaning of which Welles drew upon in *Touch of Evil*. Yet the nostalgic appeal of the instrument was not its only appealing feature — through Nancarrow's works the player piano continued as a compositional tool after the instrument's fall in the popular market.

Komponisten . . . Erweiterung der technischen und klanglichen Möglichkeiten" (Paul Hindemith, "Zur mechanischen Musik," *Musikanten Gilde* 5 [15 November 1927]: 156.). Mark Katz, *Capturing Sound: How Technology has Changed Music* (Berkeley: University of California Press, 2010), 121.

[90]James Parakilas, *Piano Roles: Three Hundred Years of Life with the Piano* (New Haven: Yale University Press, 1999), 74.

[91]Suisman, "Sound, Knowledge, and the 'Immanence of Human Failure,'" 25.

Nancarrow turned to the player piano because he lived in Mexico City, a place of "extreme musical isolation."[92] Moreover, he needed a way to play his music and the player piano offered a convenient means of bypassing of performers, whom he dreamed to "get rid of."[93] He punched his rolls by hand using a personalized roll-punching machine he had made in New York, and he played his pieces on one of his two player pianos that he altered, also by hand.[94] Nancarrow's music relies heavily on complex and perfectly measured rhythms, something well suited to a mechanical performer (when properly operated), and it reportedly took him several months to draw and punch a two- to three- minute work.[95] Philip Carlson claims "no one before Nancarrow had systematically used the [player piano] to explore rhythm."[96] And reviewer for *The Boston Globe* went so far as to describe Nancarrow's music as "filled with the exuberance and sheer relish of a sonic scientist running wild in his private laboratory."[97] His pieces were not popular at the time of their composition — indeed his works were not well known until the late 1960s when Columbia released an album of them. Furthermore, it was not until the 1970s and 80s, relatively late in his life, that he gained any kind of real recognition in the classical music community.

[92]Philip Carlson, *The Player-Piano Music of Conlon Nancarrow: An Analysis of Selected Studies* (Institute for Studies in American Music, Conservatory of Music, Brooklyn College of the City University of New York, 1988), 2.

[93]Igor Stravinsky, *An Autobiography*, 69. For more on Stravinsky's relationship with the player piano, see chapter 4. Conlon Nancarrow, quoted in Charles Amirkhanian, "Interview with Composer Conlon Nancarrow," in Nancarrow *Selected Studies for Player Piano*, 15.

[94]Carlson, *The Player-Piano Music of Conlon Nancarrow*, 4.

[95]Robert Commanday, "The Man Who Writes For Player Piano," *The San Francisco Chronicle*, June 30, 1981, 41.

[96]Carlson, *The Player-Piano Music of Conlon Nancarrow*, 3.

[97]Jeremy Eichler, "Mechanical Music, Improbable Joy," *The Boston Globe* Feb 19, 2007. Accessed November 9, 2015. http://www.boston.com/news/globe/living/articles/2007/02/19/mechanical_music_improbable_joy/

Nancarrow was aware that he was composing for an outmoded technology. Indeed, in an interview he called the player piano an "old-fashioned, out-of-date thing" that he "just got hung up on."[98] In composing for player piano Nancarrow's work is philosophically similar to electronic music, such as Halim El-Dabh's work for magnetic tape or Pierre Schaeffer's musique concrète compositions, but rather than working with new technologies and their modern or even non-musical sounds, Nancarrow worked with quaint but accessible technology. He said, "Frankly, I think the future is electronic," but that he used the player piano because it was available to him in Mexico City.[99] And Nancarrow felt "constrained by players' limitations" but "with the player piano [he] just did what [he] wanted to do."[100] Thus Nancarrow turned to the player piano because it was available, and because it allowed him to bypass the performer, who would struggle not only with the rhythmic demands of his music but also the technical ones.

