



The Audible Past

Jonathan Sterne

CULTURAL ORIGINS OF SOUND REPRODUCTION

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For Carrie



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List of Abbreviations

for Archival and Other Historical Materials Cited

AGB	Alexander Graham Bell Collection, Manuscripts Division, Library of Congress
CST	Charles Sumner Tainter Collection, Archives Center, National Museum of American History
EB	Emile Berliner Collection, Recorded Sound Reference Center, Library of Congress
EBM	Emile Berliner Collection, Manuscripts Division, Library of Congress
EG	Elisha Gray Collection, Archives Center, National Museum of American History
GHC	George H. Clark Radioana Collection, Archives Center, National Museum of American History
NWA	N. W. Ayer Collection, Archives Center, National Museum of American History
WBA	Warshaw Business Americana Collection, Archives Center, National Museum of American History
<i>Phonogram I</i>	Periodical published by the National Phonograph Company, 1891–93
<i>Phonogram II</i>	Periodical published by the Edison Phonograph Company, 1900–1902

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Hello!

Here are the tales currently told: Alexander Graham Bell and Thomas Watson had their first telephone conversation in 1876. “Mr. Watson—Come here—I want to see you!” yelled Bell to Watson, and the world shook. Thomas Edison first heard his words—“Mary had a little lamb”—returned to him from the cylinder of a phonograph built by his assistants in 1878, and suddenly the human voice gained a measure of immortality. Guglielmo Marconi’s wireless telegraph conquered the English channel in 1899. Unsuspecting navy personnel first heard voices coming over their radios in 1906. Each event has been claimed as a turning point in human history. Before the invention of sound-reproduction technologies, we are told, sound withered away. It existed only as it went out of existence. Once telephones, phonographs, and radios populated our world, sound had lost a little of its ephemeral character. The voice became a little more unmoored from the body, and people’s ears could take them into the past or across vast distances.

These are powerful stories because they tell us that something happened to the nature, meaning, and practices of sound in the late nineteenth century. But they are incomplete.¹ If sound-reproduction technologies changed the way we hear, where did they come from? Many of the practices, ideas, and constructs associated with sound-reproduction technologies predated the machines themselves. The basic technology to make phonographs (and, by extension, telephones) existed for some time prior to their actual invention.² So why did sound-reproduction technologies emerge when they did and not at some other time? What preceded them that made them pos-

sible, desirable, effective, and meaningful? In what milieu did they dwell? How and why did sound-reproduction technologies take on the particular technological and cultural forms and functions that they did? To answer these questions, we move from considering simple mechanical possibility out into the social and cultural worlds from which the technologies emerged.

The Audible Past offers a history of the *possibility* of sound reproduction—the telephone, the phonograph, radio, and other related technologies. It examines the social and cultural conditions that gave rise to sound reproduction and, in turn, how those technologies crystallized and combined larger cultural currents. Sound-reproduction technologies are artifacts of vast transformations in the fundamental nature of sound, the human ear, the faculty of hearing, and practices of listening that occurred over the long nineteenth century. Capitalism, rationalism, science, colonialism, and a host of other factors—the “maelstrom” of modernity, to use Marshall Berman’s phrase—all affected constructs and practices of sound, hearing, and listening.³

As there was an Enlightenment, so too was there an “Ensoniment.” A series of conjunctures among ideas, institutions, and practices rendered the world audible in new ways and valorized new constructs of hearing and listening. Between about 1750 and 1925, sound itself became an object and a domain of thought and practice, where it had previously been conceptualized in terms of particular idealized instances like voice or music. Hearing was reconstructed as a physiological process, a kind of receptivity and capacity based on physics, biology, and mechanics. Through techniques of listening, people harnessed, modified, and shaped their powers of auditory perception in the service of rationality. In the modern age, sound and hearing were reconceptualized, objectified, imitated, transformed, reproduced, commodified, mass-produced, and industrialized. To be sure, the transformation of sound and hearing took well over a century. It is not that people woke up one day and found everything suddenly different. Changes in sound, listening, and hearing happened bit by bit, place by place, practice by practice, over a long period of time.

“The golden age of the ear never ended,” writes Alan Burdick. “It continues, occluded by the visual hegemony.”⁴ *The Audible Past* tells a story where sound, hearing, and listening are central to the cultural life of modernity, where sound, hearing, and listening are foundational to modern modes of knowledge, culture, and social organization. It provides an alter-

native to the pervasive narrative that says that, in becoming modern, Western culture moved away from a culture of hearing to a culture of seeing. There is no doubt that the philosophical literature of the Enlightenment—as well as many people’s everyday language—is littered with light and sight metaphors for truth and understanding.⁵ But, even if sight is in some ways the privileged sense in European philosophical discourse since the Enlightenment, it is fallacious to think that sight alone or in its supposed difference from hearing explains modernity.

There has always been a heady audacity to the claim that vision is the social chart of modernity. While I do not claim that listening is *the* social chart of modernity, it certainly charts a significant field of modern practice. There is always more than one map for a territory, and sound provides a particular path through history. In some cases—as this book will demonstrate—modern ways of hearing prefigured modern ways of seeing. During the Enlightenment and afterward, the sense of hearing became an object of contemplation. It was measured, objectified, isolated, and simulated. Techniques of audition developed by doctors and telegraphers were constitutive characteristics of scientific medicine and early versions of modern bureaucracy. Sound was commodified; it became something that can be bought and sold. These facts trouble the cliché that modern science and rationality were outgrowths of visual culture and visual thinking. They urge us to rethink exactly what we mean by the *privilege* of vision and images.⁶ To take seriously the role of sound and hearing in modern life is to trouble the visualist definition of *modernity*.

Today, it is understood across the human sciences that vision and visual culture are important matters. Many contemporary writers interested in various aspects of visual culture (or, more properly, visual aspects of various cultural domains)—the arts, design, landscape, media, fashion—understand their work as contributing to a core set of theoretical, cultural, and historical questions about vision and images. While writers interested in visual media have for some time gestured toward a conceptualization of *visual culture*, no such parallel construct—*sound culture* or, simply, *sound studies*—has broadly informed work on hearing or the other senses.⁷ While sound is considered as a unified intellectual problem in some science and engineering fields, it is less developed as an integrated problem in the social and cultural disciplines.

Similarly, visual concerns populate many strains of cultural theory. The question of *the gaze* haunts several schools of feminism, critical race theory,

psychoanalysis, and poststructuralism. The cultural status of *the image* and seeing occupies great minds in semiotics, film studies, several schools of literary and art-historical interpretation, architecture, and communication. While sound may interest individual scholars in these areas, it is still too often considered a parochial or specialized concern. While there are many scholars of sound active in communication, film studies, music, and other human sciences, sound is not usually a central theoretical problem for major schools of cultural theory, apart from the privilege of the voice in phenomenology and psychoanalysis and its negation in deconstruction.⁸

It would be possible to write a different book, one that explains and criticizes scholars' preference for visual objects and vision as an object of study. For now, it is enough to note that the fault lies with both cultural theorists and scholars of sound. Cultural theorists too easily accept pieties about the dominance of vision and, as a result, have elided differences between the privilege of vision and the totality of vision. Meanwhile, studies of sound tend to shy away from questions of sound culture as such (with a few notable exceptions) and prefer instead to work within other disciplinary or interdisciplinary intellectual domains. By *not* gesturing back toward a more general level of questioning, these works offer an implicitly cumulativist epistemology of the history of sound. The promise of cumulativist approaches is that one day we will have enough historical information to begin generalizing about society. The problem with this perspective is that such a remarkable day is always just over the horizon.⁹ If sound and hearing are indeed significant theoretical problems, then now is as good a time as any to begin dealing with them as broad intellectual matters.

Many authors have claimed that hearing is the neglected sense in modernity, a novel sense for analysis.¹⁰ It would perhaps be polemically acceptable at this point to lament the relative lack of scholarly work on sound as compared with images and vision, chart the pioneers, and then claim that this book will fill the gap. But the reality is somewhat different. There is a vast literature on the history and philosophy of sound; yet it remains conceptually fragmented. For the interested reader, there is a wealth of books and articles available on different aspects of sound written by scholars of communication, music, art, and culture.¹¹ But, without some kind of overarching, shared sensibility about what constitutes *the history of sound*, *sound culture*, or *sound studies*, piecing together a history of sound from the bewildering array of stories about speech, music, technology, and other sound-related practices has all the promise and appeal of piecing together a pane

of shattered glass. We know that the parts line up somehow, we know that they can connect, but we are unsure of how they actually link together. We have histories of concert audiences, telephones, speeches, sound films, soundscapes, and theories of hearing. But only rarely do the writers of histories of sound suggest how their work connects with other, related work or with larger intellectual domains. Because scholarship on sound has not consistently gestured toward more fundamental and synthetic theoretical, cultural, and historical questions, it has not been able to bring broader philosophical questions to bear on the various intellectual fields that it inhabits. The challenge, then, is to imagine sound as a problem that moves beyond its immediate empirical context. The history of sound is already connected to the larger projects of the human sciences; it is up to us to flesh out the connections.

In positing a history of sound, *The Audible Past* extends a long tradition of interpretive and critical social thought. Some authors have quoted the young Marx on the importance of sensory history: “The forming of the five senses is a labor of the entire history of the world down to the present.” Marx’s passage signals that the very capacity to relate to the world through one’s senses is organized and learned differently in different social settings. The senses are “cultivated or brought into being.” “Man himself becomes the object” to be shaped and oriented through historical and social process.¹² Before the senses are real, palpable, concrete, or available for contemplation, they are already affected and effected through the particular historical conditions that also give rise to the subject who possesses them. We can fully consider the senses as historical only if we consider society, culture, technology, and the body as themselves artifacts of human history. A truly historicist understanding of the senses—or of a particular sense—therefore requires a commitment to the constructivist and contextualist strain of social and cultural thought. Conversely, a vigorous constructivism and a vigorous contextualism require a history of the senses. It is no accident that Marx’s discussion of the senses appears in a section on communism in the *Economic and Philosophic Manuscripts of 1844*. Even to begin imagining (another) society, the young Marx had to consider the historical dynamics of sensation itself. As we imagine the possibilities of social, cultural, and historical change—in the past, present, or future—it is also our task to imagine histories of the senses. It is widely accepted that “the individual observer became an object of investigation and a locus of knowledge beginning in the first few decades of the 1800s” and that, during that same

period, “the status of the observing subject was transformed.”¹³ So, too, transformations in sound, hearing, and listening were part of massive shifts in the landscapes of social and cultural life of the last three centuries.

The emergence of sound-reproduction technology in the nineteenth and twentieth centuries provides a particularly good entry into the larger history of sound. It is one of the few extant sites in the human sciences where scholars have acknowledged and contemplated the historicity of hearing. As Theodor Adorno, Walter Benjamin, and countless other writers have argued, the problem of mechanical reproduction is central to understanding the changing shape of communication in the late nineteenth and early twentieth centuries. For them, the compelling problem of sound’s reproducibility, like the reproduction of images, was its seeming abstraction from the social world even as it was manifested more dynamically within it.¹⁴ Other writers have offered even stronger claims for sound reproduction: it has been described as a “material foundation” of the changing senses of space and time at the turn of the twentieth century, part of a “perceptual revolution” in the early twentieth century. Sound technologies are said to have amplified and extended sound and our sense of hearing across time and space.¹⁵ We are told that telephony altered “the conditions of daily life”; that sound recording represented a moment when “everything suddenly changed,” a “shocking emblem of modernity”; that radio was “the most important electronic invention” of the twentieth century, transforming our perceptual habits and blurring the boundaries of private, public, commercial, and political life.¹⁶

Taken out of context or with a little hostility, claims for the historical significance of sound reproduction may seem overstated or even grandiose. D. L. LeMahieu writes that sound recording was one of “a score of new technologies thrust upon a population increasingly accustomed to mechanical miracles. In a decade when men learned to fly, the clock-sprung motor of a portable gramophone or the extended playing time of a double-sided disk hardly provoked astonishment. Indeed, what may be most remarkable was the rapidity with which technological innovations became absorbed into everyday, commonplace experience.”¹⁷ The same could be said for telephony, radio, and many other technologies. Yet LeMahieu’s more sober prose still leaves room for wonder—not at the revolutionary power of sound-reproduction technology, but at its banality. If modernity, in part, names the experience of rapid social and cultural change, then its “shocking emblems” may very well have been taken in stride by some of its people.

Because sound-reproduction technology's role in history is so easily treated as self-evidently decisive, it makes sense to begin rewriting the history of sound by reconsidering the historical significance of sound technologies. A focus on sound-reproduction technology has an added advantage for the historian of sound: during their early years, technologies leave huge paper trails, thus making them especially rich resources for historical research. In early writings about the telephone, phonograph, and radio, we find a rich archive of reflections on the nature and meaning of sound, hearing, and listening. Douglas Kahn writes that, "as a historical object, sound cannot furnish a good story or consistent cast of characters nor can it validate any ersatz notion of progress or generational maturity. The history is scattered, fleeting, and highly mediated—it is as poor an object in any respect as sound itself."¹⁸ Prior to the twentieth century, very little of the sonic past was physically preserved for historical analysis at a later date. So it makes sense to look instead at a particular domain of practice associated with sound. The paper trail left by sound-reproduction technologies provides one useful starting point for a history of sound.

Like an examination of the sense organs themselves, an examination of sound technologies also cuts to the core of the nature/nurture debate in thinking about the causes of and possibilities for historical change. Even the most basic mechanical workings of sound-reproduction technologies are historically shaped. As I will argue, the vibrating diaphragm that allowed telephones and phonographs to function was itself an artifact of changing understandings of human hearing. Sound-reproduction technologies are artifacts of particular practices and relations "all the way down"; they can be considered archaeologically. The history of sound technology offers a route into a field of conjunctures among material, economic, technical, ideational, practical, and environmental changes. Situated as we are amid torrential rains of capitalist development and marketing that pelt us with new digital machinery, it is both easy and tempting to forget the enduring connection between any technology and a larger cultural context. Technologies sometimes enjoy a certain level of deification in social theory and cultural history, where they come to be cast as divine actors. In "impact" narratives, technologies are mysterious beings with obscure origins that come down from the sky to "impact" human relations. Such narratives cast technologies themselves as primary agents of historical change: technological deification is the religion behind claims like "the telephone changed the way we do business," "the phonograph changed the way we listen to music." Impact narratives have been rightly and widely criticized

as a form of technological determinism; they spring from an impoverished notion of causality.¹⁹

At the same time, technologies are interesting precisely because they can play a significant role in people's lives. Technologies are repeatable social, cultural, and material processes crystallized into mechanisms. Often, they perform labor that had previously been done by a person. It is this process of crystallization that makes them historically interesting. Their mechanical character, the ways in which they commingle physics and culture, can tell us a great deal about the people who build and deploy them. Technologies manifest a designed mechanical agency, a set of functions cordoned off from the rest of life and delegated to them, a set of functions developed from and linked to sets of cultural practices. People design and use technologies to enhance or promote certain activities and discourage others. Technologies are associated with habits, sometimes crystallizing them and sometimes enabling them. They embody in physical form particular dispositions and tendencies. The door closer tends to close the door unless I stop it with my hand or a doorstop. The domestic radio set receives but does not broadcast unless I do a little rewiring and add a microphone. The telephone rings while I write the introduction to this book. After years of conditioning to respond to a ringing telephone, it takes some effort to ignore it and finish the sentence or paragraph. To study technologies in any meaningful sense requires a rich sense of their connection with human practice, habitat, and habit. It requires attention to the fields of combined cultural, social, and physical activity—what other authors have called *networks* or *assemblages*—from which technologies emerge and of which they are a part.²⁰

The story presented in these pages spirals out from an analysis of the mechanical and physical aspects of the technologies themselves to the techniques, practices, and institutions associated with them. At each juncture in the argument, I show how sound-reproduction technologies are shot through with the tensions, tendencies, and currents of the culture from which they emerged, right on down to their most basic mechanical functions. Our most cherished pieties about sound-reproduction technologies—for instance, that they separated sounds from their sources or that sound recording allows us to hear the voices of the dead—were not and are not innocent empirical descriptions of the technologies' impact. They were wishes that people grafted onto sound-reproduction technologies—wishes that became programs for innovation and use.

For many of their inventors and early users, sound-reproduction technologies encapsulated a whole set of beliefs about the age and place in which they lived. Sound-reproduction technologies represented the promise of science, rationality, and industry and the power of the white man to co-opt and supersede domains of life that were previously considered to be magical. For their early users, sound technologies were—in a word—modern.²¹ *Modernity* is of course a cloudy analytic category, fraught with internal contradictions and intellectual conflicts. Its difficulty probably stems from its usefulness as a heuristic term, and my use of it is deliberately heuristic. When I claim that sound-reproduction technology indexes an acoustic modernity, I do not mean quite the same thing as the subjects of my history. *The Audible Past* explores the ways in which the history of sound contributes to and develops from the “maelstrom” of modern life (to return to Berman): capitalism, colonialism, and the rise of industry; the growth and development of the sciences, changing cosmologies, massive population shifts (specifically migration and urbanization), new forms of collective and corporate power, social movements, class struggle and the rise of new middle classes, mass communication, nation-states, bureaucracy; confidence in progress, a universal abstract humanist subject, and the world market; and a reflexive contemplation of the constancy of change.²² In modern life, sound becomes a problem: an object to be contemplated, reconstructed, and manipulated, something that can be fragmented, industrialized, and bought and sold.

But *The Audible Past* is not a simple modernization narrative for sound and hearing. *Modernization* can too easily suggest a brittle kind of universalism, where the specific historical developments referenced by *modernity* are transmogrified into a set of historical stages through which all cultures must pass. In Johannes Fabian’s apt phrase, the idea of modernity as modernization turns relations of space—relations between cultures—into relations of time, where the white man stands at the pinnacle of world evolution.²³ While I am not an exponent of a developmental theory of modernity as “modernization,” it is such a central element of some discourses about sound reproduction that we will confront it more than once in the following pages. A long line of inventors, scholars, businesspeople, phonographic anthropologists, and casual users thought of themselves as partaking in a modern way of life, as living at the pinnacle of the world’s progress. They believed that their epoch rode the crest of modernization’s unstoppable wave. So, in addition to being a useful heuristic for describing the context

of the project as a whole, *modernity* and its conjugates are also important categories to be analyzed and carefully taken apart within this history.

The remainder of this introduction provides some conceptual background for the history that follows. The next section is an extended consideration of sound as an object of historical study: what does it mean to write a history of something so apparently natural and physical as sound and hearing? A more detailed map of the book's arguments then follows.

Rethinking Sound's Nature: Of Forests, Fallen Trees, and Phenomenologies

All this talk of modernity, history, and sound technology conjures an implied opposite: the *nature* of sound and hearing. Insofar as we treat sound as a fact of nature, writing something other than its natural history might seem like an immodest or inappropriate endeavor—at best it could aspire only to partiality. Although film scholars have been using the phrase *history of sound* for some time, it has an uneasy ring to it. After all, scholars of the visible world do not write “histories of light” (although perhaps they should), instead preferring to write histories of “visual culture,” “images,” “visuality,” and the like. Bracketing light in favor of “the visual” may be a defensive maneuver since the various visual terms conveniently bracket questions of the nature of nature. But, besides sounding good, *history of sound* already embodies a hard-to-grasp but necessary paradox of nature and culture central to everything that follows in this book. At its core, the phenomenon of sound and the history of sound rest at the in-between point of culture and nature.

It is impossible to “merely describe” the faculty of hearing in its natural state. Even to try is to pretend that language has no figurative dimension of its own. The language that we use to describe sound and hearing comes weighted down with decades or centuries of cultural baggage. Consider the careers of two adjectives associated with the ear in the English language. The term *aural* began its history in 1847 meaning “of or pertaining to the organ of hearing”; it did not appear in print denoting something “received or perceived by the ear” until 1860. Prior to that period, the term *auricular* was used to describe something “of or pertaining to the ear” or perceived by the ear.²⁴ This was not a mere semantic difference: *auricular* carried with it connotations of oral tradition and hearsay as well as the external features of the ear visible to the naked eye (the folded mass of skin that is often synecdochally referred to as the ear is technically either the *au-*

ricle, the *pinna*, or the *outer ear*). *Aural*, meanwhile, carried with it no connotations of oral tradition and referred specifically to the middle ear, the inner ear, and the nerves that turn vibrations into what the brain perceives as sound (as in *aural surgery*). The idea of the aural and its decidedly medical inflection is a part of the historical transformation that I describe in the following pages.

Generally, when writers invoke a binary coupling between culture and nature, it is with the idea that culture is that which changes over time and that nature is that which is permanent, timeless, and unchanging. The nature/culture binary offers a thin view of nature, a convenient straw figure for “social construction” arguments.²⁵ In the case of sound, the appeal to something static is also a trick of the language. We treat sound as a natural phenomenon exterior to people, but its very definition is anthropocentric. The physiologist Johannes Müller wrote over 150 years ago that, “without the organ of hearing with its vital endowments, there would be no such a thing as sound in the world, but merely vibrations.”²⁶ As Müller pointed out, our other senses can also perceive vibration. Sound is a very particular perception of vibrations. You can take the sound out of the human, but you can take the human out of the sound only through an exercise in imagination. Sounds are defined as that class of vibrations perceived—and, in a more exact sense, sympathetically produced—by the functioning ear when they travel through a medium that can convey changes in pressure (such as air). The numbers for the range of human hearing (which absolutely do not matter for the purposes of this study) are twenty to twenty thousand cycles per second, although in practice most adults in industrial society cannot hear either end of that range. We are thus presented with a choice in our definition: we can say either that sound is a class of vibration that *might* be heard or that it is a class of vibration that *is* heard, but, in either case, the hearing of the sound is what makes it. My point is that human beings reside at the center of any meaningful definition of sound. When the hearing of other animals comes up, it is usually contrasted with human hearing (as in “sounds that only a dog could hear”). As part of a larger physical phenomenon of vibration, sound is a product of the human senses and not a thing in the world apart from humans. Sound is a little piece of the vibrating world.

Perhaps this reads like an argument that falling trees in the forest make no sounds if there are no people there to hear them. I am aware that the squirrels would offer another interpretation. Certainly, once we establish an operational definition of sound, there may be those aspects of it that can be

identified by physicists and physiologists as universal and unchanging. By our definition of sound, the tree makes a noise whether or not anyone is there to hear it. But, even here, we are dealing in anthropocentric definitions. When a big tree falls, the vibrations extend outside the audible range. The boundary between vibration that is sound and vibration that is not-sound is not derived from any quality of the vibration in itself or the air that conveys the vibrations. Rather, the boundary between sound and not-sound is based on the understood possibilities of the faculty of hearing—whether we are talking about a person or a squirrel. Therefore, as people and squirrels change, so too will sound—by definition. Species have histories.

Sound history indexes changes in human nature and the human body—in life and in death. The very shape and functioning of technologies of sound reproduction reflected, in part, changing understandings of and relations to the nature and function of hearing. For instance, in the final chapter of this book, I discuss how Victorian writers' desire for permanence in sound recording was an extension of changing practices and understandings of preserving bodies and food following the Civil War. The connections among canning, embalming, and sound recording require that we consider practices of sound reproduction in relation to other bodily practices. In a phrase, the history of sound implies a history of the body.

Bodily experience is a product of the particular conditions of social life, not something that is given prior to it. Michel Foucault has shown that, in the eighteenth and nineteenth centuries, the body became “an object and target of power.” The modern body is the body that is “is manipulated, shaped, trained,” that “obeys, responds, becomes skillful and increases its forces.” Like a machine, it is built and rebuilt, operationalized and modified.²⁷ Beyond and before Foucault, there are scores of authors who reach similar conclusions. Already in 1801, a Dr. Jean-Marc Gaspard Itard concluded, on the basis of his interactions with a young boy found living “wild” in the woods, that audition is learned. Itard named the boy Victor. Being a wild child, Victor did not speak—and his silence led to questions about his ability to hear. Itard slammed doors, jingled keys, and made other sounds to test Victor's hearing. The boy even failed to react when Itard shot off a gun near his head. But Victor was not deaf: the young doctor surmised that the boy's hearing was just fine. Victor simply showed no interest in the same sounds as “civilized” French people.²⁸

While the younger Marx argued that the history of the senses was a core component of human history, the older Marx argued that the physical con-

ditions under which laborers “reproduced” themselves would vary from society to society—that their bodies and needs were historically determined.²⁹ The French anthropologist Marcel Mauss, one of Foucault’s many influences, offered that “man’s first and most natural technical object, and at the same time technical means, is his body.” What Mauss called *body techniques* were “one of the fundamental moments of history itself: education of the vision, education in walking—ascending, descending, running.”³⁰ To Mauss’s list we could add the education and shaping of audition. Phenomenology always presupposes culture, power, practice, and epistemology. “Everything is knowledge, and this is the first reason why there is no ‘savage experience’: there is nothing beneath or prior to knowledge.”³¹

The history of sound provides some of the best evidence for a dynamic history of the body because it traverses the nature/culture divide: it demonstrates that the transformation of people’s physical attributes is part of cultural history. For example, industrialization and urbanization decrease people’s physical capacities to hear. One of the ways in which adults lose the upper range of their hearing is through encounters with loud machinery. A jackhammer here, a siren there, and the top edge of hearing begins to erode. Conflicts over what does and does not constitute environmental noise are themselves battles over what sounds are admissible in the modern landscape.³² As Nietzsche would have it, modernity is a time and place where it becomes possible for people to be measured.³³ It is also a place where the human-built environment modifies the living body.

If our goal is to describe the historical dynamism of sound or to consider sound from the vantage point of cultural theory, we must move just beyond its shifting borders—just outside sound into the vast world of things that we think of as not being about sound at all. The history of sound is at different moments strangely silent, strangely gory, strangely visual, and always contextual. This is because that elusive inside world of sound—the sonorous, the auditory, the heard, the very density of sonic experience—emerges and becomes perceptible only through its exteriors. If there is no “mere” or innocent description of sound, then there is no “mere” or innocent description of sonic experience. This book turns away from attempts to recover and describe people’s interior experience of listening—an auditory past—toward the social and cultural grounds of sonic experience. The “exteriority” of sound is this book’s primary object of study. If sound in itself is a variable rather than a constant, then the history of sound is of necessity an externalist and contextualist endeavor. Sound is an artifact of the messy and political human sphere.

To borrow a phrase from Michel Chion, I aim to “disengage sound thinking . . . from its naturalistic rut.”³⁴ Many theorists and historians of sound have privileged the static and transhistorical, that is, the “natural,” qualities of sound and hearing as a basis for sound history. A surprisingly large proportion of the books and articles written about sound begin with an argument that sound is in some way a “special case” for social or cultural analysis. The “special case” argument is accomplished through an appeal to the interior nature of sound: it is argued that sound’s natural or phenomenological traits require a special sensibility and special vocabulary when we approach it as an object of study. To fully appreciate the strangeness of beginning a history with a transhistorical description of human listening experience, consider how rare it is for histories of newspapers or literature to begin with naturalistic descriptions of light and phenomenologies of reading.

Sound certainly has natural dimensions, but these have been widely misinterpreted. I want to spend the next few pages considering other writers’ claims about the supposed natural characteristics of sound in order to explain how and why *The Audible Past* eschews transhistorical constructs of sound and hearing as a basis for a history of sound. Transhistorical explanations of sound’s nature can certainly be compelling and powerful, but they tend to carry with them the unacknowledged weight of a two-thousand-year-old Christian theology of listening.

Even if it comes at the beginning of a history, an appeal to the “phenomenological” truth about sound sets up experience as somehow outside the purview of historical analysis. This need not be so—phenomenology and the study of experience are not by definition opposed to historicism. For instance, Maurice Merleau-Ponty’s work has a rich sense of the historical dimensions of phenomenological experience.³⁵ But founding one’s analysis on the supposed transhistorical phenomenological characteristics of hearing is an incredibly powerful move in constructing a cultural theory of sound. Certainly, it asserts a universal human subject, but we will see that the problem is less in the universality per se than in the universalization of a set of particular religious prejudices about the role of hearing in salvation. That these religious prejudices are embedded at the very center of Western intellectual history makes them all the more intuitive, obvious, or otherwise persuasive.

To offer a gross generalization, assertions about the difference between hearing and seeing usually appear together in the form of a list.³⁶ They begin at the level of the individual human being (both physically and psy-

chologically). They move out from there to construct a cultural theory of the senses. These differences between hearing and seeing are often considered as biological, psychological, and physical facts, the implication being that they are a necessary starting point for the cultural analysis of sound. This list strikes me as a litany—and I use that term deliberately because of its theological overtones—so I will present it as a litany here:

- hearing is spherical, vision is directional;
- hearing immerses its subject, vision offers a perspective;
- sounds come to us, but vision travels to its object;
- hearing is concerned with interiors, vision is concerned with surfaces;
- hearing involves physical contact with the outside world, vision requires distance from it;
- hearing places us inside an event, seeing gives us a perspective on the event;
- hearing tends toward subjectivity, vision tends toward objectivity;
- hearing brings us into the living world, sight moves us toward atrophy and death;
- hearing is about affect, vision is about intellect;
- hearing is a primarily temporal sense, vision is a primarily spatial sense;
- hearing is a sense that immerses us in the world, vision is a sense that removes us from it.³⁷

The audiovisual litany—as I will hereafter call it—idealizes hearing (and, by extension, speech) as manifesting a kind of pure interiority. It alternately denigrates and elevates vision: as a fallen sense, vision takes us out of the world. But it also bathes us in the clear light of reason. One can also see the same kind of thinking at work in Romantic conceptualizations of music. Caryl Flinn writes that nineteenth-century Romanticism promoted the belief that “music’s immaterial nature lends it a transcendent, mystical quality, a point that then makes it quite difficult for music to speak to concrete realities. . . . Like all ‘great art’ so construed, it takes its place outside of history where it is considered timeless, universal, functionless, operating beyond the marketplace and the standard social relations of consumption and production.”³⁸ Outlining the *differences* between sight and hearing begs the prior question of what we mean when we talk about their nature. Some authors refer back to physics; others refer back to transcendental phenomenology or even cognitive psychology. In each case, those citing the litany do so to demarcate the purportedly special capacities of

each sense as the starting point for historical analysis. Instead of offering us an entry into the history of the senses, the audiovisual litany posits history as something that happens *between* the senses. As a culture moves from the dominance of one sense to that of another, it changes. The audiovisual litany renders the history of the senses as a zero-sum game, where the dominance of one sense by necessity leads to the decline of another sense. But there is no scientific basis for asserting that the use of one sense atrophies another. In addition to its specious zero-sum reasoning, the audiovisual litany carries with it a good deal of ideological baggage. Even if that were not so, it would still not be a very good empirical account of sensation or perception.

The audiovisual litany is ideological in the oldest sense of the word: it is derived from religious dogma. It is essentially a restatement of the long-standing spirit/letter distinction in Christian spiritualism. The spirit is living and life-giving—it leads to salvation. The letter is dead and inert—it leads to damnation. Spirit and letter have sensory analogues: hearing leads a soul to spirit, sight leads a soul to the letter. A theory of religious communication that posits sound as life-giving spirit can be traced back to the Gospel of John and the writings of Saint Augustine. These Christian ideas about speech and hearing can in turn be traced back to Plato's discussion of speech and writing in the *Phaedrus*.³⁹ The hearing-spirit/sight-letter framework finds its most coherent contemporary statement in the work of Walter Ong, whose later writing (especially *Orality and Literacy*) is still widely cited as an authoritative description of the phenomenology and psychology of sound. Because Ong's later work is so widely cited (usually in ignorance of the connections between his ideas on sound and his theological writings), and because he makes a positive statement of the audiovisual litany such a central part of his argument about cultural history, Ong's work warrants some consideration here.

To describe the balance sheet of the senses, Ong used the word *sensorium*, a physiological term that denoted a particular region of the brain that was thought to control all perceptual activity. *Sensorium* fell out of favor in the late nineteenth century as physiologists learned that there is no such center in the brain. Ong's use of the term should therefore be considered metaphorical. For him, the sensorium is "the entire sensory apparatus as an organizational complex," the combined balance among a fixed set of sensory capacities.

Although *Orality and Literacy* reads at times like a summary of scientific findings, Ong's earlier writings clearly state that his primary interest in the

senses is explicitly driven by theological concerns: “The question of the sensorium in the Christian economy of revelation is particularly fascinating because of the primacy which this economy accords to the word of God and thus in some mysterious way to sound itself, a primacy already suggested in the Old Testament pre-Christian [*sic*] tradition.”⁴⁰ For Ong, “divine revelation itself . . . is indeed inserted in a particular sensorium, a particular mixture of the sensory activity typical of a given culture.” Ong’s balance-sheet history of the senses is clearly and urgently linked to the problem of how to hear the word of God in the modern age. The sonic dimension of experience is closest to divinity. Vision suggests distance and disengagement. Ong’s history of the move from sound-based oral culture to sight-based literate culture is a history of “a certain silencing of God” in modern life. Ong’s assertions about the difference between the world of “oral man” and the “hypertrophy of the visual” that marks the modern age parallel perfectly the spirit/letter distinction in Catholic spiritualism. It is a sophisticated and iconoclastic antimodernist Catholicism. Still, Ong argues that the audiovisual litany transcends theological differences: “Faith or no, we must all deal with the same data.”⁴¹

Of course, parts of the audiovisual litany have come under heavy criticism. The work of Jacques Derrida can be read as an inversion of Ong’s value system—Ong himself suggests as much.⁴² Derrida uses his well-known phrase *the metaphysics of presence* to criticize and dismantle the connections among speech, sound, voice, and presence in Western thought. Although Derrida’s most celebrated critiques of presence find him tarrying with Edmund Husserl’s transcendental phenomenology, Ferdinand de Saussure’s semiotic theory, and Martin Heidegger’s ontology, his criticisms are certainly applicable to Ong’s thought as well. Ong argues for exactly the metaphysics of presence that Jacques Derrida attacks as “ontotheological,” as a creeping Christian spiritualism that inhabits Western philosophy: “The living act, the life-giving act [hearing oneself speak], the *Lebendigkeit*, which animates the body of the signifier and transforms it into a meaningful expression, the soul of language, seems not to separate itself from itself, from its own self-presence.”⁴³ For Derrida, the elevation of speech as the center of subjectivity and the point of access into the divine is “essential to the history of the West, therefore to metaphysics in its entirety, even when it professes to be atheist.”⁴⁴ Derrida uses this position to argue for the visual side of the audiovisual litany—an emphasis on vision, writing, difference, and absence. Deconstruction inverts, inhabits, and reanimates the sound/vision binary, privileging writing over speech

and refusing both speech-based metaphysics and presence-based positive assertions.

Here, I want to make a slightly different move: the audiovisual litany carries with it the theological weight of the durable association among sound, speech, and divinity, even in its scientific guise. Rather than inverting the audiovisual litany, why not redescribe sound? Since this book is not bound by Christian doctrine, there is no law—divine or otherwise—requiring us to assume the interiority of sound and the connection between sound, subjective self-presence, and intersubjective experience. We do not need to assume that sound draws us into the world while vision separates us from it. We can reopen the question of the sources of rationality and modern ways of knowing. If history exists *within* the senses as well as *between* them, then we need not begin a history of sound with an assertion of the transhistorical dimensions of sound.

My criticism of the audiovisual litany goes far beyond the questions of essentialism or social construction, which usually degenerate into philosophical hygienics. Even if we grant the possibility of a transcendental subject of sensation, the audiovisual litany falls short on its own terms. Despite all the appeals to nature in the name of the litany, the phenomenology implied by the audiovisual litany is highly selective—it stands on shaky empirical (and transcendental) ground. As Rick Alman has argued, claims about the transhistorical and transcultural character of the senses often derive their support from culturally and historically specific evidence—limited evidence at that. In the audiovisual litany, “an apparently ontological claim about the role of sound [or vision] has been allowed to take precedence over actual analysis of sound’s functioning.”⁴⁵ Consider the purportedly unique temporal and spatial characteristics of auditory phenomenology. Ong argues that “sound is more real or existential than other sense objects, despite the fact that it is also more evanescent. Sound itself is related to present actuality rather than to past or future”; sounds exist only as they go out of existence.⁴⁶ But, strictly speaking, Ong’s claim is true for any event—any *process* that you can possibly experience—and so it is not a quality special or unique to sound. To say that ephemerality is a special quality of sound, rather than a quality endemic to any form of perceptible motion or event in time, is to engage in a very selective form of nominalism.⁴⁷ The same criticism can be made of the litany’s attribution of a “surface”-oriented spatiality to vision as opposed to an “interior” orientation to sound: it is a very selective notion of surface. Anyone who has heard fingernails on a chalkboard or footsteps in a concrete hallway (or on a wooden

floor) can recognize that listening has the potential to yield a great deal of information about surfaces very quickly. The phenomenologist Don Ihde has shown that writers who take sound as a weakly spatial sense wholly disregard “the contemporary discoveries of very complex spatial attributes to auditory experience.”⁴⁸ He demonstrates that hearing has many spatial aspects and possibilities to which we do not normally attend. We can learn a great deal about shape, surface, or texture from listening. Perhaps the biggest error of the audiovisual litany lies in its equation of hearing and listening. Listening is a directed, learned activity: it is a definite cultural practice. Listening requires hearing but is not simply reducible to hearing.

There is no “mere” or innocent description of interior auditory experience. The attempt to describe sound or the act of hearing in itself—as if the sonic dimension of human life inhabited a space prior to or outside history—strives for a false transcendence. Even phenomenologies can change. In this respect, we follow in Dr. Itard’s footsteps. Like the studious Itard, who was perplexed by the wild boy who could hear but did not speak, historians of sound must surmise that our subjects’ hearing is fine medically. But we can know their sonic world only through their efforts, expressions, and reactions. History is nothing but exteriorities. We make our past out of the artifacts, documents, memories, and other traces left behind. We can listen to recorded traces of past history, but we cannot presume to know exactly what it was like to hear at a particular time or place in the past. In the age of technological reproduction, we can sometimes experience an audible past, but we can do no more than presume the existence of an auditory past.

What Is Sound Reproduction? Plan of the Present Work

I have argued that technologies of sound reproduction provide us with a compelling entry into the history of sound, but sound-reproduction technology is not necessarily a well-bounded historical object. One could argue that ancient uses of animal horns to amplify the voice and aid the hard-of-hearing are, in a certain sense, sound-reproduction technologies. Certainly, musical instruments could have some claim to that status, as could speaking-head or piano-playing automatons and other sound-synthesis technologies from the seventeenth to the nineteenth centuries. So what is different about telephones, phonographs, radios, and other technologies commonly conjured up as “sound reproduction”? A number of writers have offered semiexperiential definitions of modern sound-reproduction technologies based on their power to separate a sound from its “source.”

Since the power to split sources and copies is the most common definition of sound-reproduction technology, it warrants some scrutiny. Pierre Schaeffer, the composer who pioneered *musique concrète*, argued that sound-reproduction technologies produced “acousmatic” sounds—sounds that one hears without seeing their source. John Corbett extends the line of thought by using an explicitly psychoanalytic framework to talk about reproduced sound in terms of visual lack: “It is the lack of the visual, endemic to recorded sound, that initiates desire in relation to the popular music object.”⁴⁹ For Corbett, our inability to see the recording leads us to want it, to attend to it. Barry Truax and R. Murray Schafer have coined the term *schizophonia* to describe the “split between an original sound and its electro-acoustic reproduction” enabled by sound-reproduction technologies.⁵⁰ The Greek prefix *schizo-* means “split” and also has a convenient connotation of “psychological aberration” for these authors. Truax and Schafer also argue that reproduction removes sound from its original context.

By my own historicization of practices and ideologies of sound, one could hypothesize a particular context where the acousmatic definition of sound reproduction holds explanatory force. Indeed, the concept of acousmatic sound may seem intuitively plausible to many people today. But that does not make it true. Recall, with Stuart Hall, that that which is most obvious is most ideological: “When people say to you ‘Of course that’s so, isn’t it?’ that ‘of course’ is the most ideological moment, because that’s the moment at which you’re least aware that you are using a particular ideological framework, and that if you used another framework the things that you are talking about would have a different meaning.”⁵¹ Acousmatic or schizophonic definitions of sound reproduction carry with them a questionable set of prior assumptions about the fundamental nature of sound, communication, and experience. Most important, they hold human experience and the human body to be categories outside history:

1. They assume that face-to-face communication and bodily presence are the yardsticks by which to measure all communicative activity. They define sound reproduction negatively, as negating or modifying an undamaged interpersonal or face-to-face copresence. For these authors, the difference between sound reproduction and interpersonal interaction is important because the former lacks some of the qualities of the latter.
2. Because they assume the primacy of face-to-face interaction, these authors assume that sound-reproduction technologies will have

a disorienting effect on the senses that are otherwise oriented or grounded in coherent bodily experience. The assumption of prior sensory coherence requires a notion of a human body that exists outside history. For instance, the claim that sound reproduction has “alienated” the voice from the human body implies that the voice and the body existed in some prior holistic, unalienated, and self-present relation. As I have already argued, phenomenological understandings of subjectivity need not privilege self-presence or reject historicism.