Tempo was always of the utmost importance to Nancarrow. When interviewer Cole Gagne asked him to elaborate on this he said, "A sort of subdivision of tempo is rhythm and combinations of rhythm; polyrhythms or whatever. The other things, harmony and melody, I use only as a crutch for tempo or rhythm, that's all." [101] As shown in Example 5.14, his Study No. 2 begins with ostinati, setting the background for the metric complexity that will drive the rest of the piece. The lower ostinato begins in 5/8 and ascends through a pattern of F-G-B♭-D adding one eighth-rest after every three notes,

[98]J. Rockwell, "Conlon Nancarrow: Poet of the Player Piano," *New York Times*, June 28, 1981, 3.
[99]Ibid.
[100]Ibid.
[101]C. Gagne and T. Caras, "Conlon Nancarrow," in *Soundpieces: Interviews with American Composers* (Metuchen, 1982), 301.

essentially upsetting the four-note pattern so that it does not fall the same way in each measure. This pattern is set against a second ostinato in 3/4 that moves in an even pattern between A♭ and D♭ eighth notes each divided by an eighth rest. The pitches used in these two ostinati combine to form a blues scale, with a lowered seventh and major/minor ambiguity around the third (D/ D♭).[102] In the example, the brackets above the top voice show the groupings into which that ostinato falls naturally — it breaks evenly into a 2/4 pattern, as labeled with the boxed 2/4. By shifting this pattern into 3/4, Nancarrow adjusts where the downbeat falls and thus prevents any of the beats from being too strong in this pattern. Nancarrow likes to be in control of where accents will occur, occasionally going to great lengths to avoid having any kind of convergence between lines. In the lower voice, there are two sets of brackets. The brackets between the staves indicate where the pattern restarts on F: each bracket contains one full statement of F-G-B♭-D with one eighth rest. The brackets below the staves show the three eighth note plus one eighth rest rhythmic combination, which also fits comfortably into 2/4 and is labeled as such. Note that the top and bottom brackets cover the same number of beats and would align completely if both voices were rewritten in 2/4.[103]

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[102]Gann, *The Music of Conlon Nancarrow*, 73.

[103]In her dissertation, Margaret Elida Thomas discusses this Study and she creates a figure that actually aligns these ostinati in 2/4. She calls 2/4 "the meter that the two components gesturally imply." She includes examples to prove that "two of the four simultaneous articulations of the excerpt that appear to be metrically significant in Example 4-4(a) are perceptually not very significant after all, as represented by the thin vertical lines in 4-4 (b), since they do not coincide with mutual perceptual downbeats." Ultimately, she concludes that the ostinato is much more dissonant than it appears. Margaret Elida Thomas, "Conlon Nancarrow's 'Temporal Dissonance': Rhythmic and Textural Stratification in the Studies for Player Piano" (PhD diss., Yale University, 1996), 101-102.

Example 5.14: Nancarrow *Study no. 2* mm. 1-6
Conlon Nancarrow STUDY NO. 2
Copyright © 1983a by Schott Music, Mainz, Germany
Copyright © renewed
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As James Tenney, Margaret Elida Thomas, and Kyle Gann mention in their work,

Nancarrow often used ratios to determine tempo and time signature for a given passage,

and as shown in the previous example, he may overlap different time signatures at the

same time in order to achieve a particular mathematical or rhythmic effect. The

mechanical piano allowed him to create these complex passages. While sometimes he

explicitly indicates his ratios (for example, Study no. 24 which is subtitled "Canon

14/15/16"), he just as often does not. Thomas highlights the ratios between tempos that

she works out into 3/4/5/6. In Study no. 2, Tenney and Gann work out the tempo ratios as

10/12/15/20 (which is a reduction of 57.5/ 69/ 86.25/ 115).[104] Margaret Elida Thomas's

ratios for the work are not as direct, as she derives them from individual comparisons at

each occurrence. For example, the opening ratio of 69:115 is 3:5. 4 derives from

comparing 69:86.25 resulting in the ratio 4:5 or from comparing 86.25:115 resulting in

the ratio 3:4. To get 6, she compares 57.5: 69 to get 5:6, and she stacks each of these

individual results to conclude that the piece is based on the ratios 3/4/5/6. Even though all

four tempos occur together, she does not compare them to one another in order to arrive

at 10/12/15/20 as the ultimate compositional ratio. Instead she compares them in smaller

chunks, and thus deals with smaller ratios.[105] The ratio 3/4/5/6 can come out of a

fractional comparison of the time signatures, which would perhaps lend some more

support to Thomas's ratio conclusions. The opening ratio of 3:5 comes from comparing

the tempos, but if we look just at 3/4 as compared to 5/8, we get the common

denominator of 8 and then land on the ratio of 6:5. The next tempo is 2/4, and 2/4: 3/4:

5/8 works out to 4:5:6. When 6/16 enters, it reduces to 3/8, and the ratio becomes 3:4:5:6.