3. They assume that, at some time prior to the invention of sound-reproduction technologies, the body was whole, undamaged, and phenomenologically coherent. By extension, this is to argue that all modern life is disorienting, that the only subject that is whole or at peace with itself is one that is not mediated or fragmented by technology. But the idea of the body’s phenomenological unity and sanctity gains power precisely at the moment in its history that the body is being taken apart, reconstructed, and problematized—the eighteenth and nineteenth centuries. In contrast, medieval thought and practice often constructed the body as a filthy container for the soul, something to be transcended and overcome in the afterlife.
4. They assume that sound-reproduction technologies can function as neutral conduits, as instrumental rather than substantive parts of social relationships, and that sound-reproduction technologies are ontologically separate from a “source” that exists prior to and outside its affiliation with the technology. Attending to differences between “sources” and “copies” diverts our attention from processes to products; technology vanishes, leaving as its by-product a source and a sound that is separated from it.

Assertions of the primacy of face-to-face communication or interpersonal immediacy have been widely criticized on a variety of theoretical fronts, and I will not rehearse those arguments here.⁵² Treating face-to-face communication as primary also predetermines the history of sound reproduction before we even tell the story. If interpersonal interaction is the presumptively primary or “authentic” mode of communication, then sound reproduction is doomed to denigration as inauthentic, disorienting, and possibly even dangerous by virtue of its “decontextualizing” sound from its “proper” interpersonal context. But, to begin a theory and history of sound’s reproducibility, we do *not* need final, fundamental, or

transhistorical answers to questions about the relations between hearing and seeing, between technological reproduction and sensory orientation, between original and copy, and between presence and absence in communication. We can provide more robust answers to those questions by re-considering them in the course of studying sound reproduction. This history of sound begins by positing sound, hearing, and listening as historical problems rather than as constants on which to build a history.

So let us take a ride on Ockham's razor and work from a simpler definition of sound-reproduction technology, one that does not require us to posit a transcendental subject of hearing: modern technologies of sound reproduction use devices called *transducers*, which turn sound into something else and that something else back into sound. All sound-reproduction technologies work through the use of transducers. Telephones turn your voice into electricity, sending it down a phone line and turning it back into sound at the other end. Radio works on a similar principle but uses waves instead of wires. The diaphragm and stylus of a cylinder phonograph change sound through a process of inscription in tinfoil, wax, or any number of other surfaces. On playback, the stylus and diaphragm transduce the inscriptions back into sounds. Digital sound-reproduction technologies all use transducers; they simply add another level of transformation, converting electric current into a series of zeros and ones (and back again).

My definition is certainly reductive and incomplete, but it is a very instructive reduction. It offers us a useful starting point for a history of sound reproduction, especially for a history that will proceed analytically rather than chronologically. Even though transducers operate on a very simple set of physical principles, they are also cultural artifacts. This is where *The Audible Past* begins its history of sound.

Chapter 1 takes as its central exhibit the ear phonautograph, a machine for "writing" sound waves. By following around the device, its inventors, and the ideas that it operationalized, the chapter offers a genealogy of new constructs of sound and hearing. The ear phonautograph used an excised human middle ear as a transducer, and the functioning of the tympanic membrane (also known as the diaphragm or the eardrum) in the human ear was the model for the diaphragms in all subsequent sound-reproduction technologies. As a result, I call the mechanical principle behind transducers *tympanic*. The history of the isolation and reproduction of the tympanic function leads us back into the construction of sound and hearing as objects of knowledge and experimentation in the late eighteenth century and

the nineteenth. The tympanic function emerged at the intersection of modern acoustics, otology, and physiology and the pedagogy of the deaf.

The ways in which the middle ear conducts vibration may seem like a simple mechanical function, something that we feel is without history. But the tympanic function opens out into changing constructions of sound, hearing, and humanity. Sound reproduction is historical all the way down.⁵³ In acoustics, physiology, and otology, sound became a waveform whose source was essentially irrelevant; hearing became a mechanical function that could be isolated and abstracted from the other senses and the human body itself. Although these developments may on their own seem minor or merely matters of technical discovery, they mark a larger shift in the history of sound.

Prior to the nineteenth century, philosophies of sound usually considered their object through a particular, idealized instance such as speech or music. Works of grammar and logic distinguished between significant and insignificant sounds by calling all significant sounds *vox*—voice.⁵⁴ Other philosophers took music as an idealized theoretical instance of sound, leading to the analysis of pitch and harmony, all the way up to the harmony of the spheres and, for Saint Augustine, God. In contrast, the concept *frequency*—previously developed by Descartes, Mersenne, and Bernoulli—offered a way to think about sound as a form of motion or vibration. As the notion of frequency took hold in nineteenth-century physics, acoustics, otology, and physiology, these fields broke with the older philosophies of sound. Where speech or music had been the general categories through which sound was understood, they were now special cases of the general phenomenon of sound. The emergence of the tympanic function thus coincided with an inversion of the general and the specific in philosophies of sound. Sound itself became the general category, the object of knowledge, research, and practice.⁵⁵ Chapter 1 also inverts a historical commonplace: the objectification and abstraction of hearing and sound, their construction as bounded and coherent objects, was a prior condition for the construction of sound-reproduction technologies; the objectification of sound was not a simple “effect” or result of sound-reproduction technology.

While chapter 1 considers the construction of sound and hearing, chapters 2 and 3 offer histories of various practices of listening during the same period. They chronicle the development of *audile technique*, a set of practices of listening that were articulated to science, reason, and instrumentality and that encouraged the coding and rationalization of what was heard. By

articulation, I mean the process by which different phenomena with no necessary relation to one another (such as hearing and reason) are connected in meaning and/or practice.⁵⁶ For a time, hearing surpassed vision as a tool of examination, conception, and understanding in selected regions of medicine and telecommunications. Chapter 2 provides an introduction to the idea of audile technique and explores how, in the first decades of the nineteenth century, doctors moved away from listening to their patients' speech and began listening more closely to patients' bodies to distinguish signs of health and illness. As it became a symbol of the medical profession, the stethoscope signaled both virtuosic and highly technical listening skills. Chapter 3 explores how American telegraph operators from the 1840s to the 1880s and early users of sound-reproduction technologies from the 1880s to the 1920s developed other forms of audile technique. Telegraphers started listening to their machines instead of reading their printouts. In a cacophonous room, they would focus on the noise of their machine alone and take down telegraphic messages at ever-increasing speeds. Listening skill was a mark of professional distinction in sound telegraphy. Physicians' use of stethoscopes and sound telegraphers' virtuosic message taking prefaced a much wider dissemination of audile technique with the telephone, phonograph, and radio. Even today, when listeners in a music library treat the surface noise of an LP record or the hiss of a tape as "exterior" to the music on the recording, they use some of the same techniques of listening that physicians and telegraphers developed over 150 years ago.

A new practical orientation toward acoustic space developed alongside audile technique: listening became more directional and directed, more oriented toward constructs of private space and private property. The construct of acoustic space as private space in turn made it possible for sound to become a commodity. Audile technique did not occur in the collective, communal space of oral discourse and tradition (if such a space ever existed); it happened in a highly segmented, isolated, individuated acoustic space. Listening technologies that promoted the separation of hearing from the other senses and promoted these traits were especially useful. Stethoscopes and headphones allowed for the isolation of listeners in a "world of sounds" where they could focus on the various characteristics of the sounds to which they attended. Thus, as early as 1820, R. T. H. Laennec, the inventor and first popularizer of the stethoscope, could characterize listening to a patient's body without a stethoscope as *immediate*, by which he meant to connote "lacking in the proper mediation." While other techniques of listening likely developed in other contexts, chapters 2 and

3 offer a genealogy of those techniques that were central for constructing sound reproduction as we know it today.

Chapter 4 moves from the subjective to the industrial: it shows how the technologies that came to be organized as the sound media emerged from a small, industrializing field of invention that was in continuous flux from the 1870s through the 1920s. The new sound media were part of an emergent field of mass communication and mass culture that was itself organized by and oriented toward an American middle class shifting from Victorian ideals to consumerism as a way of life. Moreover, the shape of the sound media was not guaranteed at the outset. There is no necessary connection between the technology of radio and that of broadcasting; nor is there an essential connection between the technology of telephony and that of point-to-point communication. At prior moments, the telephone was a broadcast medium, and radio was a point-to-point medium. Social forms did not necessarily follow logically from technologies: those connections had to be made. Technologies had to be articulated to institutions and practices to become media. The sound media thus emerged in the tumultuous context of turn-of-the-century capitalism and colonialism.

Chapter 5 historicizes “acousmatic” understandings of sound-reproduction technologies—the idea that they separate a sound from its “source”—through examining the idea of a reproduced sound’s “fidelity” to its source. Acousmatic understandings of sound reproduction (which conceptualized it as splitting copies of sounds from their ontologically separate sources) depended on three prior conditions: (1) the emergence of audile technique as a way of abstracting some reproduced sounds (such as voices or music) as worthy of attention or “interior,” and others (such as static or surface noise) as “exterior” and therefore to be treated as if they did not exist; (2) the organization of sound-reproduction technologies into whole social and technical networks; and (3) the representation of these techniques and networks as purely natural, instrumental, or transparent conduits for sound.

The idea that sound-reproduction technologies separated sounds from their sources turns out to have been an elaborate commercial and cultural project. Early auditors of sound-reproduction technologies did not always assume that reproduced sound reflected an “original” at the other end. In response, manufacturers and marketers of sound-reproduction technologies felt that they had to convince audiences that the new sound media belonged to the same class of communication as face-to-face speech. While other rhetorical strategies may have been possible, this rhetoric of

equivalence allowed advertisers to render sound-reproduction technologies in familiar terms. Through an examination of the idea of sound fidelity before it denoted a quality that can be physically measured (covering the period 1878–1930), chapter 5 argues that early skeptical listeners essentially had it right: sound-reproduction technologies are inseparable from the “sources” of reproduced sound. To put it another way, the social organization of sound-reproduction technology conditioned the possibility for *both* “original” and “copy” sounds. Performers had to develop whole new performance techniques in order to produce “originals” suitable for reproduction. Even the very grounds on which the ability of sound-reproduction technologies “faithfully” to reproduce sound could be tested in laboratories had to be established. The ever-shifting figure of sound fidelity crystallized a whole set of problems around the experience of reproducibility, the aesthetics of technologically reproduced sound, and the relations between original and copy. Considering sound-reproduction technologies as articulated to particular techniques and as media forces us to trouble the supposed objectivity of acousmatic descriptions; it shows them to be historically motivated.

Chapter 6 offers a history of the audible past itself. It considers the conditions under which recordings came to be understood as historical documents, yielding insight into the past. Although early recordings were far from permanent records, early images of and overtures to sound recording’s permanence—and the newfound ability to hear “the voices of the dead”—promoted and gradually propelled technological and institutional innovation. New, innovative recording equipment and media were developed with the specific aim of producing longer-lasting recordings. In this respect, sound recording followed innovations in other major nineteenth-century industries like canning and embalming. Institutions grew that were dedicated to the collection and preservation of sound recordings. Chapter 6 argues that through the historical process of making sound recording more “permanent”—which began as nothing more than a Victorian fantasy about a machine—the historical process was itself altered. As beliefs surrounding death, the preservation of the dead body, transcendence, and temporality shaped or explained sound reproduction, sound reproduction itself became a distinctive way of relating to, understanding, and experiencing death, history, and culture.

Developmental ideas of history and culture were bound up with the political currents of American society at the turn of the twentieth century.

After decades of pursuing genocidal policies toward Native Americans, the U.S. government and other agencies began in the 1890s to employ anthropologists, who would use sound recording to “capture and store” the music and language of their native subjects. Embedded in this anthropological project were loaded conceptions of American culture as embodying a universal tendency toward “progress” that would simply engulf Native American life ways along the way. As Johannes Fabian has argued, the idea of modernity and its doctrine of progress was often taken to imply the historical superiority of “modern” civilization (generally urban, cosmopolitan, largely white, middle-class culture in the United States and Western Europe) over other cultures by casting those different (yet actually contemporaneous) cultures as if they existed in the collective past of the moderns. The military and economic domination of other cultures by the United States and Western Europe—and the larger projects of racism and colonialism—became explainable in the late nineteenth century as the product of a difference between that which is modern and that which is not (yet) modern. Relations of space become relations of time.⁵⁷ The drive to build and fill phonographic archives with the sounds of “dying” nations and cultures, the desire to make sound recordings permanent, was inextricably linked to early anthropologists’ ambivalent relations to history and their subjects. Phonography’s much-touted power to capture the voices of the dead was thus metonymically connected to the drive to dehistoricize and preserve cultures that the U.S. government had actively sought to destroy only a generation earlier. Permanence in sound recording was much more than a mechanical fact; it was a thoroughly cultural and political program. To a great degree, inventing reproducibility was about reconstructing sound and hearing and developing technologies to fit and promote these new constructs. The idea of sound recording’s permanence is a striking example of the movement from wish to practice to technological form.

A note on my approach concludes this introduction. Given the scope of my task, I offer no pretense to finality or totality in the account that I offer. *The Audible Past* is a deliberately speculative history. My intent is not to establish once and for all a small set of historical facts, although clearly facts are important to my history. Rather, this book uses history as a kind of philosophical laboratory—to learn to ask new questions about sound, technology, and culture. If all accounts of human action carry with them some concept of human nature, then we would do well to reflect on the choices that

we make in describing human nature. *The Audible Past* offers a speculative foray into moments when the many natures of sounding and hearing were objects of practice and reflection. It is not a complete statement on human nature itself, nor is my primary goal the recovery of lived experience, although certainly people's own accounts of their experiences can provide insight into the history of sound.

Like any intellectual product, this book bears the mark of its author's biases. My own distaste for the cult of Edison in phonograph historiography has led me to emphasize Berliner and Bell (who are much less fully treated in the critical historiography). The greater depth of the film and radio historiography has led me to place greater emphasis on the telephone and phonograph. In foregrounding the history of sound, I deemphasize many of the metanarratives of cultural and political history. It would be equally possible to orient a history of sound around points of change or transformation in the history of speech, music, or even industrial and other forms of environmental noise.⁵⁸ But the history of sound reproduction provides a uniquely powerful entry into the history of sound precisely because it is a history of attempts to manipulate, transform, and shape sound.

My emphasis on the very early moments of technologies and practices at times leads me to concentrate on a relatively small, elite (white, male, European or American, middle-class, able-bodied, etc.) group of people. My archival material, perhaps limited by some measures of historiography, has a distinctly American and East Coast bias. In the early years of sound-reproduction technologies, their use was heavily scattered and atomized. Each technology took decades to "diffuse" fully throughout American society and elsewhere. The emphasis on sound itself also risks a certain level of audism (a term used by scholars of deaf culture; we might best think of it as an ethnocentrism of those who hear). But these are risks worth taking.

The Audible Past focuses on hearing elites because they provide a wealth of documentation about the meaning of sound and listening—qua sound and listening—on which to build a study. As a result, I have not been very concerned with recovering the experiences of my historical subjects. Alexander Graham Bell does not need *The Audible Past* to save him from historical oblivion—and one does not need to identify with elites in order to study them. But, more important, the history of sound must move beyond recovering experience to interrogating the conditions under which that experience became possible in the first place. Experiences are themselves variables shaped by the contexts through which they then help their subjects navigate.⁵⁹

Of course the question of experience still lingers. While acknowledging the plurality of possible audible pasts, this book outlines some common bases for modern sound culture in the West—especially around practices of sound reproduction. It is doubtful that they are truly universals, but they are sufficiently general to be worth considering. There are certainly other dominant, emergent, or subjugated constructs of sound, listening, and hearing beyond the ones considered in these pages. Histories of sound could contribute to a much wider range of themes in cultural and political history than I cover in this book. As always, there are other histories to be written. We will have to write them in order to know if they fundamentally challenge my conclusions here.

This is not to succumb to the localism, cumulativism, and neopositivism that has ravaged much contemporary cultural historiography. Events or phenomena merely need to exist to carry some intellectual significance; they do not need to pass a test of universality. Sound history, however partial, must continually move between the immediate and the general, the concrete and the abstract. There is a burden of sound history, just as there is a burden of history, to borrow a phrase from Hayden White. To offer a compelling account of humanity, sound history must remain “sensitive to the more general world of thought *and* action from which it proceeds and to which it returns.”⁶⁰

Notes

Hello!

- 1 In both the Bell and the Edison cases, the inventors had a partially functional device before the moment of their “famous first.”
- 2 Oliver Read and Walter L. Welch, *From Tin Foil to Stereo: Evolution of the Phonograph* (New York: Herbert W. Sams, 1976), 4; Michael Chanan, *Repeated Takes: A Short History of Recording and Its Effects on Music* (New York: Verso, 1995), 2.
- 3 Marshall Berman, *All That Is Solid Melts into Air: The Experience of Modernity* (New York: Penguin, 1992).
- 4 Alan Burdick, “Now Hear This: Listening Back on a Century of Sound,” *Harper’s Magazine* 303, no. 1804 (July 2001): 75.
- 5 For the sake of readability, I have largely kept with the standard practice of using light and sight metaphors for knowledge. Replacing all these with sonic metaphors would be largely a formalist exercise and of dubious value in helping readers understand my argument.
- 6 For a full discussion of the status of vision in modern thought and the idea that vision is central to the categories of modernity, see Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley and Los Angeles: University of California Press, 1993); and David Michael Levin, ed., *Modernity and the Hegemony of Vision* (Berkeley and Los Angeles: University of California Press, 1993). See also Marshall McLuhan, *The Gutenberg Galaxy: The Making of Typographic Man* (Toronto: University of Toronto Press, 1962); Michel Foucault, *The Birth of the Clinic: An Archaeology*

of *Medical Perception*, trans. A. M. Sheridan Smith (New York: Pantheon, 1973); and Walter Ong, *Orality and Literacy: The Technologization of the Word* (New York: Routledge, 1982). Ong's work and the phenomenology of listening are discussed below.

- 7 Although one can hope that this, too, is changing. In addition to some of the scholars of sound cited elsewhere in this introduction, see, e.g., Laura Marks, *The Skin of the Film: The Senses in Intercultural Cinema* (Durham, N.C.: Duke University Press, 1999); David Howes, *The Varieties of Sensory Experience: A Sourcebook in the Anthropology of the Senses* (Toronto: University of Toronto Press, 1991); and Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination* (Cambridge, Mass.: Harvard University Press, 1986), and *Time, Desire, and Horror: Toward a History of the Senses*, trans. Jean Birrell (Cambridge: Blackwell, 1995).
- 8 In addition to the works discussed below, see Kaja Silverman, *The Acoustic Mirror: The Female Voice in Psychoanalysis and Cinema* (Bloomington: Indiana University Press, 1988); Amy Lawrence, *Echo and Narcissus: Women's Voice in Classical Hollywood Cinema* (Berkeley and Los Angeles: University of California Press, 1991); and Claudia Gorbman, *Unheard Melodies: Narrative Film Music* (Bloomington: Indiana University Press, 1987). Anahid Kassabian, *Hearing Film: Tracking Identifications in Contemporary Hollywood Film Music* (New York: Routledge, 2001), provides an interesting alternative approach.
- 9 See C. Wright Mills, *The Sociological Imagination* (New York: Oxford University Press, 1959), 50–75; Peter Novick, *That Noble Dream: The "Objectivity Question" and the American Historical Profession* (New York: Cambridge University Press, 1988); Georg C. Iggers, *Historiography in the Twentieth Century: From Scientific Objectivity to the Postmodern Challenge* (Hanover, N.H.: Wesleyan University Press, 1997); and Bonnie Smith, *The Gender of History* (Cambridge, Mass.: Harvard University Press, 1998).
- 10 See, e.g., Hadley Cantril and Gordon Allport, *The Psychology of Radio* (New York: Harper and Bros., 1935); Rudolf Arnheim, *Radio*, trans. Margaret Ludwig and Herbert Read (London: Faber and Faber, 1936); and Hanns Eisler and Theodor Adorno, *Composing for the Films* (New York: Oxford University Press, 1947). For a contemporary example, see David Michael Levin, *The Listening Self: Personal Growth, Social Change, and the Closure of Metaphysics* (New York: Routledge, 1989).
- 11 A significant share of the English-language literature appears in my notes and bibliography.
- 12 Karl Marx, *Economic and Philosophic Manuscripts of 1844*, trans. Martin Milligan (New York: International, 1968), 140–41.
- 13 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, Mass.: MIT Press, 1990), 16.