Looking more closely at the entrance of the melody in m. 17, shown in Example

5.15, the ostinati shift in the accompanying voices. Tenney describes this shift as a move

to IV, and both Tenney and Gann assert that the entire study follows a I-IV-I-V-I

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[104]The opening tempo indication is 69:115, which works out to a ratio of 3:5. This ties into the time signature indications of 3/4 and 5/8. When the third voice enters in m. 17 (my measure numbers are based on the bar lines of the two already-established ostinati), it enters in 2/4 with the tempo indication of 86.25. The tempo ratios for 69: 86.25: 115 works out to 3/4/5. The fourth voice enters in m. 29 and it is in 6/16 with the tempo of 115 — the same metronomic speed as the lowest voice, but with different subdivisions. 5/8 is an odd meter, and here it follows the basic eighth-note pulse for its beat level, while 6/16 is compound duple and divides each measure in half. When another new voice enters on page 5 of the score, it is in 6/8 or simple duple with the tempo indication of 57.5. The comparison of 57.5:69:86.25:115 works out to 10:12:15:20, which is how Gann and Tenney arrive at their analytical ratios.
[105]Thomas, "Temporal Dissonance," 103-104.

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harmonic pattern that is typical of the blues.[106] It is not a coincidence that m. 17 is where

the melody enters: roughly every 16 measures the two original ostinati align, and these

moments of alignment also mark the harmonic shifts between I-IV-I-V-and I. The

combination of different time signatures and tempo designations leads to the creation of

what is called *temporal dissonance*. This is Nancarrow's term for the relationship

between the lines — the level of temporal dissonance is correlative to how often lines

converge. Fewer convergences create a higher level of temporal dissonance. Eric Drott

summarizes: "Tempo relations that feature a high number of such simultaneities are

relatively dissonant. Or, the greater the duration separating one such simultaneity from

the next, the greater the degree of temporal dissonance."[107] In Study no. 2, these

alignments always lead to some kind of change in the melody, whether it is the

introduction of a new voice or a tempo change in an already-present line. Example 5.16

shows the full melodic line as it appears the first time. When the second melodic voice

enters in m. 29 it centers the melody around E♭ while the original line shifts to B♭. The

melody appears bitonally several times as the piece progresses, but it is notable here that

the two areas the melody focuses on are tonic and subdominant, supporting the claim that

this section is in IV.

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[106]James Tenney, "Conlon Nancarrow's Studies for Player Piano," in *Conlon Nancarrow, Selected Studies for Player Piano*, ed. Peter Garland (Berkeley: Soundings Press, 1977), 47.
[107]Eric Drott, "Conlon Nancarrow and the Technological Sublime," *American Music* 22, no. 4 (Winter, 2004): 539.

Example 5.15: Entrance of the Melody over Ostinati Realignment, mm. 16-19
Conlon Nancarrow STUDY NO. 2
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Example 5.16: First appearance of the full melody- E♭
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Soon after the canonic entrance of the second melodic voice, the two bass ostinati

converge once again, and the harmony shifts back to I. This shift knocks the lower

melodic voice into a statement on B♭ while the top voice enters with a hint of the melody

on F, foreshadowing the next move to V. The voice shifts back to E♭ as the top moves to

B♭, and at the end of m. 42 the two melodic voices switch lines. Both melodic voices

come in with the melody in F as the music adds a third melodic line and the ostinati

switch to V. Once V is established, there is another instance of bitonality (roughly in m.

51) when the outer melodic voices (lines 1 and 3) carry the melody in F while the inner

voice (line 2) sings through in B♭. The texture thins as the piece moves towards its close

— the lower two melodic voices drop out and the top voice carries the melody in B♭.

Voice 1 hammers out the line in octaves, and when voice 2 enters a few measures later, it,

too is in B♭. Voice 2 briefly tonicizes V, echoed by Voice 1, before both return to tonic. Voice 2 drops out four measures from the end and Voice 1 finishes the melody on a held B♭, bringing the piece to a close.