- 14 These questions recur constantly in the classic texts, such as Max Horkheimer and Theodor Adorno, *Dialectic of Enlightenment* (New York: Continuum, 1944); Walter Benjamin, "The Storyteller," and "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, trans. Hannah Arendt (New York: Schocken, 1968); and Theodor Adorno, "The Curves of the Needle," trans. Thomas Levin, *October*, no. 55 (winter 1990): 49–56.
- 15 Stephen Kern, *The Culture of Time and Space, 1800–1918* (Cambridge, Mass.: Harvard University Press, 1983), passim; Donald M. Lowe, *History of Bourgeois Perception* (Chicago: University of Chicago Press, 1982), 9, 111–17; and Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 265–83, 297–307.
- 16 Claude S. Fischer, *America Calling: A Social History of the Telephone* (Berkeley and Los Angeles: University of California Press, 1992), 5; Jacques Attali, *Noise: The Political Economy of Music* (Minneapolis: University of Minnesota Press, 1985), 87; John Durham Peters, *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 160; Susan Douglas, *Listening In: Radio and the American Imagination from Amos 'n Andy and Edward R. Murrow to Wolfman Jack and Howard Stern* (New York: Times Books, 1999), 9.
- 17 D. L. LeMahieu, *A Culture for Democracy: Mass Communication and the Cultivated Mind in Britain between the Wars* (Oxford: Clarendon, 1988), 81.
- 18 Douglas Kahn, "Histories of Sound Once Removed," in *Wireless Imagination: Sound, Radio, and the Avant-Garde*, ed. Douglas Kahn and Gregory Whitehead (Cambridge, Mass.: MIT Press, 1992), 2.
- 19 Technological determinism is, more or less, the premise that technology determines the conduct and form of cultural life. For criticisms of technological determinism from perspectives sympathetic to my own, see Jennifer Daryl Slack, *Communication Technologies and Society: Conceptions of Causality and the Politics of Technological Intervention* (Norwood, N.J.: Ablex, 1984); Raymond Williams, *Television: Technology and Cultural Form* (Middletown, Conn.: Wesleyan University Press, 1992); and Carol Stabile, *Feminism and the Technological Fix* (New York: St. Martin's, 1994). From a different angle, Martin Heidegger points out that there are actually four kinds of causality when we consider technology: material, form, use, and that which shapes the material into a particular form for a particular use (see *The Question Concerning Technology and Other Essays*, trans. William Lovitt [New York: Harper Torchbooks, 1977], 6–12 and throughout).
- 20 Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, Mass.: Harvard University Press, 1993), 3–8; Jody Berland, "Cultural Technologies and the Production of Space," in *Cultural Studies*, ed. Lawrence Grossberg, Cary Nelson, and Paula Treichler (New York: Rout-

- ledge, 1992); J. Macgregor Wise, *Exploring Technology and Social Space* (Thousand Oaks, Calif.: Sage, 1997), xvi, 54–55, 68; Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 4, 90, 503–5.
- 21 Jonathan Sterne, “Sound Out of Time/Modernity’s Echo,” in *Turning the Century*, ed. Carol Stable (Boulder, Colo.: Westview, 2000), 9–30.
- 22 This list is drawn from Berman, *All That Is Solid Melts into Air*, 5–12, 16; Matei Calinescu, *Five Faces of Modernity: Modernity, Avant-Garde, Decadence, Kitsch, Postmodernism* (Durham, N.C.: Duke University Press, 1987), 42; Zygmunt Bauman, *Modernity and Ambivalence* (Cambridge: Polity, 1991), 5; and Henri Lefebvre, *Introduction to Modernity*, trans. John Moore (New York: Verso, 1995), 168–238.
- 23 Johannes Fabian, *Time and the Other: How Anthropology Makes Its Object* (New York: Columbia University Press, 1983).
- 24 *Oxford English Dictionary*, s.v. “aural,” “auricular.”
- 25 Michael Taussig, *Mimesis and Alterity: A Particular History of the Senses* (New York: Routledge, 1993), xvi–xviii. See also Ian Hacking, *The Social Construction of What?* (Cambridge, Mass.: Harvard University Press, 1999).
- 26 Johannes Müller, *Elements of Physiology*, trans. William Baly, arranged from the 2d London ed. by John Bell (Philadelphia: Lea and Blanchard, 1843), 714.
- 27 Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (New York: Vintage, 1977), 136. Foucault has a similar discussion in *The History of Sexuality*, vol. 1, *An Introduction*, trans. Robert Hurley (New York: Vintage, 1978), 139.
- 28 Jean-Marc Gaspard Itard, *The Wild Boy of Aveyron*, trans. George Humphrey and Muriel Humphrey (New York: Meredith, 1962), 26–27; Douglas Keith Candland, *Feral Children and Clever Animals: Reflections on Human Nature* (New York: Oxford University Press, 1993).
- 29 Karl Marx, *Capital*, vol. 1, *The Process of Capitalist Production* (New York: International, 1967), 168.
- 30 Marcel Mauss, “Body Techniques,” in *Sociology and Psychology: Essays*, trans. Ben Brewster (Boston: Routledge and Kegan Paul, 1979), 104, 121.
- 31 Gilles Deleuze, *Foucault*, trans. Sean Hand (Minneapolis: University of Minnesota Press, 1988), 109.
- 32 Alain Corbin, *Village Bells: Sound and Meaning in the Nineteenth-Century French Countryside* (New York: Columbia University Press, 1999), 254–83.
- 33 “Man himself must first of all have become *calculable, regular, necessary*, even in his own image of himself, if he is to be able to stand security for *his own future*” (Friedrich Nietzsche, *On the Genealogy of Morals and Ecce Homo*, trans. Walter Kauffman [New York: Vintage, 1967], 58). Nietzsche makes this

- comment in a discussion of promises and contracts. For him, a sense of the human calculability is inextricably tied to the contemplation of an interrelated past, present, and future. For our purposes, it is enough to note that Nietzsche's self-calculating subject who can make a promise is a short step from Zygmunt Bauman's subject who contemplates the relation between continuity and change (see Bauman, *Modernity and Ambivalence*).
- 34 Michel Chion, *Audio-Vision: Sound on Screen*, trans. Claudia Gorbman (New York: Columbia University Press, 1994), 94.
- 35 Maurice Merleau-Ponty, "The Primacy of Perception and Its Philosophical Consequences," trans. James M. Edie, in *The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History, and Politics*, ed. James M. Edie (Evanston, Ill.: Northwestern University Press, 1964), 20. For a discussion of the temporal and ephemeral character of perception, see *ibid.*, 35.
- 36 The following summarizes an argument that I develop more fully in an essay in progress entitled "The Theology of Sound."
- 37 This list is most clearly elaborated in Walter Ong, *The Presence of the Word: Some Prolegomena for Cultural and Religious History* (Minneapolis: University of Minnesota Press, 1981). See also Ong, *Orality and Literacy*, 30–72; Attali, *Noise*; Lowe, *History of Bourgeois Perception*; Marshall McLuhan and Edmund Carpenter, "Acoustic Space," in *Explorations in Communication: An Anthology*, ed. Edmund Carpenter and Marshall McLuhan (Boston: Beacon, 1960); Rick Altman, "The Material Heterogeneity of Recorded Sound," in *Sound Theory/Sound Practice*, ed. Rick Altman (New York: Routledge, 1992); John Shepherd, *Music as a Social Text* (Cambridge: Polity, 1991); Barry Truax, *Acoustic Communication* (Norwood, N.J.: Ablex, 1984); Eric Havelock, *Preface to Plato* (Cambridge, Mass.: Harvard University Press, 1963), and *The Muse Learns to Write: Reflections on Orality and Literacy from Antiquity to the Present* (New Haven, Conn.: Yale University Press, 1986), esp. 1–29; and Bruce R. Smith, *The Acoustic Culture of Early-Modern England: Attending to the O-Factor* (Chicago: University of Chicago Press, 1999), 3–29.
- 38 Caryl Flinn, *Strains of Utopia: Gender, Nostalgia, and Hollywood Film Music* (Princeton, N.J.: Princeton University Press, 1992), 7. Although it is still quite influential, this Romantic notion of music has been widely criticized in the past few decades. See, e.g., Janet Wolff, "The Ideology of Autonomous Art," in *Music and Society: The Politics of Composition, Performance, and Reception*, ed. Richard Leppert and Susan McClary (New York: Cambridge University Press, 1987).
- 39 Susan Handelman, *Slayers of Moses: The Emergence of Rabbinic Interpretation in Modern Literary Theory* (Albany: State University of New York Press, 1982),

- 15–21. Handelman's book offers an extended discussion of the spirit /letter distinction as it is manifested in Western metaphysics and hermeneutics. See also Peters, *Speaking into the Air*, 36–51, 66–74; Jacques Derrida, *Of Grammatology*, trans. Gayatri Chakravorty Spivak (Baltimore: Johns Hopkins University Press, 1976), 323 n. 3, *Dissemination*, trans. Barbara Johnson (Chicago: University of Chicago Press, 1981), 61–171, and *The Postcard: From Socrates to Freud and Beyond*, trans. Alan Bass (Chicago: University of Chicago Press, 1987); Plato, "Phaedrus," in *Collected Dialogues*, ed. Edith Hamilton and Huntington Cairns (Princeton, N.J.: Princeton University Press, 1961), 475–525; and Havelock, *Preface to Plato*.
- 40 Ong, *Presence of the Word*, 6. *Pre-Christian* is an important modifier here since it treats rabbinic thought as an incomplete prelude to Catholic Christianity.
- 41 *Ibid.*, 6, 11, 12, 288–89, 324. In *Orality and Literacy* (perhaps at the request of his editors), Ong largely removed the religious content of the distinction, treating it instead as a purely secular academic discovery (see pp. 1, 6).
- 42 Ong, *Orality and Literacy*, 75, 77, 123, 129, 166–71.
- 43 Jacques Derrida, *Speech and Phenomena and Other Essays on Husserl's Theory of Signs*, trans. David B. Allison (Evanston, Ill.: Northwestern University Press, 1973), 77.
- 44 Derrida, *Of Grammatology*, 323 n. 3. For a reading of Derrida's critique of Christian metaphysics as an instance of a "heretical" rabbinic hermeneutics, see also Handelman, *Slayers of Moses*.
- 45 Rick Altman, "Four and a Half Film Fallacies," in Altman, ed., *Sound Theory/Sound Practice*, 37, 39.
- 46 Ong, *Presence of the Word*, 111 (quotation), and *Orality and Literacy*, 32 (on sound existing only as it goes out of existence).
- 47 James Lastra (*Sound Technology and American Cinema: Perception, Representation, Modernity* [New York: Columbia University Press, 2000], 133) criticizes nominalism on the basis that it treats technological reproduction as a false mediation of a real event. He is actually criticizing bad nominalism since a fully developed nominalism would treat *all* events in their uniqueness. See, e.g., Gilles Deleuze, *Spinoza: Practical Philosophy* (San Francisco: City Lights, 1988), 122–30.
- 48 Don Ihde, *Listening and Voice: A Phenomenology of Sound* (Athens: Ohio University Press, 1976), 58. Steven Feld has also roundly criticized the notion of orality as a universal construct of sound culture. See his "Orality and Consciousness," in *The Oral and the Literate in Music*, ed. Yoshiko Tokumaru and Osamu Yamaguti (Tokyo: Academia Music, 1986).
- 49 Chanan, *Repeated Takes*, 12 (on Schaeffer); John Corbett, *Extended Play*:

Sounding Off from John Cage to Dr. Funkenstein (Durham, N.C.: Duke University Press, 1994), 37. Andrew Goodwin has criticized Corbett's idea of visual lack in *Dancing in the Distraction Factory: Music Television and Popular Culture* (Minneapolis: University of Minnesota Press, 1992), 49.

Musique concrète uses found recorded sounds to create an original piece through montage. It is a partial forerunner of sampling.

- 50 Truax, *Acoustic Communication*, 120. See also R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, N.Y.: Destiny, 1994), 90–91.
- 51 Stuart Hall, “The Narrative Construction of Reality: An Interview with Stuart Hall,” *Southern Review* 17 (March 1984): 8.
- 52 In addition to the discussion of the transcendental phenomenology of listening presented above, see Derrida, *Speech and Phenomena*, 70–87; Briankle Chang, *Deconstructing Communication* (Minneapolis: University of Minnesota Press, 1996), 187–220; and John Durham Peters, “The Gaps of Which Communication Is Made,” *Critical Studies in Mass Communication* 11, no. 2 (1994): 117–40, and *Speaking into the Air*, 33–108.
- 53 On genealogy as demystification, see Michel Foucault, “Nietzsche, Genealogy, History,” in *Language, Counter-Memory, Practice: Selected Essays and Interviews*, ed. Donald Bouchard, trans. Donald Bouchard and Sherry Simon (Ithaca, N.Y.: Cornell University Press, 1977), 139–40; and Nietzsche, *On The Genealogy of Morals and Ecce Homo*, 25–26.
- 54 Charles Burnett, “Sound and Its Perception in the Middle Ages,” in *The Second Sense: Studies in Hearing and Musical Judgement from Antiquity to the Seventeenth Century*, ed. Charles Burnett, Michael Fend, and Penelope Gouk (London: Warburg Institute, 1991), 48, 49; Penelope Gouk, “Some English Theories of Hearing in the Seventeenth Century: Before and After Descartes,” in *ibid.*, 96.
- 55 On this point, see also Douglas Kahn, *Noise, Water, Meat: A History of Sound in the Arts* (Cambridge, Mass.: MIT Press, 1999), 9; and Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, Calif.: Stanford University Press, 1999), 24–25. Felicia Frank's *The Mechanical Song: Women, Voice, and the Artificial in Nineteenth-Century French Narrative* (Stanford, Calif.: Stanford University Press, 1995) offers a full study of the female voice in nineteenth-century French literature, arguing that new attitudes connecting voice and artifice became prevalent during that period.
- 56 Here I am using *articulation* to convey a sense of cultural connection as suggested by Stuart Hall, “On Postmodernism and Articulation,” *Journal of Communication Inquiry* 10, no. 2 (1986): 45–60; and Lawrence Grossberg, *We Gotta Get Out of This Place: Popular Conservatism and Postmodern Culture*

(New York: Routledge, 1992), 52–61. I discuss articulation further in chapter 4.

- 57 Fabian, *Time and the Other*, esp. 37–69. See also Robert F. Berkhofer Jr., *The White Man's Indian: Images from Columbus to the Present* (New York: Vintage, 1978); Francis Paul Prucha, *The Great Father: The United States Government and the American Indians*, abridged ed. (Lincoln: University of Nebraska Press, 1986); Calinescu, *Five Faces of Modernity*, 26–32; Edward Said, *Culture and Imperialism* (New York: Vintage, 1993), 15–19; and Rita Felski, *The Gender of Modernity* (Cambridge, Mass.: Harvard University Press, 1995), 13.
- 58 Corbin's *Village Bells* offers an interesting history of structured environmental sounds—church bells. He chronicles struggles over the use and meaning of the bells and shows that those struggles are connected with anxieties over modernity, subjectivity, and the emerging French state.
- 59 See, e.g., Joan Scott, *Gender and the Politics of History* (New York: Columbia University Press, 1988), 5; and Pierre Bourdieu and Loïc J. D. Wacquant, *An Invitation to Reflexive Sociology* (Chicago: University of Chicago Press, 1992), 132–35.
- 60 Hayden White, “The Burden of History,” in *Tropics of Discourse: Essays in Cultural Criticism* (Baltimore: Johns Hopkins University Press, 1978), 50.

I. Machines to Hear for Them

- 1 Although, throughout this book, I invoke the names of famous individuals, I do not want to give the impression that this is a “great man” history. On the contrary, following Pierre Bourdieu, I consider Bell, Blake, Berliner, and all the others as “epistemic individuals”: their actions are instances and particular locations of social activity, rather than being purely matters of personal biography. The goal is to use the artifacts that they left behind to establish a history of activities and ideas, not to establish the merits or characteristics of particular people. See Pierre Bourdieu, *Homo Academicus*, trans. Peter Collier (Stanford, Calif.: Stanford University Press, 1988).
- 2 *Oxford English Dictionary*, s.v. “tympanic,” “tympanum.” *Tympanum* has a considerably longer history, but the adjectival form is significant here because it indicates that the term has come to have some mobility. *Tympanum* also refers to an architectural form, the recessed part of a pediment, often adorned with sculpture.
- 3 The two predominant techniques for early film sound—sound on disk and sound on film—are also tympanic. Sound on disk was essentially based on a modified version of the gramophone; sound on film used light pulses in a manner analogous to the telephone's use of magnetism. For a discussion of

- the working of these technologies, see, e.g., Stephen Neale, *Cinema and Technology: Image, Sound, Colour* (Bloomington: Indiana University Press, 1985), 71–76; and James Lastra, *Sound Technology and American Cinema: Perception, Representation, Modernity* (New York: Columbia University Press, 2000), 92–122.
- 4 Emile Berliner, “The Gramophone: Etching the Human Voice” (paper read before the Franklin Institute, 16 May 1888, EB [unsorted papers]), 4; Edward Wheeler Scripture, *The Elements of Experimental Phonetics* (New York: Scribner’s, 1902), 17; Thomas L. Hankins and Robert J. Silverman, *Instruments and the Imagination* (Princeton, N.J.: Princeton University Press, 1995), 135.
 - 5 Melville Bell, *A New Elucidation of the Principles of Speech and Elocution* (1849), quoted in Robert V. Bruce, *Bell: Alexander Graham Bell and the Conquest of Solitude* (Boston: Little, Brown, 1973), 19.
 - 6 John Durham Peters, “Helmholtz, Edison, and Sound History,” in *Memory Bytes: History, Technology, and Digital Culture*, ed. Lauren Rabinovitz (forthcoming); a revised English-language version of John Durham Peters, “Helmholtz und Edison: Zur Endlichkeit der Stimme,” *Zwischen Rauschen und Offenbarung: Zur kulturellen und Medien-geschichte der Stimme*, ed. Friedrich A. Kittler, Thomas Macho, and Sigrid Weigel, trans. Antje Pfannkuchen (Berlin: Akademie, in press).
 - 7 George Bernard Shaw, “Preface to *Pygmalion*,” in *Bernard Shaw: Collected Plays with Their Prefaces* (New York: Dodd, Mead, 1972), 4:664. See also Shaw, *Pygmalion*, in *ibid.*
 - 8 Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, Calif.: Stanford University Press, 1999), 27.
 - 9 Alexander Graham Bell, *The Telephone: A Lecture Entitled Researches in Electric Telephony by Professor Alexander Graham Bell, Delivered before the Society of Telegraph Engineers, October 31st, 1877* (New York: Society of Telegraph Engineers, 1878), 20.
 - 10 Alexander Graham Bell quoted in Charles Snyder, “Clarence John Blake and Alexander Graham Bell: Otology and the Telephone,” *Annals of Otology, Rhinology, and Laryngology* 83, no. 4, pt. 2, suppl. 13 (July–August 1974): 30.
 - 11 Scripture, *Elements of Experimental Phonetics*, 27.
 - 12 Snyder, “Clarence John Blake and Alexander Graham Bell,” 11.
 - 13 See Alexander Graham Bell, *Memoir upon the Formation of a Deaf Variety of the Human Race* (New Haven, Conn.: National Academy of Sciences, 1883).
 - 14 “We recall that the Deaf were considered more radically deprived of life than the blind, for blindly still we dwell in language” (Avital Ronell, *The*

Telephone Book: Technology—Schizophrenia—Electric Speech [Lincoln: University of Nebraska Press, 1989], 324).