Study no. 2 is a combination of two ostinati and up to three canonic layers in the melody. The ostinati establishes the I-IV-I-V-I harmonic motion in B♭, a key established by the pitch collection of the opening ostinati. Ratios come into play for the tempo relations, and the melody appears at various tempos: 57.25, 69, 86.25, and 115. The melody also tonicizes I, IV, and V depending on the location in the piece. Nancarrow employs bitonality when he layers the canonic occurrences of the melody in I and IV or I and V simultaneously. The ostinati control the content of the piece, and the melodic key areas come from the harmonic motion of the ostinati. The piece is a basic layering of ostinati and canonic melody, which is broken down into a grouping of two against 1, 2, or 3, creating a dissonance even on the most background level. Tonally, Nancarrow's work is more easily organized than Stravinsky's block form. The opening ostinati can be grouped by pitch collection into the B♭ blues scale, the melody is easily hearable and each occurrence falls clearly into I, IV, or V. There are very few melodic exceptions from these categories (for example, the melody does briefly highlight C, or V/V), and even these are explainable in tonal terms.

Study no. 2 is an early work for Nancarrow, and his pieces only get more complex with time. After Study no. 20, Nancarrow "changed the punching machine. It wasn't necessary to use the evenly spaced notches anymore. You could adjust it to punch in any

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place. So the only limitation was on the spacing of repeated notes…" [108] The changes in

his punching machine lead to a change in the complexity of Nancarrow's work. As Drott

writes, his earlier works are "lacking in nuance at the most immediate rhythmic level. . . .

The presence of a relatively simple underlying grid in the early studies imposed a rigid,

artificial order on the rhythmic flow."[109] After he had his punching device altered,

however, it opened his music up to more rhythmic possibilities. The changes in the

mechanics transformed the "player piano's distinctly mechanical rhythm" that was so

present in his earlier studies "into a more unpredictable, irrational, and almost 'natural'

rhythm."[110] Nancarrow was obsessed with rhythmic exactitude and was willing to

sacrifice the performer's role to get it; he felt so strongly about how his music should

sound that he controlled every nuance, down to the very instrument upon which his

pieces were to be played. His extreme control over the musical result supports the idea

that what Nancarrow was working towards was absolute music — an exact performance

according to his specifications, the music as it is meant to be played according to the

composer. His layering of complex rhythms and tempi along with ratio-based metric

shifts put the exact execution of the work above musical interpretation — rhythm was the

most important, and performer's interpretational influence would only blemish the

ultimate performance.

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[108]Roger Reynolds, "Conlon Nancarrow: Interviews in Mexico City and San Francisco," *American Music* 2, no. 2 (Summer, 1984): 20.
[109]Drott, "Technological Sublime," 558.
[110]Ibid., 559.

CONCLUSION

As evidenced through Nancarrow's compositions, the player piano did not completely disappear after its sales declined in the 1920s — in fact, the player piano was rediscovered in 1950s American markets.[111] The Aeolian Company produced a new instrument called the Key-Top Pianola, a push-up piano player that recalls the push-up devices of the late nineteenth century.[112] Arthur W. J. G. Ord-Hume calls the renewed interest in the player piano "an example of yet another demonstration of the latent rebelling by the ordinary person against the electronic age."[113] But upon its re-entry, the player piano was a niche instrument, of interest to only a select portion of the market. It never returned to its previous levels of popularity, and to this day remains on the sidelines of the market.

The player piano promises absolute music to its listener — an absolute music that despite its theoretical and philosophical definition by Hanslick, Dahlhaus, and Nattiez, remains elusive even in its mechanical execution. Taruskin, in an article responding to a critic telling him to "let the music speak for itself," writes that this is a curious request of the performer, claiming "if a performer did not have the urge to participate in it and, yes, to contribute to it, why then he wouldn't have become a performer in the first place."[114] He criticizes composers for their desire to eliminate the performer, and points out Stravinsky's flaw in particular for his simply becoming a performer himself rather than

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[111]Ord-Hume, 42.

[112]Technically, any push-up device is a piano player, while a player piano has the player mechanism in the body of the piano. Cecelia Björkén-Nyberg, *The Player Piano and the Edwardian Novel* (Burlington, VT: Ashgate Publishing, 2015), 17.

[113]Ord-Hume, 43.

[114]Taruskin, "On Letting the Music Speak for Itself," 339.

trusting any interpretational decisions to another player.[115] Taruskin claims "music can

never under any circumstances but electronic speak for itself… [it is] impossible to realize

absolutely."[116] Yet absolute music was the goal for many piano roll performances, not just

for Stravinsky with his *Étude*, and the struggle to capture, store, and recreate absolute

music pulls in the tangled writings on musical authenticity, a subject for another project.