- 15 Douglas C. Baynton, "'Savages and Deaf-Mutes': Evolutionary Theory and the Campaign against Sign Language in the Nineteenth Century," in *Deaf History Unveiled: Interpretations from the New Scholarship*, ed. John Vickery Van Cleve (Washington, D.C.: Gallaudet University Press, 1993), 92–112. See also Richard Winefield, *Never the Twain Shall Meet: Bell, Gallaudet, and the Communications Debate* (Washington, D.C.: Gallaudet University Press, 1987); and Douglas C. Baynton, *Forbidden Signs: American Culture and the Campaign against Sign Language* (Chicago: University of Chicago Press, 1996).
- 16 Baynton, "Savages and Deaf-Mutes," 108, 100. See also Jack R. Gannon, *Deaf Heritage: A Narrative History of Deaf America* (Silver Spring, Md.: National Association of the Deaf, 1981), esp. 75–79; and Bruce, *Bell*, 409–12.
- 17 Lennard Jeffries, *Enforcing Normalcy: Disability, Deafness, and the Body* (New York: Verso, 1995), 32, 81, and passim. Jeffries provides a detailed critique of the category *disability*, especially as it is applied to deafness.
- 18 Kittler, *Gramophone, Film, Typewriter*, 22.
- 19 Bruce, *Bell*, 121; Bell, *The Telephone*, 22. See also Michael Gorman, *Simulating Science: Heuristics, Mental Models, and Technoscientific Thinking* (Bloomington: Indiana University Press, 1992).
- 20 S. Morland, *Tuba Stentoro-Phonica: An Instrument of Excellent Use, as Well at Sea, as at Land; Invented and Variously Experimented in the Year 1670 and Humbly Presented to the Kings Most Excellent Majesty Charles II in the Year 1671* (London: Printed by W. Godbid and Sold by M. Pitt, 1672), 6–7.
- 21 Kittler, *Gramophone, Film, Typewriter*, 24–25; Hankins and Silverman, *Instruments and the Imagination*, 130–32.
- 22 Kittler, *Gramophone, Film, Typewriter*, 47 (see also 71).
- 23 "The Invention of the Euphon, and Other Acoustic Discoveries of C. F. Chladni . . .," *Philosophical Magazine* 2 (October 1798): 391; "Chladni's Experiments on the Resonant Figures on Glass; Philosophical Transactions; Berthoud on Time-Pieces," *Journal of Natural Philosophy, Chemistry, and the Arts* 3 (April 1799–March 1800): 185; T. H. Huxley, *On the Physical Basis of Life* (New Haven, Conn.: Charles C. Chatfield, 1870), 112–20; Hankins and Silverman, *Instruments and the Imagination*, 130–32.
- 24 Adam Politzer, *History of Otology*, trans. Stanley Milstein, Collice Portnoff, and Antje Coleman (Phoenix: Columella, 1981), 250.
- 25 Thomas Young, *A Course of Lectures on Natural Philosophy and the Mechanical Arts* (London: J. Johnson, 1807), 1: 369. See also Robert Silverman, "Instrumentation, Representation, and Perception in Modern Science: Imitating

- Human Function in the Nineteenth Century” (Ph.D. diss., University of Washington, 1992), esp. 96–189.
- 26 Hankins and Silverman, *Instruments and the Imagination*, 133.
 - 27 Scott quoted in *ibid.*, 135.
 - 28 Edouard-Léon Scott de Martinville, *Le Problème de la parole s'écrivant elle-même: La France, l'Amérique* (Paris, 1878), cited in Hankins and Silverman, *Instruments and the Imagination*, 137; and in Thomas Y. Levin, “For the Record: Adorno on Music in the Age of Its Technological Reproducibility,” *October*, no. 55 (winter 1990): 36. Levin cites Scott in support of his thesis that, just as early cinema was heralded as a transparent reproduction of images that would supersede national languages, the prehistory of sound recording articulated an “analogous discourse of democratization and univocal, natural signs” (36).
 - 29 Jacques Derrida, *Of Grammatology*, trans. Gayatri Chakravorty Spivak (Baltimore: Johns Hopkins University Press, 1976), 25–26; Briankle Chang, *Deconstructing Communication* (Minneapolis: University of Minnesota Press, 1996), 187–220; Lastra, *Sound Technology and American Cinema*, 73–91.
 - 30 Arnold Pacey’s discussion of “virtuosity values” is apropos here. Pacey argues that scientific and technical research often seeks technological innovation for its own sake, rather than for some specific end toward which it can be put. Thus, even though Berliner would probably have had no idea what to do with phonautograms (it is not known for certain whether he was familiar with Bell’s plans for them), he could herald their existence with the hope that a use would later be found. See Arnold Pacey, *The Culture of Technology* (Cambridge, Mass.: MIT Press, 1983), esp. 78–96.
 - 31 Berliner Gramophone Co., Philadelphia Division, “The Gramophone,” EB, scrapbook 2.
 - 32 Bell, *The Telephone*, 22; Berliner, “The Gramophone,” 17; General Electric Co., “Radio Signals Recorded by the General Electric Visual and Photograph Recorder,” GHC, series 93, box 389; Hankins and Silverman, *Instruments and the Imagination*, 135.
 - 33 Edward Wheeler Scripture, *Researches in Experimental Phonetics: The Study of Speech Curves* (Washington, D.C.: Carnegie Institution of Washington, 1906), 3.
 - 34 *Ibid.*, 4.
 - 35 Derrida, *Of Grammatology*, 17.
 - 36 Theodor Adorno, “The Form of the Phonograph Record,” trans. Thomas Y. Levin, *October*, no. 55 (winter 1990): 59; see also Levin, “For the Record,” 38–41.
 - 37 Digital audio technologies allow for the reversal of that formulation, and it is now possible to subject auditory phenomena to the orderings of images.

- 38 *Oxford English Dictionary*, s.v. “phonograph”; Bruce, *Bell*, 351; William Elterich to Emile Berliner, n.d. (probably late 1890s), EB, scrapbook 2.
- 39 Bruce, *Bell*, 112. Bell and Blake met in 1871.
- 40 *Ibid.*; Alexander Graham Bell, “Early Telephony” (address before the Telephone Society of Washington, Washington, D.C., 3 February 1910, AGB, box 383, speech file “Early Telephony”), “Prehistoric Telephone Days” (n.d., AGB, box 385, speech file “Prehistoric Telephone Days”), and *The Telephone*; Clarence J. Blake, “Sound and the Telephone” (paper read before the British Society of Telegraph Engineers, London, 8 May 1878) (an offprint of this talk can be found at the Library of Congress), and “The Use of the Membrana Tympani as a Phonautograph and Logograph,” *Archives of Ophthalmology and Otology* 5 (1878): 108–113. This last article provides the most complete instructions for the construction of an ear phonautograph.
- 41 Blake, “Sound and the Telephone,” 5–7.
- 42 Snyder, “Clarence John Blake and Alexander Graham Bell,” 13.
- 43 S. Morland, *Tuba Stentoro-Phonica*, 7.
- 44 P. Kennedy, *Ophthalmographia; or, A Treatise of the Eye in Two Parts* (London: Bernard Lintott, 1713), H2.
- 45 William R. Wilde, *Practical Observations on Aural Surgery and the Nature and Treatment of Diseases of the Ear with Illustrations* (Philadelphia: Blanchard and Lea, 1853), 60–61.
- 46 Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley and Los Angeles: University of California Press, 1993); and David Michael Levin, ed., *Modernity and the Hegemony of Vision* (Berkeley and Los Angeles: University of California Press, 1993).
- 47 Anton von Trötsch, *Treatise on the Diseases of the Ear, Including the Anatomy of the Organ*, trans. D. B. St. John Roosa, 2d American ed., from the 4th German ed. (New York: William Wood, 1869), vii (quotation), 25–26. (The first German edition, from which the quoted passage is taken, appeared in 1862.) See also Dennis Pappas, “Anton Friedrich von Trötsch (1829–1890): The Beginning of Otology in Germany,” *Ear, Nose, and Throat Journal* 75, no. 10 (October 1996): 50–51.
- 48 Snyder, “Clarence John Blake and Alexander Graham Bell,” 3–4.
- 49 Joseph Toynbee, *The Diseases of the Ear: Their Nature, Diagnosis, and Treatment* (London: John Churchill, 1860), 1–2 (quotation), 7–9.
- 50 N. Rüdinger, *Rüdinger Atlas of the Osseous Anatomy of the Human Ear, Comprising a Portion of the Atlas of the Human Ear*, translated, with notes and an additional plate, by Clarence Blake (Boston: A. Williams, 1874), 18.
- 51 Snyder, “Clarence John Blake and Alexander Graham Bell,” 5, 12. See also Gustav Brühl and Adam Politzer, *Atlas and Epitome of Otology*, trans. and

- ed. S. MacCuen Smith (Philadelphia: W. B. Saunders, 1903); and Hermann Helmholtz, *The Mechanism of the Ossicles of the Ear and the Membrana Tympani*, trans. Albert H. Buck and Norman Smith (New York: William Wood, 1873). Brühl and Politzer's book is both an anatomical and a diagnostic manual, containing illustrations from Politzer's collection. It is a testimony to the significance of Politzer's collection of models and bones in the development of European otology. Its translation and mass dissemination in the United States are also indicative of the greater degree of institutionalization and professionalization of otology in the United States by the turn of the twentieth century as well as of the professionalization of medicine in general.
- 52 Sylvan Stool, Marlyn Kemper, and Bennett Kemper, "Adam Politzer, Otology, and the Centennial Exhibition of 1876," *Laryngoscope* 85, no. 11, pt. 1 (November 1975): 1898–1904; Neil Weir, "Adam Politzer's Influence on the Development of International Otology," *Journal of Laryngology and Otolology* 110, no. 9 (September 1996): 824, 826, 828.
 - 53 Elisabeth Bennion, *Antique Medical Instruments* (Berkeley and Los Angeles: University of California Press, 1979), 99–101.
 - 54 Georg Békésy and Walter Rosenblinth, "The Early History of Hearing—Observations and Theories," *Journal of the Acoustical Society of America* 20, no. 6 (November 1948): 727–28.
 - 55 Soyara de Chadarevian, "Graphical Method and Discipline: Self-Recording Instruments in Nineteenth-Century Physiology," *Studies in the History and Philosophy of Science* 24, no. 2 (1993): 279. See also Hankins and Silverman, *Instruments and the Imagination*, 113–48.
 - 56 Alexander Munro, *Observations on the Organ of Hearing in Man and Other Animals* (Edinburgh: Adam Neill, 1797); Neil Weir, *Otolaryngology: An Illustrated History* (Boston: Butterworths, 1990), 63.
 - 57 Peter Degrauers, *A Complete Physico-Medical and Chirurgical Treatise on the Human Eye, Second Edition, Corrected and Considerably Enlarged, to Which Is Now Added a Treatise on the Human Ear* (Edinburgh: Printed for the Author, 1788), 267.
 - 58 Charles Bell, *The Nervous System of the Human Body: Embracing the Papers Delivered to the Royal Society on the Subject of Nerves* (Washington, D.C.: Stereotyped by D. Green, for the Register and Library of Medicine and Chirurgical Science, 1833), 21 (see also 20, 21, 333, 37, 51, 71). See also Charles Bell, *Ideas of a New Anatomy of the Brain: A Facsimile of the Privately Printed Edition of 1811* (London: Dawsons of Pall Mall, 1966).
 - 59 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, Mass.: MIT Press, 1990), 89–90.
 - 60 Johannes Müller, *Elements of Physiology*, trans. William Baly, arranged from

the 2d London ed. by John Bell (Philadelphia: Lea and Blanchard, 1843), 587–88 (see also 709).

- 61 Ibid., 710, 712.
- 62 Ibid., 711.
- 63 Crary, *Techniques of the Observer*, 92.
- 64 I appear to be in the good company of another Jonathan: Crary (ibid., 92) notes homologies between Müller's account of vision and theories of photography. In "Helmholtz, Edison, and Sound History," John Peters argues that the telegraph was the inspiration for the physiological instrumentation that in turn begat modern electronic media.
- 65 Müller, *Elements of Physiology*, 744–71.
- 66 Hermann Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, 2d English ed., trans. from the 4th German ed. by Alexander J. Ellis (New York: Dover, 1954), 7.
- 67 Helmholtz, *Sensations of Tone*, 3–4. On Helmholtz's elaboration of Müller's theory, see Stephan Vogel, "Sensation of Tone, Perception of Sound, and Empiricism: Helmholtz's Physiological Acoustics," in *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*, ed. David Cahan (Berkeley and Los Angeles: University of California Press, 1993), 282–83.
- 68 Helmholtz, *Sensations of Tone*, 129 (first quotation), 142 (second quotation), 166 (discussion of Scott and Politzer).
- 69 Robert Walser, *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music* (Hanover, N.H.: Wesleyan University Press, 1993), 41–44. For Helmholtz's definition of *lower partial* and *upper partial*, see *Sensations of Tone*, 23. For a summary of the effects of different kinds of upper partials for timbre, see ibid., 118–19. Helmholtz writes that the entire first part of *On the Sensations of Tone* is essentially an explanation of upper partials (ibid., 4). See also Theodore Gracyk, *Rhythm and Noise: An Aesthetics of Rock* (Durham, N.C.: Duke University Press, 1996), 111–14; and Steve Waksman, *Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience* (Cambridge, Mass.: Harvard University Press, 1999), 137–38.
- 70 Peters, "Helmholtz, Edison, and Sound History" (forthcoming). Although Helmholtz's synthesizer (discussed later in this chapter) is quite distant from the twentieth-century instrument, it foreshadows the latter—creating a sound with a distinctive timbre through the combination of more basic tones. Thaddeus Cahill's telharmonium is, perhaps, a missing link between Helmholtz's synthesizer and the mid-twentieth-century variety. See Reynold Weidenaar, *Magic Music from the Telharmonium* (Metuchen, N.J.: Scarecrow, 1995). See also Hankins and Silverman, *Instruments and the Imagination*, 203.
- 71 Peters, "Helmholtz, Edison, and Sound History" (forthcoming).

- 72 Helmholtz, *Sensations of Tone*, 43 (see also 43–44, 129, 149).
- 73 *Ibid.*, 148.
- 74 Peters, “Helmholtz, Edison, and Sound History” (forthcoming). Peters is quoting Brian Winston, *Media, Technology, and Society: A History: From the Telegraph to the Internet* (New York: Routledge, 1998), 38.
- 75 Berliner, “The Gramophone,” 2.
- 76 For a full account, see Paul Starr, *The Social Transformation of American Medicine* (New York: Basic, 1982), esp. 93–144.
- 77 Snyder, “Clarence John Blake and Alexander Graham Bell,” 4–5.
- 78 See Ruth Richardson, *Death, Dissection, and the Destitute* (New York: Routledge and Kegan Paul, 1987; and Suzanne Shultz, *Body Snatching: The Robbing of Graves for the Education of Physicians* (Jefferson, N.C.: McFarland, 1993). Shultz discusses the incident on pp. 85–89. See also Roger French, “The Anatomical Tradition,” in *Companion Encyclopedia to the History of Medicine*, ed. W. F. Bynum and Roy Porter (London: Routledge, 1993), 81–84, 99–100.
- 79 See Ulrich Beck, *Risk Society: Towards a New Modernity*, trans. Mark Ritter (Newbury Park, Calif.: Sage, 1992).
- 80 See Richardson, *Death, Dissection, and the Destitute*, 207–10; and Shultz, *Body Snatching*, 90–94.
- 81 Richardson, *Death, Dissection, and the Destitute*, 266.
- 82 On the passage of anatomy acts in the United States, see Shultz, *Body Snatching*, 78–94; and Linden F. Edwards, *The History of Human Dissection* (Fort Wayne, Tex.: Fort Wayne and Allen County Public Libraries, 1955), 18–20. On class politics in nineteenth-century America, see, e.g., Alexander Saxton, *The Rise and Fall of the White Republic: Class Politics and Mass Culture in Nineteenth Century America* (New York: Verso, 1990).
- 83 Catherine F. Mackenzie, *Alexander Graham Bell: The Man Who Contracted Space* (Boston: Houghton-Mifflin, 1928), 71. Ronell writes, “This kind of conduct tends to border on illegality, but it turned out that because the ears were a missing pair, they legally assisted Bell” (*The Telephone Book*, 333).
- 84 Walter Benjamin, “Theses on the Philosophy of History,” in *Illuminations*, trans. Harry Zohn (New York: Schocken, 1968), 256.
- 85 Kittler, *Gramophone, Film, Typewriter*, 75.
- 86 For a discussion of the subsumption of the function of the mouth and speech under a larger rubric of sound production for reproduction, see chapter 5. For an alternate reading of the historical relation between automata and other sound-reproduction technologies, see Michael Taussig, *Mimesis and Alterity: A Particular History of the Senses* (New York: Routledge, 1993), 212–25; Hankins and Silverman, *Instruments and the Imagination*, 178–220; Kittler, *Gramophone, Film, Typewriter*, 24–29; and Lastra, *Sound Technology*

- and *American Cinema*, 16–60. Hankins and Silverman and Lastra both provide a more in-depth analysis than I can here.
- 87 National Phonograph Co., *The Phonograph and How to Use It, Being a Short History of Its Invention and Development Containing also Directions Helpful Hints and Plain Talks as to Its Care and Use, Etc.* (New York: National Phonograph Co., 1900), 13–14.
- 88 Quoted in Snyder, “Clarence John Blake and Alexander Graham Bell,” 30.
- 89 Francis Bacon, *The Advancement of Learning and the New Atlantis* (Oxford: Clarendon, 1974), 294.
- 90 Derek J. de Solla Price, “Automata and the Origins of Mechanism and Mechanistic Philosophy,” *Technology and Culture* 5 (1964): 9. See also Jamie C. Kassler, “Man—a Musical Instrument: Models of the Brain and Mental Functioning before the Computer,” *History of Science* 22 (1984): 59–92.
- 91 Kassler, “Man,” 62.
- 92 Price, “Automata,” 23.
- 93 René Descartes, *Treatise of Man* (1664), trans. Thomas Steele Hall (Cambridge, Mass.: Harvard University Press, 1972), 2–4. Descartes clearly wants to argue for his own version of the body over the conventional one, but he is careful simply to pose his version as an alternative.
- 94 René Descartes, *Discourse on Method and Meditations on First Philosophy*, 4th ed., trans. Donald A. Cress (Indianapolis: Hackett, 1998), 26, 31. On Descartes’s “unfulfilled promise,” see Descartes, *Treatise of Man*, 2 n. 2.
- 95 Arthur W. J. G. Ord-Hume, *Clockwork Music: An Illustrated History of Mechanical Musical Instruments from the Musical Box to the Pianola, from Automaton Lady Virginal Players to Orchestrion* (New York: Crown, 1973), 18, 25.
- 96 Hankins and Silverman, *Instruments and the Imagination*, 182–85.
- 97 *The History and Analysis of the Supposed Automaton Chess Player of M. de Kempelen, Now Exhibiting in This Country, by Mr. Mälzel; with Lithographic Figures, Illustrative of the Probable Method by Which Its Motions Are Directed* (Boston: Hilliard, Gray, 1826), esp. 3–9; Hankins and Silverman, *Instruments and the Imagination*, 186–98; Erasmus Darwin, *The Letters of Erasmus Darwin*, ed. Desmond King-Hele (Cambridge: Cambridge University Press, 1981), 63. See also Lastra, *Sound Technology and American Cinema*, 31–32.
- 98 J.B. [John Bulwer], *Philosophicus* (1648), 48, copied “verbatim” from the original by Professor J. C. Gordon, 6 February 1886, AGB, box 256, folder “Subject, Phonograph, Miscellany.” It appears as though this quote was sent to Bell.
- 99 Bell, “Prehistoric Telephone Days,” 17, 19, 21–22. See also Bell, “Early Telephony,” 7–8.
- 100 Sir Charles Wheatstone, *The Papers of Sir Charles Wheatstone* (London: Tay-

- lor and Francis, 1879), 62–63; Müller, *Elements of Physiology*, 699–700 (Müller documents extensive experimentation with human glottises removed from the body and with the glottises of living dogs; the discussion of an artificial glottis comes at the end of this section, pp. 687–700); Hankins and Silverman, *Instruments and the Imagination*, 213–17; Ord-Hume, *Clockwork Music*, 19.
- 101 Helmholtz, *On the Sensations of Tone*, 120–29, 163; Hankins and Silverman, *Instruments and the Imagination*, 198–209.
- 102 Berliner, “The Gramophone,” 2. It is not clear whether *tympanum membrani* was a phrase in common use at the time or whether this is an error on Berliner’s part.
- 103 König’s manometric flame was also based on the diaphragm principle, although it is not commonly thought of as a predecessor of other sound-reproduction technologies.
- 104 Berliner, “The Gramophone,” 4.
- 105 *Ibid.*, 4.
- 106 Bell quoted in Bruce, *Bell*, 252.
- 107 Columbia Phonograph Co., *The Latest and Best Talking Machines: The Perfected Graphophone with Clockwork or Electric Motor* (Washington, D.C.: Columbia Phonograph Co., 1895), n.p., Smithsonian Institution, National Museum of American History, Mechanisms Division, phonograph box 1.
- 108 Hermann Helmholtz, “On the Interaction of Natural Forces,” in *Popular Lectures on Scientific Subjects*, trans. E. Atkinson (New York: Appleton, 1885), 154.
- 109 Hankins and Silverman, *Instruments and the Imagination*, 223.
- 110 “New Remedy for Deafness: Dr. Leech Believes That the Phonograph Will Cause a Cure,” *New York Times*, 23 May 1892. See also “Miracle of the Phonograph: Edison’s Invention Applied to the Scientific Cure of Deafness,” *New York Times*, 12 October 1895; and “Possibilities of the Phonograph,” *New York Times*, 13 December 1891.
- 111 Grant Eldridge, “The Human Telephone,” *Buffalo (N.Y.) Times*, 24 January 1897, National Museum of American History, Medical Sciences Division, folder “Hearing.”
- 112 Kenneth Berger, *The Hearing Aid: Its Operation and Development* (Livonia, Mich.: National Hearing Aid Society, 1974), 24.
- 113 On the concept of the diagram, see Gilles Deleuze, *Foucault*, trans. Sean Hand (Minneapolis: University of Minnesota Press, 1988), 34; Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (New York: Vintage, 1977), 205.
- 114 On Foucault’s reading of his own work in relation to Weber’s notion of ideal types, see his “Questions of Method: An Interview with Michel Fou-

- cault,” in *The Foucault Effect: Studies in Governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: University of Chicago Press, 1991), 8–9.
- 115 Wiebe Bijker (*Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* [Cambridge, Mass.: MIT Press, 1995]) offers one noninstrumental theory of technological change that does not fall into technological determinism.
- 116 Edward Wheeler Scripture reports that, as late as 1898, Nagel and Samojloff “used the ear in the head of a freshly killed animal as a manometric capsule” in a manometric flame (*Elements of Experimental Phonetics*, 29).
- 117 Blake, “Sound and the Telephone,” 7.
- 118 Snyder, “Clarence John Blake and Alexander Graham Bell,” 21.