The modern or "Stravinskian" aesthetic involves an erasure — or, more

appropriately for this context, the complete displacement — of the performer in the

playing of a work as if the performer's interpretation were automatically a culturally

invalid, distracting intrusion into the work's aural space. The idea, then, is that a piano roll

performance, even one that was first played onto the roll and then edited and perfected,

stores the only performance of the work; no live pianist need play the *Étude* because the

roll always already stores the work. By playing the roll listeners come to believe they have

access to absolute music, to the work itself. But this is not the case. The piano roll fails

when the sounds of the mechanism interfere with a performance. Because music cannot

speak for itself, i.e. without some kind of mediating performer whether human or

mechanical, Taruskin goes on to challenge performers to have their own intentions,

intentions that are valid and authentic to the performance and to the work.[117] The player

piano's stored performances — perfect performances that never came to pass on the

instrument itself — were supposed to capture, store, and recreate more than music; the roll

was to capture time so that each playing issued a performance complete in itself. But

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[115]Ibid., 339.
[116]Ibid., 340.
[117]Ibid., 343.

maybe the idea of the roll was so appealing because, in addition to time, they appeared to store a piece of the performer or composer. Player piano rolls offered performers a kind of immortality, an immortality some would later hope to find in digitally recorded music. But player piano was the earliest indication of this kind of musical preservation. Through piano rolls composers and performers immortalized a piece of their spirit through their work — through a piano roll, a musician becomes the ghost in the machine.

Conclusion: Reviving the Player Piano

This dissertation explores just a few of the possible avenues for future study into the important role of the player piano in the history of sound recording. It has two main objectives. First, to point out the ways machines and their sounds infiltrate music at various levels, from shaping musical sounds into a musical topic that uses mechanically relentless rhythms, jagged melodic lines, and high-register woodwinds, to machines that perform music, most notably the player piano. Second, to examine some of the ways the player piano influences and helps shape the modern musical marketplace and its music, and reflects the early twentieth-century's Taylorized reorganization of labor. This dissertation also leaves several areas open for future research. First, a longer and broader list of analyzed works is needed to further demonstrate the musical topic of the mechanical, including earlier examples such as works written for mechanical clock. Second, the discussion of player piano advertisements can be expanded to incorporate examples from phonograph and radio advertisements. Finally, the absolute music chapter should be lengthened to further clarify how mechanical music operates as the ideal version of absolute music, strengthening the connections between the player piano and absolute music literature. The player piano, although not an obvious part of today's musical culture, still influences today's musical culture and thus deserves further scholarly pursuit.

The player piano's popularity reached its height between 1920 and 1925.[1] Production of the instrument peaked in 1923, but by that point the phonograph was already taking over the market.[2] The player piano's market started to collapse — quickly. Composers who wanted their player piano works to continue to be performed had to figure out a way to adapt the works for other instruments. As discussed in Chapter 5, Stravinsky adapted his *Étude pour Pianola* early on: in 1928 the *Étude*, retitled *Madrid*, combined with his *Three Pieces for String Quartet* of 1914 to become his *Four Études for Orchestra*.[3] Other works' salvation through arrangement or recomposition came later. For example, in the 1950s George Antheil revised his *Ballet Mécanique* for a more traditional instrumentation. Chapter 2 includes an analysis of the original version of the work, which was finally performed at the National Gallery of Art in Washington D.C. in 2006. And while Conlon Nancarrow did not rewrite his pieces for other instruments, the modern chamber orchestra Alarm Will Sound has tackled some arrangements of his works. They play his *Study No. 2a*, discussed in its original form in chapter 5, in an arrangement for their twenty-piece chamber ensemble. As a means of conclusion, I include two sections below. The first returns to George Antheil's *Ballet Mécanique*, discussed first in chapter 2, and the second to Conlon Nancarrow's *Study No. 2*, discussed in chapter 5. Each of these pieces were restaged within the last decade in a new way — one through further mechanical mediation, the other through humanization. Each, then, represents a different way the player piano remains relevant to today's musical culture.