2. Techniques of Listening

- 1 The language of modern advertising is unmistakable in the Brandes ad; it presumes all sorts of knowledge on the part of the reader. For a discussion of the emergence of advertising language, see Richard Ohmann, *Selling Culture: Magazines, Markets, and Class at the Turn of the Century* (New York: Verso, 1996), esp. 176.
- 2 “You need a headset,” advertisement for Brandes headphones, GHC, series 49, box 301.
- 3 See Susan Smulyan, *Selling Radio: The Commercialization of American Broadcasting, 1920–1934* (Washington, D.C.: Smithsonian Institution Press, 1994), 13–20.
- 4 I have used R. T. H. Laennec, *A Treatise on the Diseases of the Chest and on Mediate Auscultation*, 3d ed., trans. John Forbes (New York: Samuel Wood; Collins and Hannay, 1830). The difference between the second and the third editions rests in only minor revisions.
- 5 Michel Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, trans. A. M. Sheridan Smith (New York: Pantheon, 1973).
- 6 Nor is it a definitive history of acoustic technique. Emily Thompson’s “Mysteries of the Acoustic: Architectural Acoustics in America, 1800–1932” (Ph.D. diss., University of Pennsylvania, 1992) considers the development of architectural acoustics; her concerns are largely with changing notions of engineering and the development of the profession as such.
- 7 Michel Foucault, “Questions of Method,” in *The Foucault Effect: Studies in Governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: University of Chicago Press, 1991), 75, 81.
- 8 See, e.g., Katherine Ott, *Fevered Lives: Tuberculosis in American Culture since 1870* (Cambridge, Mass.: Harvard University Press, 1996), 6, 21, 25; and

- Audrey B. Davis, *Medicine and Its Technology: An Introduction to the History of Medical Instrumentation* (Westport, Conn.: Greenwood, 1981).
- 9 Marcel Mauss, "Body Techniques," in *Sociology and Psychology: Essays*, trans. Ben Brewster (Boston: Routledge and Kegan Paul, 1979), 104–5.
 - 10 See, e.g., *ibid.*, 112–19.
 - 11 *Ibid.*, 108.
 - 12 Aristotle, *Nicomachean Ethics*, trans. Martin Ostwald (New York: Bobbs-Merrill, 1962), 151–52; Martin Heidegger, *The Question concerning Technology and Other Essays*, trans. William Lovitt (New York: Harper Torchbooks, 1977), 12; Jacques Ellul, *The Technological Society* (New York: Vintage, 1964), 4, 79–133.
 - 13 Pierre Bourdieu, *The Logic of Practice*, trans. Richard Nice (Stanford, Calif.: Stanford University Press, 1990), 52–65; Pierre Bourdieu and Loïc J. D. Wacquant, *An Invitation to Reflexive Sociology* (Chicago: University of Chicago Press, 1992), 13–14, 120–40. To describe the way a particular society organizes practices of listening, John Mowitt has coined the suggestive phrase *structure of listening*—meant as a play on Raymond Williams's *structure of feeling*. I have chosen not to use the term here mainly because of the connotative meaning of the word *structure*, but Mowitt's notion gels well with my discussion of habitus. See John Mowitt, "The Sound of Music in the Era of Its Electronic Reproducibility," in *Music and Society: The Politics of Composition, Performance, and Reception*, ed. Richard Leppert and Susan McClary (New York: Cambridge University Press, 1987), 175.
 - 14 Laennec's failed attempt to develop an acoustic lexicon for the stethoscope will be discussed below.
 - 15 A whole range of writers have contested the notion that hearing is necessarily an imprecise sense. See, e.g., Barry Truax, *Acoustic Communication* (Norwood, N.J.: Ablex, 1984), 15–24; and Don Idhe, *Listening and Voice: A Phenomenology of Sound* (Athens: Ohio University Press, 1974), 6–8, 58. Although they do not extend the argument to a direct consideration of the relation between audition and techniques of rationality and instrumental perception, their arguments enable the move that I make here.
 - 16 Rudolf Arnheim, *Radio*, trans. Margaret Ludwig and Herbert Read (London: Faber and Faber, 1936); Hadley Cantril and Gordon Allport, *The Psychology of Radio* (New York: Harper and Bros., 1935). See also Hanns Eisler and Theodor Adorno, *Composing for the Films* (New York: Oxford University Press, 1947); and Theodor Adorno, "On the Fetish-Character in Music and the Regression of Listening," in *The Essential Frankfurt School Reader*, ed. Andrew Arato and Eike Gebhardt (New York: Continuum, 1982), 270–99, and *Introduction to the Sociology of Music*, trans. E. B. Ashton (New York: Seabury, 1976).

- 17 *Oxford English Dictionary*, s.v. “audile.” Aesthetic preference and convenience also motivate my choice of *audile* as my adverb and adjective: *aural* is too easily confused with *oral* when the word is spoken, and *auscultatory* seems a bit baroque and is too closely associated with the specific case of medical listening.
- 18 Truax, *Acoustic Communication*, 15–24; Steven Feld, “Aesthetics as Iconicity of Style (Uptown Title); or, (Downtown Title) ‘Lift-up-over Sounding’: Getting into the Kaluli Groove,” in *Music Grooves*, by Charles Keil and Steven Feld (Chicago: University of Chicago Press, 1994), 115–31; Michel Foucault, *The History of Sexuality*, vol. 1, *An Introduction*, trans. Robert Hurley (New York: Vintage, 1978). On audile sensibilities, see also Christopher Small, *Music-Society-Education* (London: John Calder, 1977); and John Miller Chernoff, *African Rhythm and African Sensibility: Aesthetics and Social Action in African Musical Idioms* (Chicago: University of Chicago Press, 1979).
- 19 James H. Johnson, *Listening in Paris: A Cultural History* (Berkeley and Los Angeles: University of California Press, 1995), 284. For a more flattering account of the importance of musical sound in modern listening, see Simon Frith, *Performing Rites: On the Value of Popular Music* (Cambridge, Mass.: Harvard University Press, 1996), 99–122.
- 20 Foucault, *Birth of the Clinic*, xiv.
- 21 *Ibid.*, xii and passim (I discuss Foucault’s dogmatic emphasis on vision below); Stanley Joel Reiser, *Medicine and the Reign of Technology* (Cambridge: Cambridge University Press, 1978), 1–44; Jacalyn Duffin, *To See with a Better Eye: A Life of R. T. H. Laennec* (Princeton, N.J.: Princeton University Press, 1998), 6–7.
- 22 *Oxford English Dictionary*, s.v. “auscultation.” Although the entry dates the earliest medical use of the term in English to 1833, it is likely that the term was already in common medical usage when John Forbes first translated Laennec’s *Treatise on Mediate Auscultation* into English.
- 23 Laennec on Buisson (1802) quoted in Duffin, *To See with a Better Eye*, 43 (see also 153).
- 24 For more discussion of the history of the physiology of hearing, see chapter 1.
- 25 Duffin, *To See with a Better Eye*, 302.
- 26 See Paul Starr, *The Social Transformation of American Medicine* (New York: Basic, 1982), 17–24 and passim.
- 27 Laennec, *Treatise on Mediate Auscultation*, 5. This narrative became the subject of popular lore throughout the nineteenth century (Davis, *Medicine and Its Technology*, 90).
- 28 Duffin, *To See with a Better Eye*, 121.

- 29 As discussed in chapter 1, Young used a stylus to trace the vibrations of sound.
- 30 Ibid., 122–24.
- 31 Ibid., 153–55.
- 32 Davis, *Medicine and Its Technology*, 97–102.
- 33 Duffin, *To See with a Better Eye*, 129.
- 34 Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley and Los Angeles: University of California Press, 1993), 83–148. On light as a metaphor for truth in Greek, medieval, and early-modern thought, see Hans Blumenberg, “Light as a Metaphor for Truth: As the Preliminary Stage of Philosophical Concept Formation,” in *Modernity and the Hegemony of Vision*, ed. David Michael Levin (Berkeley and Los Angeles: University of California Press, 1993), 30–62.
- 35 This also served as a useful preemptory critique of François Double’s work on listening directly to the patient’s body.
- 36 Laennec, *Treatise on Mediate Auscultation*, 25–26.
- 37 The physical examination “was the result of a recasting at the level of epistemic knowledge (*savoir*) itself, and at the level of accumulated, refined, deepened, adjusted knowledge (*connaissances*)” (Foucault, *Birth of the Clinic*, 137).
- 38 Malcolm Nicolson, “The Introduction of Percussion and Stethoscopy to Early Nineteenth-Century Edinburgh,” in *Medicine and the Five Senses*, ed. W. F. Bynum and Roy Porter (New York: Cambridge University Press, 1993), 135.
- 39 Distilled from Laennec, *Treatise on Mediate Auscultation*, 27–28; John Hughes Bennett, *Clinical Lectures on the Principles and Practice of Medicine* (New York: Samuel S. and William Wood, 1860), 49–50; and Austin Flint, *A Manual of Percussion and Auscultation; of the Physical Diagnosis of Diseases of the Lungs and Heart, and of Thoracic Aneurism* (Philadelphia: Henry C. Lea, 1876), 72–74.
- 40 Foucault, *Birth of the Clinic*, 164.
- 41 For a discussion of the separation of the senses and the construction of hearing as an object of knowledge, see chapter 1.
- 42 Flint, *Manual of Percussion and Auscultation*, 73–74.
- 43 Reiser, *Medicine and the Reign of Technology*, 41; Davis, *Medicine and Its Technology*, 104.
- 44 For the most part, stethoscope construction in the nineteenth century was not heavily based on the principles of acoustics. Although the instrument embodied a basic principle of acoustics, none of the more advanced thinking concerning acoustics was applied until the turn of the century. Additionally, starting in the 1890s, inventors sought to incorporate new sound-

- reproduction technologies into the stethoscope—most notably, sound recording and electric amplification (Davis, *Medicine and Its Technology*, 109).
- 45 Ibid., 104, 259.
- 46 Flint, *Manual of Percussion and Auscultation*, 71.
- 47 The phrase comes from Langdon Winner, *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought* (Cambridge, Mass.: MIT Press, 1977), 315. Winner is very ambivalent about the *license to forget*: for him, it is “the source of the colossal passivity in man’s dealings with technical means,” but “the benefits in terms of health, mobility, material comfort, and the overcoming of the physical problems of production and communication are well known” (ibid.). I consider this process of forgetting less a source of passivity than a basic precondition for human tool use or any other kind of repeatable behavior.
- 48 See Pierre Bourdieu, *Distinction: A Social Critique of the Judgment of Taste*, trans. Richard Nice (Cambridge, Mass.: Harvard University Press, 1984), 169–225.
- 49 Laennec, *Treatise on Mediate Auscultation*, 4.
- 50 Duffin, *To See with a Better Eye*, 79.
- 51 Norbert Elias, *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*, trans. Edmund Jephcott, ed. Eric Dunning, Johan Goudsblom, and Stephen Mennell, rev. ed. (Malden: Blackwell, 2000), 420. Elias’s thesis that the repression and management of drives goes hand in hand with ever-increasing rationalization clearly bears the influence of both Freud and Weber, although one need not accept the larger claims of either writer for Elias’s insight to have some explanatory utility.
- 52 Duffin, *To See with a Better Eye*, 110–13.
- 53 Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic, 1983), 76–77; Starr, *Social Transformation of American Medicine*, 72–77.
- 54 Laennec, *Treatise on Mediate Auscultation*, 8: “It is only in an hospital that we can acquire, completely and certainly, the practice and habit of this new art of observation.”
- 55 Duffin, *To See with a Better Eye*, 126.
- 56 Ibid., 126–27; Charles E. Rosenberg, “And Heal the Sick: Hospital and Patient in the Nineteenth Century,” *Journal of Social History* 4 (1977): 428–71.
- 57 Duffin, *To See with a Better Eye*, 79, 104.
- 58 Foucault, *Birth of the Clinic*, 163.
- 59 Davis, *Medicine and Its Technology*, 88.
- 60 This was also a result of the clinicization of medicine and the shaping of the doctor-patient relation through its rationalization and institutionalization.

- 61 Reiser, *Medicine and the Reign of Technology*, 1–7.
- 62 *Ibid.*, 24.
- 63 *Ibid.*, 19 (see also 10–19). Dissection-based pedagogy, which had existed throughout the Middle Ages, gradually came into greater favor as the scientific view gained currency in medicine.
- 64 Of course, the taking of medical history continues down to the present day, but it exists as only one of an array of techniques to be used in medical diagnosis. It is a residual technique.
- 65 Elias, *The Civilizing Process*, 420.
- 66 Laennec (*Treatise on Mediate Auscultation*, 24) acknowledged Hippocrates' experiment with immediate auscultation but "considered it as indeed it is, one of the mistakes of that great man."
- 67 Leopold Auenbrugger, "On Percussion of the Chest," trans. John Forbes in 1824 from the 1761 Latin ed., with an introduction by Henry Sigerist, *Bulletin of the History of Medicine* 4 (1936): 379. Forbes's translation of Auenbrugger first appeared as part of John Forbes, *Original Cases with Dissections and Observations Illustrative of the Use of the Stethoscope and Percussion in the Diagnosis of Diseases of the Chest; Also Commentaries on the Same Subjects Selected and Translated from Auenbrugger, Corvisart, Laennec, and Others* (London: Printed for T. and G. Underwood, Fleet Street, 1824).
- 68 Reiser, *Medicine and the Reign of Technology*, 21; Duffin, *To See with a Better Eye*, 32.
- 69 Reiser, *Medicine and the Reign of Technology*, 21–22; see also Henry Sigerist, introduction to Auenbrugger, "On Percussion of the Chest," 374. Reiser (*Medicine and the Reign of Technology*, 37) notes that this prejudice remained in residual form into Laennec's time: one of the early objections to the stethoscope was that it would cause physicians to be classed with surgeons as craftsmen.
- 70 Forbes, *Original Cases*.
- 71 Laennec, *Treatise on Mediate Auscultation*, 22–23.
- 72 Duffin, *To See with a Better Eye*, 33–35.
- 73 Davis, *Medicine and Its Technology*, 89; Reiser, *Medicine and the Reign of Technology*, 29–30.
- 74 Foucault, *Birth of the Clinic*, 137, 141, 143, 144.
- 75 Freud's "talking cure" is sometimes cast as a return to subjectivity, but even here speech is interesting, no longer for its semantico-referential content, but as a manifestation of the patient's interior psyche. In that sense, Freud's emphasis on exterior speech as an index of interior condition was not a full departure from empiricist medicine. Obviously, there are significant differences between psychoanalytic method and the methods of diagnosis discussed here. On the talking cure, see, e.g., Josef Breuer and Sigmund Freud,

- Studies in Hysteria*, trans. A. A. Brill (New York: Nervous and Mental Disease Publishing Co., 1936).
- 76 Reiser (*Medicine and the Reign of Technology*, 167–68) argues that the emergent predominance of laboratory medicine led to the decline of physical examination since the latter was seen as less precise and more time-consuming; the eclipse of mediate auscultation by other diagnostic methods should be understood in this context. Of course, as with patient histories, the stethoscope remains in current use, but its general importance in accurate diagnosis has greatly diminished.
- 77 Duffin, *To See with a Better Eye*, 43.
- 78 J.-B.-P. Barth and Henri Roger, *A Practical Treatise on Auscultation*, trans. Patrick Newbigging (Lexington, Ky.: Scrugham and Dunlop, 1847), 1, cited in Reiser, *Medicine and the Reign of Technology*, 31.
- 79 Reiser, *Medicine and the Reign of Technology*, 43–44.
- 80 Of course, other sounds could conceivably mislead a physician and lead to misdiagnosis, but they would not deceive in the same way that speech could since speech was ascribed a level of intentionality that other bodily sounds were not.
- 81 *Ibid.*, 36.
- 82 Foucault, *Birth of the Clinic*, 162.
- 83 Laennec, *Treatise on Mediate Auscultation*, 38.
- 84 I discuss automata in chapter 1. See also Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, Calif.: Stanford University Press, 1999), 25.
- 85 Laennec, *Treatise on Mediate Auscultation*, 51 (quotation), 58.
- 86 Duffin, *To See with a Better Eye*, 147.
- 87 Laennec, *Treatise on Mediate Auscultation*, 36–37.
- 88 Duffin, *To See with a Better Eye*, 157.
- 89 *Ibid.*, 134. See also Foucault, *Birth of the Clinic*, 160; Reiser, *Medicine and the Reign of Technology*, 29.
- 90 Reiser, *Medicine and the Reign of Technology*, 33.
- 91 Duffin, *To See with a Better Eye*, 138.
- 92 Foucault, *Birth of the Clinic*, 165.
- 93 Lisa Cartwright, *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995), xi.
- 94 Laennec, *Treatise on Mediate Auscultation*, 163 (quotation), 162–63.
- 95 Duffin, *To See with a Better Eye*, 203–4. Duffin points out that *specificity* and *sensitivity* are somewhat anachronistic terms for Laennec's thinking, but they are at least heuristically useful for understanding how he built his semiology.
- 96 Flint, *Manual of Percussion and Auscultation*, 14.

- 97 Charles Sanders Peirce, *Philosophical Writings of Peirce*, ed. Justus Buchler (New York: Dover, 1955), 107.
- 98 Laennec, *Treatise on Mediate Auscultation*, 566, 569, 571–72.
- 99 Reiser, *Medicine and the Reign of Technology*, 28. Prior to the innovations of Josef Skoda later in the century, Laennec's teachings did not undergo significant innovation or revision.
- 100 The analytic language of sound remains incomplete to this day. While all sorts of aspects of visual phenomena can be described in abstract language (e.g., shape, color, texture, size), apart from the specialized technical languages of engineers, musicians, and others who work with sound (none of which has achieved the kind of general currency that abstractions of visual phenomena have in everyday language use) there exists no commonly used equivalent to describe the texture, shape, density, timbre, or rhythm of sound.
- 101 *Ibid.*, 39–40; Josef Skoda, *Auscultation and Percussion*, trans. W. O. Markham (Philadelphia: Lindsay and Blakiston, 1854), *passim*.
- 102 Flint, *Manual of Percussion and Auscultation*, 34.
- 103 See Tom Turino's discussion of sound and indexicality in "Signs of Imagination, Identity, and Experience: A Peircian Semiotic Theory for Music," *Ethnomusicology* 43, no. 2 (1999): 221–55.
- 104 Flint, *Manual of Percussion and Auscultation*, 32–33.
- 105 Bennett, *Clinical Lectures*, 55–56.
- 106 Peirce, *Philosophical Writings*, 102.
- 107 John Forbes, translator's introduction to Laennec, *Treatise on Mediate Auscultation*, vi.
- 108 Bennett, *Clinical Lectures*, 52; Flint, *Manual of Percussion and Auscultation*, 31 (see also 69–70).
- 109 Foucault, *Birth of the Clinic*, 64–85.
- 110 Flint, *Manual of Percussion and Auscultation*, 33.
- 111 Bennett, *Clinical Lectures*, 51.
- 112 Davis, *Medicine and Its Technology*, 90.
- 113 Flint, *Manual of Percussion and Auscultation*, 69–70.
- 114 Forbes, translator's introduction to Laennec, *Treatise on Mediate Auscultation*, vii.
- 115 Davis, *Medicine and Its Technology*, 108.
- 116 Reiser, *Medicine and the Reign of Technology*, 38.

3. Audile Technique and Media

- 1 Harold Innis, *The Bias of Communication* (Toronto: University of Toronto Press, 1951), 59, 167–69; Menahem Blondheim, *News over the Wires: The*

Telegraph and the Flow of Public Information in America, 1844–1897 (Cambridge, Mass.: Harvard University Press, 1994).

- 2 Daniel Czitrom, *Media and the American Mind: From Morse to McLuhan* (Chapel Hill: University of North Carolina Press, 1982), 3–29; James Carey, “Technology and Ideology: The Case of the Telegraph,” in *Communication as Culture: Essays on Media and Society* (Boston: Unwin Hyman, 1988), 203. See also Steven Lubar, *Infoculture* (Boston: Houghton Mifflin, 1993), 73–100.
- 3 Michael Warner, following Jürgen Habermas, considers the print culture of colonies and, by extension, institutions such as newspapers and the post office central to the formation of modern media culture. See Michael Warner, *The Letters of the Republic: Publication and the Public Sphere in Eighteenth-Century America* (Cambridge, Mass.: Harvard University Press, 1990); and Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, trans. Thomas Burger with the assistance of Frederick Lawrence (Cambridge, Mass.: MIT Press, 1991). For a history of postal communication that argues for the mail’s significance in modern media history, see Richard R. John, *Spreading the News: The American Postal System from Franklin to Morse* (Cambridge, Mass.: Harvard University Press, 1995).
- 4 Aeschylus, *The Agamemnon*, trans. Louis MacNeice (London: Faber and Faber, 1936), 13.
- 5 For a fuller technical history of telegraphy, see Lazlo Solymar, *Getting the Message: A History of Communications* (New York: Oxford University Press, 1999), 7–98.
- 6 For a fuller critique of this position with respect to cinema, see Rick Altman, “Four and a Half Film Fallacies,” in *Sound Theory Sound Practice*, ed. Rick Altman (New York: Routledge, 1992), 37–38.
- 7 C.M. [Charles Morrison], “An Expeditious Method of Conveying Intelligence,” *Scots’ Magazine* 15 (1753): 73, cited in E. A. Marland, *Early Electrical Communication* (New York: Abelard-Schuman, 1964), 18–19. Morrison, a Scottish surgeon, apparently did not want his neighbors to think that he was a wizard—hence the anonymity of the letter.
- 8 Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (New York: Doubleday, 1954), 14–15.
- 9 Charles Bright received an English patent in 1855 for an acoustic telegraph, which involved the use of dots and dashes similar to Morse’s code, the dot ringing the bell clearly and the dash giving a longer, more muffled sound. This telegraph was an innovation on Cook and Wheatstone’s needle telegraphs. Although the mechanical principle was the same, the code was different. For an account of technical developments in telegraphy between

- C.M.'s letter and early sounders, see Marland, *Early Electrical Communication*, 19–116. For a discussion of Bright's acoustic telegraph, see *ibid.*, 118–20.
- 10 Samuel F. B. Morse to the secretary of the Treasury, 27 September 1837, quoted in Alfred Vail, *The American Electric Magnetic Telegraph: With the Reports of Congress and a Description of All Telegraphs Known, Employing Electricity or Galvanism* (Philadelphia: Lea and Blanchard, 1845), 70. As with all first-person accounts of invention, we should take Morse's dates and realizations with a grain of salt. He was likely trying to establish precedence over Cook and Wheatstone even at this early point.
- 11 From a longer description of the telegraph's function in Vail, *Electric Magnetic Telegraph*, 25–26.
- 12 See Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, Calif.: Stanford University Press, 1999), 1–20.
- 13 Lubar, *Infoculture*, 81–82.
- 14 *Ibid.*, 79; Lewis Coe, *The Telegraph: A History of Morse's Inventions and Its Predecessors in the United States* (Jefferson, N.C.: McFarland, 1993), 67–69. Coe argues that, although Morse code fell out of international favor, it remained the faster and more efficient of the two codes.
- 15 See Czitrom, *Media and the American Mind*, 5–7.
- 16 *Ibid.*, 7.
- 17 *Ibid.*, 5.
- 18 Wireless telegraphy also initially made use of the printer, including Marconi's original apparatus and several of its predecessors, probably for the same reasons that Morse found them useful to begin with: they automatically generated a permanent record. On the technological evolution of wireless telegraphy, see Lubar, *Infoculture*, 102–11. See also Hugh G. J. Aitken, *The Continuous Wave: Technology and American Radio, 1900–1932* (Princeton, N.J.: Princeton University Press, 1985).
- 19 John Wilson Townsend, *The Life of James Francis Leonard, the First Practical Sound-Reader of the Morse Alphabet* (Louisville: John P. Morton, 1909), 18–20. Townsend also makes a brief reference to a Cincinnati operator, George Durfee, who listened to the telegraph.
- 20 *Ibid.*, 21, 24–25, 34–37.
- 21 R. W. Russell, *History of the Invention of the Electric Telegraph, Abridged from the Works of Lawrence Turnbull, M.D., and Edward Highton, C.E. with Remarks on Royal E. House's American Printing Telegraph and the Claims of Samuel F. B. Morse as an Inventor* (New York: Wm. C. Bryant, 1853), 44–45.
- 22 *American Telegraph Magazine*, 31 January 1853, quoted in Russell, *History of the Invention of the Electric Telegraph*, 54.

- 23 Robert Sabine, C.E., *The History and Progress of the Electric Telegraph with Description of Some of the Apparatus*, 2d ed. (New York: D. Van Nostrand, 1869), 58–59. See also telegraphy guides such as R. S. Culley, *A Handbook of Practical Telegraphy*, 8th ed. (London: Longmans, Green, 1885), 250, which treats the sounder as standard operating apparatus.
- 24 Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 22–32, 254–57.
- 25 Carolyn Marvin, *When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century* (New York: Oxford University Press, 1988), 93–94.
- 26 See Erving Goffman, *Presentation of Self in Everyday Life* (Garden City, N.Y.: Doubleday Anchor, 1959), 106–40; Edward Hall, *The Hidden Dimension* (London: Bodley Head, 1966); and Anthony Giddens, *The Constitution of Society: Outline of the Theory of Structuration* (Berkeley and Los Angeles: University of California Press, 1984), 122–26.
- 27 Giddens, *The Constitution of Society*, 123; John Thompson, *The Media and Modernity: A Social Theory of the Media* (Stanford, Calif.: Stanford University Press, 1995), 87–100.
- 28 Marvin, *When Old Technologies Were New*, 9–62, 94–95.
- 29 “Kate: An Electro-Mechanical Romance,” in *Lightning Flashes and Electric Dashes: A Volume of Choice Telegraphic Literature, Humor, Fun, Wit, and Wisdom, Contributed to by All of Principal Writers in the Ranks of Telegraphic Literature as Well as Some Well-Known Outsiders, with Numerous Wood-Cut Illustrations* (New York: W. J. Johnston, 1877), 56–57.
- 30 Marvin, *When Old Technologies Were New*, 84.
- 31 *Ibid.*, 10.
- 32 Charles L. Buckingham, e.g., was writing by 1890 that modern life would be unthinkable without telegraphy. See Charles L. Buckingham, “The Telegraph of Today,” in *The Telegraph: An Historical Anthology*, ed. George Shiers (New York: Arno, 1977), 163.
- 33 It should, however, be noted that the geographic development of telephony, phonography, and radio was uneven. All these media started out as local phenomena and spread only gradually.
- 34 As with mediate auscultation and sound telegraphy, some sounds made possible by the technology were considered “interior” and, therefore, proper objects of attention. Other sounds of the technology, especially those that drew attention to the process of mediation, were coded as “exterior” sounds and were supposed to be ignored. Through this coding of sounds, the process of sonic mediation, so central to audile technique, was effectively erased. This is considered at length in chapter 5.

- 35 Audrey B. Davis, *Medicine and Its Technology: An Introduction to the History of Medical Instrumentation* (Westport, Conn.: Greenwood, 1981), 107–8; Stanley Joel Reiser, *Medicine and the Reign of Technology* (Cambridge: Cambridge University Press, 1978), 41.
- 36 George L. Carrick, “On the Differential Stethoscope and Its Value in the Diagnosis of Diseases of the Lungs and Heart,” *Aberdeen Medical and Chirurgical Tracts* 12, no. 9 (1873): 902.
- 37 Alexander Graham Bell, “Experiments in Binaural Audition,” *American Journal of Otology* (July 1880): 3, 4, 5, NMAH, Division of Mechanisms, phonograph box 1 (this is an offprint signed “with compliments of the author”). See also Audrey B. Davis and Uta C. Merzbach, *Early Auditory Studies: Activities in the Psychology Laboratories of American Universities* (Washington, D.C.: Smithsonian Institution Press, 1975).
- 38 Bell, “Experiments in Binaural Audition,” 5.
- 39 Relatively few writers have made much of Horkheimer and Adorno’s discussion of the detail. Instead, discussions of Frankfurt school writers have considered the idea of the *fragment*—either at the level of the text itself of *Dialectic of Enlightenment* (since the original title and the German subtitle was *Philosophical Fragments*) or in Walter Benjamin’s more mystical version of the fragment (see, e.g., Walter Benjamin, *Illuminations*, trans. Hannah Arendt [New York: Schocken, 1968], 262–64).
- 40 See Max Horkheimer and Theodor W. Adorno, *Dialectic of Enlightenment* (New York: Continuum, 1944), 125.
- 41 American Telephone Booth Co., “Booths of Special Design Made to Match Office Furniture” (1893), NWA, telephone box 1, folder 2.
- 42 Ultimately, it is the social form that counts, not the actual construction of a booth: the proliferation of cellular phones in recent years has demonstrated that people can set up their private acoustic spaces almost anywhere and with little assistance from the ambient environment.
- 43 This sense of the possibility of owning communication space is also a tributary formation in the shape of broadcast licensing. See Thomas Streeter, *Selling the Air: A Critique of the Policy of Commercial Broadcasting in the United States* (Chicago: University of Chicago Press, 1996), 219–55.
- 44 Richard Leppert, *The Sight of Sound: Music, Representation, and the History of the Body* (Berkeley and Los Angeles: University of California Press, 1993), 15–41, esp. 39–40.
- 45 Leppert, *ibid.*, 24–25. See also James H. Johnson, *Listening in Paris: A Cultural History* (Berkeley and Los Angeles: University of California Press, 1995); David Nasaw, *Going Out: The Rise and Fall of Public Amusements* (New York: Basic, 1993), 19–33, 120–34; Lizabeth Cohen, *Making a New Deal:*

Industrial Workers in Chicago, 1919–1939 (New York: Cambridge University Press, 1990), 99–158; and Miriam Hansen, *Babel and Babylon: Spectatorship in American Silent Film* (Cambridge, Mass.: Harvard University Press, 1991). This is clearly a significant issue in sound history, but, since these other authors have considered it at some length, I have chosen to focus on other matters here.

- 46 Of course, we also find the countervailing tendency in modern life: certain spaces and certain sounds preempt people's entitlement to private acoustic space. A particularly obvious and pervasive case would be programmed music, or Muzak—a topic that I explore in my “Sounds Like the Mall of America: Programmed Music and the Architectonics of Programmed Music,” *Ethnomusicology* 41, no. 1 (winter 1997): 22–50. There are also many contexts like sporting events where unruly audience behavior is still encouraged within limits, but that is a whole other issue.
- 47 I realize that this is a tremendous simplification of social contract theory. Rousseau developed notions of moral development and general will, whereas earlier writers had emphasized the social contract as a defense against the “state of nature.” In any case, the loose narrative presented above is purely for heuristic purposes and is not meant to suggest that audile technique is structured according to any kind of formal social contract theory.
- 48 Many nineteenth-century teachers of medicine also attempted to construct models that would produce sounds identical to those heard through the stethoscope, thereby offering reproductions of the sounds of the body *outside* the body. These sound-reproduction apparatus were themselves miniature automata. As Audrey Davis puts it, these devices were constructed to “duplicate the physical conditions that produced the chest sounds.” As an example, she cites Flint's instructions for making models: “Murmurs may be produced by forcing fluids into rubber tubes and bags of varying size. Valvular-like sounds are produced by forcible tension of pieces of linen or muslin held below the surface of a liquid. Musical notes may be caused by a stream of liquid acting on a vibrating body in a closed cavity” (*Medicine and Its Technology*, 93).
- 49 Reiser, *Medicine and the Reign of Technology*, 43–44.
- 50 Davis, *Medicine and Its Technology*, 109.
- 51 MacDowell Associates, *Sound: Can It Be Put to Work? How? By Whom?* 2, WBA, acoustics box 1, folder 3. For a history of architectural acoustics, see Emily Thompson, “Mysteries of the Acoustic: Architectural Acoustics in America, 1800–1932” (Ph.D. diss., University of Pennsylvania, 1992).
- 52 On the commodification of music, see Alan Durant, *Conditions of Music* (Albany: State University of New York Press, 1984); Evan Eisenberg, *The Recording Angel: The Experience of Music from Aristotle to Zappa* (New York:

- Penguin, 1987), 11–34; and Michael Chanan, *Musica Practica: The Social Practice of Music from Gregorian Chant to Postmodernism* (New York: Verso, 1994), and *Repeated Takes: A Short History of Recording and Its Effects on Music* (New York: Verso, 1995).
- 53 William Howland Kenney, *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1945* (New York: Oxford University Press, 1999), 4.
- 54 Ibid. This aspect of recording is a fundamental condition for large-scale musical-cultural phenomena. See, e.g., Gilbert Rodman, *Elvis after Elvis: The Posthumous Career of a Living Legend* (New York: Routledge, 1996).
- 55 Johnson, *Listening in Paris*, 284.
- 56 “Your Telephone Horizon” (1912), NWA, box 21, folder 1.
- 57 Norbert Elias, *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*, trans. Edmund Jephcott, ed. Eric Dunning, Johan Goudsblom, and Stephen Mennell, rev. ed. (Malden: Blackwell, 2000), 118–19.
- 58 Kenney, *Recorded Music in American Life*, 7. See also Claude S. Fischer, *America Calling: A Social History of the Telephone* (Berkeley and Los Angeles: University of California Press, 1992), 5; and Susan Douglas, *Listening In: Radio and the American Imagination from Amos 'n Andy and Edward R. Murrow to Wolfman Jack and Howard Stern* (New York: Times Books/Random House, 1999), 7–8, 21.

4. Plastic Auality: Technologies into Media

- 1 Andre Millard, *America on Record: A History of Recorded Sound* (New York: Cambridge University Press, 1995), 30; Russel Sanjek, *American Popular Music and Its Business: The First Four Hundred Years*, vol. 2, *From 1790 to 1909* (New York: Oxford University Press, 1988), 364; Steven Lubar, *Infoculture* (New York: Houghton Mifflin, 1993), 170. The important issue for the present account is Edison’s sense of ownership, although, interestingly, the historical record on Edison’s reaction to the Johnson/Tainter meeting is somewhat unclear. Oliver Read and Walter Welch (*From Tin Foil to Stereo: Evolution of the Phonograph* [New York: Herbert W. Sams/Bobbs-Merrill, 1976], 38) cite an 1888 *Electrical World* article claiming that Edison was ill and unable to attend the meeting; they also suggest that Volta made no meaningful contributions to sound recording other than a variable-speed turntable. Andre Millard (*Edison and the Business of Innovation* [Baltimore: Johns Hopkins University Press, 1990], 65–66) cites an undated note to Johnson and suggests that it contains evidence that Edison was simply angry that someone else had improved the phonograph and that he planned to develop the machine himself (although, since Millard does not actually quote that document, its

exact contents remain a mystery). Clearly, the two accounts are not entirely compatible since, if the Volta work was of no major consequence, Edison would not have been upset or concerned.

- 2 Edward Johnson to A. G. Bell, 11 September 1885, AGB, box 255, folder “Phonograph—Correspondence.” Judging by the date on the letter, Johnson was essentially covering for himself and his boss. He could from then on argue that his impression at the meeting was that the graphophone simply was not “good enough” and that the new Edison machine grew from a separate line of research and development.
- 3 R. W. Russell, *History of the Invention of the Electric Telegraph, Abridged from the Works of Lawrence Turnbull, M.D., and Edward Highton, C.E. with Remarks on Royal E. House’s American Printing Telegraph and the Claims of Samuel F. B. Morse as an Inventor* (New York: Wm. C. Bryant, 1853), 54–55.
- 4 Alexander Graham Bell to Melville Bell, 26 February 1880, AGB, box 256, folder “Photophone, Miscellany.”
- 5 Of course, a literary notion of authorship is even more intensely articulated to the concept of the lone creative individual than is invention. But it is equally a mystification of the creative process to conceive of authors “birthing” their writings.
- 6 Inventors were far from the only people who described their work in this way. Felicia Frank translates the title of the second chapter of Villers de l’Isle-Anam’s novel *L’Eve future* (which features Edison prominently as a character) as “Phonograph’s Papa.” See Felicia Frank, *The Mechanical Song: Women, Voice, and the Artificial in Nineteenth-Century French Narrative* (Stanford, Calif.: Stanford University Press, 1995), 144. See also Thomas A. Watson, *The Birth and Babyhood of the Telephone* (reprint, n.p.: American Telephone and Telegraph Co., Information Department, 1934).
- 7 For criticisms of technological determinism from perspectives sympathetic to my own, see Raymond Williams, *Television: Technology and Cultural Form* (Middletown, Conn.: Wesleyan University Press, 1992); Jennifer Daryl Slack, *Communication Technologies and Society: Conceptions of Causality and the Politics of Technological Intervention* (Norwood, N.J.: Ablex, 1984); and Carol Stable, *Feminism and the Technological Fix* (New York: St. Martin’s, 1994).
- 8 This definition is adapted from John Nerone’s approach to the question of what a newspaper is in *Violence against the Press: Policing the Public Sphere in U.S. History* (New York: Oxford University Press, 1994), 13–17.
- 9 Jonathan Sterne, “Television under Construction: American Television and the Problem of Distribution, 1926–62,” *Media, Culture, and Society* 21, no. 4 (July 1999): 504.
- 10 Lawrence Grossberg, *We Gotta Get Out of This Place: Popular Conservatism and Postmodern Culture* (New York: Routledge, 1992), 54. See also Stuart Hall,

“On Postmodernism and Articulation,” *Journal of Communication Inquiry* 10, no. 2 (1986): 45–60.