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[1]Arthur W. J. G. Ord-Hume, *Player-Piano: The History of the Mechanical Piano and How to Repair it* (New York: A. S. Baines, 1970), 41.

[2]Kevin McElhone, *Mechanical Music* (Buckinghamshire: Shire Publications, 2004), 26.

[3]Charles Joseph, *Stravinsky and the Piano* (Ann Arbor: UMI Research Press, 1983), 93.

Antheil's *Ballet Mécanique* has an odd history of composition and recomposition. His 1926 *Ballet'*s original scoring calls for three xylophones, electric bells, three propellers, tamtam, four drums, a siren, two pianos, and sixteen pianolas written in four parts.[4] When Antheil adapted his *Ballet* to the 1950s market he removed the player pianos completely, reorchestrating the work for four pianos, four xylophones, two electric bells, two propellers, timpani, glockenspiel, and other percussion instruments, and he shortened the work, cutting its runtime from roughly 23 minutes to 18.[5] The score for *Ballet Mécanique* most commonly encountered today is the updated version, not the original score from 1926, and most scholarly articles refer to the 1952 score rather than the original.

The 1926 version of the score was not published until 2003, when engraver and music editor George A. McGuire, expert pianolist Rex Lawson, and composer and music engineer Paul D. Lehrman collaborated to reproduce the score for G. Schirmer. In an interview about his reconstruction of the original version of the *Ballet*, Lehrman describes why he thinks the piece fell to the wayside, stating

> there was no real reason to do the piece. It was a joke. It was very hard to play. It required an instrument that nobody really had anymore. Antheil himself rewrote the piece in 1952 without a player piano. He wrote a completely different version for *Ballet Mécanique* using a lot of the same thematic material, but it's much shorter, much faster, much tighter, it doesn't have the siren, it doesn't have the electric bells. It does have two airplane propellers and has a lot more percussion in it. Actually, it's a very nice piece, it's a well-constructed piece, which bears a

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[4]George Antheil, *Ballet Mécanique* (Milwaukee: G. Schirmer, Inc, 2003).
[5]Linda Whitesitt, *The Life and Music of George Antheil, 1900-1959* (Ann Arbor: UMI Research Press, 1983), 107.

passing resemblance to the original *Ballet Mécanique,* but is really quite different. That piece does get done occasionally.[6]

Lehrman, along with musician and engineer Eric Singer, helped put together a fully automatic 27-piece orchestra at the National Gallery of Art in Washington, D.C., which was to play Lehrman's realization of the *Ballet Mécanique* over 100 times between the 12th and 29th of March, 2006, as part of a Dada art exhibition. QRS Music Technologies (a piano roll company originally affiliated with Story & Clark; QRS claims to be the only company to still produce piano rolls) provided the 16 MIDI-compatible Gulbransen grand pianos, and most non-player piano parts were played by MIDI-controlled robots on real instruments.[7] They used industrial fans to simulate airplane propellers, just as Antheil did.[8] They planned for the entire orchestra to play without any human intervention.[9] The *Ballet* installation was so successful — receiving glowing reviews from the Washington *Post*, the Associated Press, ABC's "Good Morning, America," and NPR's "Fresh Air" — that the Washington gallery extended its initial 17-day run for another eight weeks. Lehrman and Singer write, "The *Ballet Mécanique* installation at the National Gallery of Art proved to be one of the most popular exhibits in that institution's history. Thousands of listeners gathered for the twice-daily performances."[10] In an interesting reversal, Antheil's *Ballet* in its original form drew an audience nearly eighty years after its original premiere, while the revised concert-hall version of 1952 seems outdated and stuck in the

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[6]Preston Wright, "Reconstructing *Ballet Mécanique*: An Interview with Paul Lehrman" American Public Media, January 2003.

[7]Paul D. Lehrman and Eric Singer, "Doing Good By the 'Bad Boy': Performing George Antheil's *Ballet Mécanique* With Robots," Technologies for Practical Robot Applications (TePRA), 2008, 14.

[8]Ibid., 15.

[9]Ibid., 14.

[10]Lehrman and Singer, 17.

concert hall. McGuire, Lawson, Lehrman, and Singer mechanized Antheil's *Ballet Mécanique,* using the original scoring to realize Antheil's vision of a work he claimed to be "like machines. All efficiency. . . Revolutionary as nothing has been revolutionary."[11]

While the player piano's popularity peaked almost a century ago, its role in digital music recording, making, and storing is more than a technological one-off, an odd offshoot that would die out in favor of the phonograph record. As the Antheil revival shows, interest in automatic, self-playing instruments continues into the twenty-first century. Perhaps, then, composing for player piano in the 1940s was not as out-of-date as Nancarrow thought. Indeed, Nancarrow's compositions for player piano prove equally modern as those written for electronic instruments. When Antheil reworked his *Ballet Mécanique* he divested it of its own modernity, of its own time, in favor of using instruments that were familiar to the institutional tradition of the eighteenth- and nineteenth-century concert hall. He disassembled his work only to put it together in such a way as to fit it into the classical institution, perhaps to immortalize himself in his more easily performable work. Nancarrow's player piano compositions do the opposite, taking what was once cutting edge technology, the player piano, and using it as a simple tool to aid in his composition.

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[11]Quoted in Carol Oja, *Making Music Modern: New York in the 1920s* (New York: Oxford University Press, 2000), 81. Cited as a letter from Antheil to Stanley Hard, [9? March 1925], George Antheil Collection, Music Division, Library of Congress.

The contemporary music group Alarm Will Sound plays an ensemble version of

Nancarrow's *Study No. 2a*, arranged by Gavin Chuck. In a Boston Globe review of one of

their performances of the work, the reviewer writes,

> Nancarrow's Studies for Player Piano (recorded on the Wergo label) are
> commonly thought of as unfit for flesh-and-blood musicians, but this is not
> strictly true. . . In distributing the often bluesy pile-ups of mechanical plinks to
> various combinations of woodwinds strings, percussion, and piano, these
> arrangements naturally lose something of the maniacal speed and precision of the
> originals — though not as much as you might think with these players.[12]

Chuck's arrangement of Nancarrow's *Study No. 2a* for the Alarm Will Sound twenty-

piece chamber ensemble begins with a clear swing that contrasts with the opening of the

piano roll with its strict timing and rhythmically exact entrances. Alarm Will Sound's

string bass emphasizes the blues influence on the work while in the player piano version

the blues influence comes through in the melody with its blues-scale pitches and

syncopated rhythms. The snare drum hits on what sounds like the second beat of each

measure along with the steady high-hat and later melodies on the trombone (including a

slide effect of which the player piano would be incapable), trumpet, and clarinet all give

the work a sense of authenticity as a jazz work while the player piano version sounds

more like a mechanized version of a jazz work. Indeed, in putting the two works next to

one another, one might assume that the chamber ensemble version came first. That is not

to say that the Alarm Will Sound version lacks the rhythmic and metrical complexity, or

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[12]Eichler, "Mechanical Music, Improbable Joy," *The Boston Globe*, Feb 19, 2007. Accessed November 9, 2015. http://www.boston.com/news/globe/living/articles/2007/02/19/mechanical_music_improbable_joy/

the extreme dissonances of the original. But rather than an exercise in machine-like precision and pushing the limits in metrical layerings, Chuck's arrangement sounds more like someone wrote something fairly simple and applied odd meter shifts to ensure the parts would only align at certain points. That makes the points when the ensemble does seem to come together — such as roughly two-thirds in when, after a period where it feels like all voices are slowing down at different speeds, the tempo picks up for a few seconds instead — seem intentional rather than accidental.[13]

Due to the dissonances and meter changes the work sounds like the ensemble is failing to listen to one another or to follow the conductor, but the passages where all the parts align serve as a reminder that each voice is indeed where it needs to be. With so many voices in different meters it would be interesting to learn exactly which part the conductor leads at various points throughout the performance. In Alarm Will Sound's 2009 performance at the Moscow Art Festival the conductor shifts meters regularly, sometimes leading the percussion, other times falling into the meter of the woodwinds or strings.

At a concert one of the group's founders, Alan Pierson, told the audience "We're taking music that wasn't supposed to be played by humans. We've figured out the sounds and now we'll make them live."[14] Alarm Will Sound's postmodern idea of taking a work and using it in a way it was never intended to be used, as a commodity to be consumed

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[13]My analysis is based on the 2009 Moscow Art November Festival performance of Nancarrow's *Study No. 2a* by Alarm Will Sound. Accessed August 13, 2015. https://www.youtube.com/watch?v=A5d9353mN5Q.
[14]Quoted in Wilson, "An Alarming Success," *Rochester Review* 69, no. 3 (March/April 2007).

and altered at will,[15] contrasts with Nancarrow's modernist view that emphasized the intellectual, through his mathematical ratios, complex meters, and faith in technology rather than human performers.[16] David Harvey describes modernist art as art for art's sake — like music for music's sake in the earlier discussion of absolute music — and he claimed that modernist art was often "a highly individualistic, aristocratic, disdainful (particularly of popular culture), and even arrogant perspective on the part of cultural producers."[17] Nancarrow's use of the player piano as the ideal performer rather than the flawed human player, his musical isolation in Mexico City, and his assumption that live players would not be able to play his complex rhythms indicate a modernist mindset.

Alarm Will Sound's adaptation of Nancarrow's work for live performers indicates an indifference to the work's original meaning in a postmodern "random cannibalization" of Nancarrow's work.[18] Unlike Stravinsky and Antheil, Nancarrow did not arrange his own player piano work for other instruments — indeed, the player piano was already obsolete when he decided to compose for it. While Stravinsky and Antheil tried to stay on the cutting edge of musical technology with their player piano works, Nancarrow made a conscious choice to use the outmoded technology.

Alarm Will Sound's live version of Nancarrow's *Study No. 2* does not revive the work — it never had a live player to begin with — but rather it demechanizes the

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[15]Frederic Jameson defines postmodernism as "the consumption of sheer commodification as a process." Frederic Jameson, *Postmodernism: Or, The Cultural Logic of Late Capitalism* (Duke University Press, 2003), x.

[16]For more on modernity and postmodernity, see David Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change* (Cambridge, MA: Blackwell Publishers, 1990).

[17]Harvey, *The Condition of Postmodernity*, 22.

[18]Jameson, *Postmodernism*, 18.

mechanical, reinserting elements of human labor previously made irrelevant by the player piano. In so doing, Alarm Will Sound *humanizes* Nancarrow's rhythmic machine. Chuck's arrangement of Nancarrow's work, then, does not revive the player piano. Instead, the arrangement extracts the musical data from the piano roll and feeds it into a human machine, the contemporary ensemble. Alarm Will Sound's playing imitates the machine and thereby creates an additional level of abstraction, a postmodern sampling of the three kinds of mechanical music discussed in chapter 2. Chapter 2 outlines a mechanical musical topic, created through constant driving rhythms, an emphasis on woodwinds and percussion, and awkward or odd accentuations. Nancarrow's work when played by player piano falls into the third category of mechanical music, like Antheil's *Ballet Mécanique*, music written "OUT OF and FOR machines."[19] But Alarm Will Sound's performance is, in a sense, more similar to the scores of *Modern Times* or *Metropolis*, once removed. Chapter 2 claims that *Ballet Mécanique* inflects the machine with aspects of the human, while *Modern Times* or *Metropolis* inflect music with aspects of the machine. Alarm Will Sound's human performance of Nancarrow's *Study no. 2*, a work intended for the mechanical performer, transitions the work from music written specifically for mechanical performance to music that imitates the machine, but instead of imitating the stomping pistons and cranking gears of the Industrial machine Alarm Will Sound imitates the player piano. Moreover, in taking mechanical music and humanizing it, Alarm Will Sound makes a critical statement about the contemporary performance

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[19]George Antheil, "My *Ballet Mécanique*" *De Stijl* 6, no. 12 (1925). Reprinted in George Antheil, *Ballet Mécanique* (Milwaukee: Schirmer, 2003), vi. Capitalization in the original.

ensemble. The ensemble is a kind of performance-generating machine, impressing audiences with their machine-like rhythmic exactitude and churning out humanized machine music. Eichler writes that "Musicians do not typically strive to play like machines," but that is just what Alarm Will Sound does in their performance of Nancarrow's *Study*.[20] Instead of mechanical instruments mimicking the human performer — as in the piano roll performances by Confrey, Rachmaninoff, Debussy, and others — human performers imitate the mechanical instrument. Twenty players take on the task previously covered by one mechanical piano; humans imitate the machine. The obsolete player piano meets its match in the equally obsolete contemporary performing ensemble that asserts its musical and artistic relevance above the technological noise of the twenty-first century.

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[20]Eichler, "Mechanical Music, Improbable Joy."

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