- 11 In addition to the extant political-economic histories of individual sound media, Jacques Attali’s *Noise: The Political Economy of Music* (trans. Brian Massumi [Minneapolis: University of Minnesota Press, 1985]), Michael Chanan’s *Musica Practica: The Social Practice of Music from Gregorian Chant to Postmodernism* (New York: Verso, 1994) and *Repeated Takes: A Short History of Recording and Its Effects on Music* (New York: Verso, 1995), Sidney Finkelstein’s *Composer and Nation: The Folk Heritage in Music* (New York: International, 1989), Max Horkheimer and Theodor W. Adorno’s *Dialectic of Enlightenment* (New York: Continuum, 1944), and much of Adorno’s writing on music as well as Walter Benjamin’s “Work of Art in the Age of Mechanical Reproduction” (in *Illuminations*, trans. Hannah Arendt [New York: Schocken, 1968]) and Alan Durant’s *Conditions of Music* (Albany: State University of New York Press, 1984) all make impressive but incomplete attempts to connect the history of music with a more general political economy. A truly political-economic history of music and sound has yet to be written.
- 12 James Carey, *Communication as Culture: Essays on Media and Society* (Boston: Unwin Hyman, 1988), 201–30. See also Daniel Czitrom, *Media and the American Mind: From Morse to McLuhan* (Chapel Hill: University of North Carolina Press, 1982), 3–29; and Lubar, *Infoculture*, 73–100.
- 13 Other institutional and intellectual contexts for the technical development of sound technologies, such as research into deafness and hearing, are covered in earlier chapters.
- 14 Both electrical engineering and research and development would become more professionalized in the following decades.
- 15 Read and Welch, *From Tin Foil to Stereo*, 3–5, 11–24; Robert V. Bruce, *Bell: Alexander Graham Bell and the Conquest of Solitude* (Boston: Little, Brown, 1973), 90–97, 104–20, 215–36; Millard, *America on Record*, 17–18.
- 16 Millard, *America on Record*, 23.
- 17 See Millard, *Edison and the Business of Innovation*.
- 18 Sumner Tainter and Chichester Bell to Alexander Graham Bell, 29 November 1881, AGB, box 25, folder “Bell, Chichester, Alexander.”
- 19 Chichester A. Bell to Alexander Graham Bell, 22 December 1886, *ibid.*
- 20 Alexander Graham Bell, entry dated 31 May 1881, typescript copied from Home Notes, 3:55–61, AGB, box 256, folder “Phonograph, Miscellany.”
- 21 Bruce, *Bell*, 82–83, 293, 340. Bell and Hubbard originally met because Hubbard’s daughter Mabel was deaf and he hired Bell to teach her to speak. Teacher and pupil would later marry.

- 22 Read and Welch, *From Tin Foil to Stereo*, 39.
- 23 George Crossette, "Chichester Alexander Bell," *Cosmos Club Bulletin*, May 1966, 3, AGB, box 25, folder "Chichester Alexander Bell."
- 24 Read and Welch, *From Tin Foil to Stereo*, 25; Thomas Edison to Alexander Graham Bell, n.d. [1879], AGB, box 122, folder "Thomas Edison."
- 25 Bruce, *Bell*, 281–87; Read and Welch, *From Tin Foil to Stereo*, 273
- 26 See the discussion of the "cult of invention" during the first two decades of the twentieth century (with respect to radio) in Susan Douglas, *Inventing American Broadcasting, 1899–1922* (Baltimore: Johns Hopkins University Press, 1987), xiv.
- 27 Frederic William Wile, *Emile Berliner: Maker of the Microphone* (Indianapolis: Bobbs-Merrill, 1926), 67–94, 183–93.
- 28 Charles Sumner Tainter and Chichester A. Bell to Alexander Graham Bell, 29 November 1881, AGB, box 25, folder "Bell, Chichester, Alexander."
- 29 Hugh G. J. Aitken, *Syntony and Spark: The Origins of Radio* (New York: Wiley, 1976), 159. Vacuum tubes are also central to understanding the aesthetics of recorded and amplified live music over the course of the twentieth century; this is a topic that I hope to pursue elsewhere.
- 30 Emily Thompson, "Mysteries of the Acoustic: Architectural Acoustics in America, 1800–1932" (Ph.D. diss., University of Pennsylvania, 1992), 267–76; Susan Smulyan, *Selling Radio: The Commercialization of American Broadcasting, 1920–1934* (Washington, D.C.: Smithsonian Institution Press, 1994), 37–64.
- 31 On the history of Muzak, see Simon Jones and Thomas Schumacher, "Muzak: On Functional Music and Power," *Critical Studies in Mass Communication* 9 (1992): 156–63; Joseph Lanza, *Elevator Music: A Surreal History of Muzak, Easy-Listening, and Other Moodsong* (New York: St. Martin's, 1994), 22–31. I discuss programmed music in a more contemporary context in my "Sounds Like the Mall of America: Programmed Music and the Architectonics of Commercial Space," *Ethnomusicology* 41, no. 1 (winter 1997): 22–50.
- 32 Winslow A. Duerr, "Will Radio Replace the Phonograph?" *Radio Broadcast*, November 1922, 52–54.
- 33 James P. Kraft, *Stage to Studio: Musicians and the Sound Revolution, 1890–1950* (Baltimore: Johns Hopkins University Press, 1996), esp. 59–88, 162–93.
- 34 Kraft, *Stage to Studio*, 66; Sanjek, *American Popular Music and Its Business*, 392–420.
- 35 Kraft, *Stage to Studio*, 47–58, 61, 64–66.
- 36 David Nasaw, *Going Out: The Rise and Fall of Public Amusements* (New York: Basic, 1993), 241–42.

- 37 Arnold Pacey, *The Culture of Technology* (Cambridge, Mass.: MIT Press, 1983).
- 38 Richard Ohmann, *Selling Culture: Magazines, Markets, and Class at the Turn of the Century* (New York: Verso, 1996), 171; Stuart Blumin, *The Emergence of the Middle Class: Social Experience in the American City, 1760–1900* (New York: Cambridge University Press, 1989), 11 and passim.
- 39 Reynold Weidenaar, *Magic Music from the Telharmonium* (Metuchen, N.J.: Scarecrow, 1995), 3–4, 17. See also Elliott Sivowitch, “Musical Broadcasting in the Nineteenth Century,” *Audio* 51, no. 6 (June 1967): 19–23. On telephone broadcasting in Munich, see Margarete Rhem, “Information und Kommunikation in Geschichte und Gegenwart” (available on-line at <http://www.ib.hu-berlin.de/~wumsta/rehm8.html>; last accessed 18 January 2001).
- 40 See Carolyn Marvin, *When Old Technologies Were New: Thinking about Electric Communication in the Nineteenth Century* (New York: Oxford University Press, 1988), 223–28; Weidenaar, *Magic Music*, 16–17; and Sivowitch, “Musical Broadcasting in the Nineteenth Century.”
- 41 Marvin, *When Old Technologies Were New*, 230–31. See also Michèle Martin, “Hello, Central?": *Gender, Technology, and Culture in the Formation of Telephone Systems* (Montreal: McGill-Queen's University Press, 1991), 14–27.
- 42 Chichester Alexander Bell, entry dated 27 February 1882, Home Notes, bk. 2, p. 14, AGB, box 25, folder “Bell, C. A. Scientific Experiments 1881–4,” 2d folder.
- 43 “Phono Chat,” *Phonogram I* 2, no. 3 (March 1892): 86. See also “Hears Sister's Voice on Phonograph,” *Phonogram II* 1, no. 6 (October 1900): 178; and “Letters by Phonography,” *Phonogram II* 1, no. 6 (October 1900): 181.
- 44 Alexander Graham Bell, Laboratory Notes, vol. 4, pp. 55–61, AGB, box 256, folder “Phonograph—Miscellany.”
- 45 Alexander Graham Bell to Chichester A. Bell and Charles Sumner Tainter, 14 June 1885, AGB, box 256, folder “Charles Sumner Tainter.”
- 46 Herbert Berliner, untitled speech (n.d.), EB, scrapbook “Phonograph, Graphophone, Gramophone: Historical Accounts.”
- 47 George H. Clark to Lee DeForest, 1940, GHC, series 135, box 532. Clark spent a good deal of time working on a definition of broadcasting and finally decided that the for-profit model of RCA was the ideal-type of broadcasting: a large, centralized source broadcasting to individuals or small groups of listeners in their homes and selling that audience to advertisers for profit. One could easily object that this definition's triumphalism renders it useless for historical purposes, and that would be true if one sought the “origin” of broadcasting as such. My purpose here, however, is simply to contrast the commercial form that radio eventually took with earlier forms of radio

communication, including antecedents of the current “American-style” capitalist broadcasting system.

- 48 Susan Douglas provides the richest account of this period in *Inventing American Broadcasting*; Susan Smulyan’s *Selling Radio* picks up where Douglas leaves off, in the early 1920s; and Robert McChesney’s *Telecommunications, Mass Media, and Democracy: The Battle for Control of U.S. Broadcasting, 1928–1935* (New York: Oxford University Press, 1994) provides a history of several broadcast reform movements in the United States and a useful critique of triumphalist accounts of American-style capitalist broadcasting.
- 49 J. Andrew White, “Report on the Broadcasting of the Dempsey-Carpentier Fight by RCA” (typescript apparently copied by George H. Clark from the original report), GHC, series 135, box 532.
- 50 *Ibid.*, 8. Additionally, KDKA of Pittsburgh planned to simulcast the fight to local theaters and to Forbes Field. In fact, it re-created the fight on the basis of telegraph transmissions from New Jersey. See Thomas White, “‘Battle of the Century’: The WJY Story” (available on-line at <http://www.ipass.net/~whitetho/wjy.htm>; last accessed 18 January 2001).
- 51 Marvin, *When Old Technologies Were New*, 230–31.
- 52 Kraft, *Stage to Studio*, 68–69. The alternative would have been to construct a state-based system of radio broadcasting and implement a tax on the ownership of radio sets to finance such broadcasting. Although this system eventually took hold in the United Kingdom and elsewhere, a variety of factors helped undermine the establishment of a similar system in the United States. See McChesney, *Telecommunications, Mass Media, and Democracy*, 100–101, 166–67.
- 53 Pierce B. Collison, “Shall We Have Music or Noise?” *Radio Broadcast*, September 1922, 434–36; Joseph H. Jackson, “Should Radio Be Used for Advertising?” *Radio Broadcast*, November 1922, 72–77.
- 54 Marvin, *When Old Technologies Were New*, 63–108.
- 55 Claude S. Fischer, *America Calling: A Social History of the Telephone to 1940* (Berkeley and Los Angeles: University of California Press, 1992), 40, 58–59, 78–79; Martin, “Hello, Central?” 140–67.
- 56 “Indeed, it was women’s extensive use of the telephone that eventually forced the industry to change some of its plans” (Martin, “Hello, Central?” 5).
- 57 Fischer, *America Calling*, 231.
- 58 Martin, “Hello, Central?” 148, 150.
- 59 Lana F. Rakow, *Gender on the Line: Women, the Telephone, and Community Life* (Urbana: University of Illinois Press, 1992), *passim*.
- 60 Marvin, *When Old Technologies Were New*, 102–8; John Brooks, *Telephone: The First Hundred Years* (New York: Harper and Row, 1976), 83–85.
- 61 Fischer, *America Calling*, 256.

- 62 McChesney, *Telecommunications, Mass Media, and Democracy*, 18, 25–28.
- 63 Raymond Williams's often-cited phrase, *mobile privatization*, would also be apropos here. Williams (*Television*, 20) references the increasing dependence on transportation and communication technologies among the emergent consumerist middle class. Clearly, this marks a change in the geography of public life.
- 64 "An Important Suggestion," *Phonogram I* 1, no. 1 (January 1891): 6.
- 65 Columbia Phonograph Co., *List of Users of the Phonograph and Phonograph-Graphophone in the District of Columbia, Maryland, and Delaware* (Washington, D.C.: Terry Bros., March 1891). Note that counts cannot be exact since phonographs in residences may be used for both work and leisure activities.
- 66 Fischer, *America Calling*, 40; Read and Welch, *From Tin Foil to Stereo*, 39; Millard, *America on Record*, 40–41.
- 67 Read and Welch, *From Tin Foil to Stereo*, 40–41.
- 68 Fischer, *America Calling*, 41.
- 69 Unfortunately, I know of no other existing phonograph directories from this period for comparison. On the uses of the phonograph by the federal government, see V. H. McRae, "The Present Position of the Phonograph and a Résumé of Its Merits," *Phonogram I* 1, no. 4 (April 1891): 83–84; and the collection of letters making the same point as McRae, *Phonogram I* 1, no. 4 (April 1891): 85–86.
- 70 See Nasaw, *Going Out*, 120–34.
- 71 Read and Welch, *From Tin Foil to Stereo*, 269.
- 72 Paraphrasing Edison as quoted in Roland Gelatt, *The Fabulous Phonograph, 1877–1977* (New York: Appleton-Century, 1977), 29; Attali, *Noise*, 93; and Chanan, *Repeated Takes*, 4.
- 73 "The Phonogram . . . has suggested to the manufacturers that albums be constructed, varying in size to suit purchasers, so that they may hold two, four, six, eight or even a hundred cylinders, and that these be prepared artistically, to resemble, as much as possible, in form, a photograph album, yet possessing the conveniences for holding the wax phonograms and keeping them intact" ("Being Dead, He Yet Speaketh," *Phonogram I* 2, no. 11 [November 1892]: 249).
- 74 Cylinders, too, could be mass produced (at least in theory), but no such scheme caught on between 1888 and 1895, when the gramophone was first being marketed.
- 75 Ohmann, *Selling Culture*, 140–49.
- 76 Emile Berliner, "The Gramophone: Etching the Human Voice," *Journal of the Franklin Institute* 75, no. 6 (June 1888): 445–46.
- 77 Nasaw, *Going Out*.
- 78 Jacques Derrida, Brianle Chang, and John Peters all argue in their own

way that this potential for dissemination is, in fact, the defining characteristic of all communication. While this may be the case, modern sound culture explicitly “problematized” (i.e., made a theoretical and practical issue of) both the sound event itself and the conditions under which it could become mobile. Dissemination became an explicitly social, economic, and cultural problem. See chapter 1 above; Jacques Derrida, *The Postcard: From Socrates to Freud and Beyond*, trans. Alan Bass (Chicago: University of Chicago Press, 1987); Brianke Chang, *Deconstructing Communication: Representation, Subject, and Economies of Discourse* (Minneapolis: University of Minnesota Press, 1996), esp. 171–221; and John Durham Peters, *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 33–62.

- 79 Michael Warner, “The Mass Public and the Mass Subject,” in *Habermas and the Public Sphere*, ed. Craig Calhoun (Cambridge, Mass.: MIT Press, 1994), 387–91; Carey, *Communication as Culture*, 1–36. Interestingly, Warner’s analysis can be read as a psychological restatement of the often-cited re-Feudalization thesis in Jürgen Habermas’s *Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society* (trans. Thomas Burger [Cambridge, Mass.: MIT Press, 1989]).
- 80 The United States Gramophone Co., “E. Berliner’s Gramophone: Directions for Users of the Seven-Inch American Hand Machine,” EBM, folder “Printed Matter.”
- 81 *Edison Phonograph Monthly* 1, no. 1 (March 1903): 1.
- 82 *The 1897 Sears Roebuck Catalogue*, ed. Fred L. Israel, with introductions by S. J. Perelman and Richard Rovere (New York: Chelsea House, 1968), 485.
- 83 *The 1902 Edition of the Sears Roebuck Catalogue*, with an introduction by Cleveland Amory (New York: Bounty, 1969), 156–64. In its copious and tiny copy, the catalog does not once mention the business uses of sound recording. Given that it offered other kinds of business supplies, the decision to market the graphophone primarily as an entertainment device was clearly a deliberate choice.
- 84 *Appointment by Telephone*, Library of Congress, Division of Motion Pictures, Broadcasting, and Recorded Sound, Paper Prints Collection, Edison 1902, LC 1460/FLA 4474.
- 85 Martin, “Hello, Central?” 146.
- 86 That said, residential telephone subscription was still relatively confined to the middle class and the rich. Telephones would become affordable to working people only after World War II. See Fischer, *America Calling*, 236–42.
- 87 Douglas, *Inventing American Broadcasting*, passim; Smulyan, *Selling Radio*,

- 37–64. For a discussion of listening for distance, or DXing, see the beginning of chapter 2.
- 88 The popularity of “race” and “ethnic” records suggests that a similar kind of cosmopolitanism was at work in phonographic listening practices during the same period. On race records, see William Barlow, “The Music Industry: Cashing In: 1900–1939,” in *Split Image: African Americans in the Mass Media*, ed. Jannette L. Dates and William Barlow (Washington, D.C.: Howard University Press, 1990), 25–56.
- 89 AT&T, “Multiplying Man-Power,” NWA, series 2, box 21, folder 3.
- 90 The Central District and Printing Telegraph Co., “The Telephone as Employee [*sic*],” NWA, box 21, folder 1.
- 91 AT&T, “Marshaling the Telephone Forces,” NWA, series 2, box 21, folder 3.
- 92 AT&T, “Highways of Speech,” NWA, series 2, box 21, folder 3, “The Clear Track,” NWA, series 2, box 21, folder 3, and “A Highway of Communication,” NWA, series 2, box 21, folder 1.
- 93 AT&T, “The Center of Population: A Title That Fits Every Bell Telephone,” WBA, telephone box, folder “AT&T #3.”
- 94 AT&T, “The Implement of the Nation,” NWA, series 2, box 21, folder 1, “A United Nation,” NWA, series 2, box 21, folder 1, and “The U.S. Is Only a Few Minutes Wide,” NWA, series 2, box 21, folder 3.
- 95 Two short films, both entitled *The Telephone*, Library of Congress, Division of Motion Pictures, Broadcasting, and Recorded Sound, Paper Prints Collection, Edison 1898m, LC 1075/FLA 4089 and LC 1076/FLA 4090.
- 96 “Here Is a Thrifty Habit for You,” ad for the Central District and Printing Telegraph Co., NWA, series 2, box 21, folder 1. The ad reads in part: “You can keep in personal contact with more people; you can be active in more affairs; you can make more money. Cultivate the telephone habit. It develops quick thinking and decisive action. It gives you mastery of self and surroundings. It is a liberal education.”
- 97 “The Imaginary and the Real Phonograph,” *Phonogram I* 2, no. 10 (October 1892): 205.
- 98 “Facts about the Phonograph When You Want a Stenographer,” *Phonogram I* 3, no. 2 (February 1893): viii.
- 99 Lubar, *Infoculture*, 171.
- 100 *The Stenographer’s Friend; or, What Was Accomplished by an Edison Business Phonograph* (a reissue of a 1904 film), Library of Congress, Division of Motion Pictures, Broadcasting, and Recorded Sound, Edison 1910.
- 101 Lizabeth Cohen, *Making a New Deal: Industrial Workers in Chicago, 1919–1939* (New York: Cambridge University Press, 1990), 99–158. See also “The Phonograph Uniting the Nation,” *Phonogram I* 3, nos. 3–4 (March and April 1893): 351; and Attali, *Noise*, 92.

5. The Social Genesis of Sound Fidelity

- 1 Victor Talking Machine Co., "Which Is Which?" WBA, phonographs box 1, folder 33, "Victor Talking Machine Co."
- 2 Victor Talking Machine Co., "Both Are Caruso," *Ladies Home Journal*, October 1913, 64.
- 3 Hillel Schwartz, *Culture of the Copy: Striking Likenesses, Unreasonable Facsimiles* (New York: Zone, 1996).
- 4 These are the two most common instances of the comparison of live and reproduced sound, although their frequency should not lead us to assume that they are transparently and transportably universal examples of "live" sound. Other examples could yield very different results.
- 5 I'm borrowing the phrase *vanishing mediator* from Slavoj Žižek (who borrows it from Fredric Jameson), but to argue against a philosophy of mediation (whereas Žižek uses the term to extend a philosophy of mediation). For Žižek, a vanishing mediator is the fourth movement in Hegel's dialectic, where the mediating term disappears, leaving its structure and effect but not its form. His reading of Weber's account of the capitalist ethos posits Protestantism as the vanishing mediator since Weber argues that, by the twentieth century, capitalism no longer needed Protestantism for an ethos. While this proves a useful argument for Žižek's purposes, I am using the term to slightly different ends. When technologies of reproduction are idealized as vanishing mediators, they are alternately fetishized as historical agents in and of themselves and instrumentalized as merely a means to an end. In fact, they do not mediate between originals and copies at all. For Žižek's discussion, see his *For They Know Not What They Do: Enjoyment as a Political Factor* (New York: Verso, 1991), 179–88. For Jameson's original use, see his "The Vanishing Mediator; or, Max Weber as Storyteller," in *Ideologies of Theory* (Minneapolis: University of Minnesota Press, 1988), 2: 3–34.
- 6 James Lastra, *Sound Technology and American Cinema: Perception, Representation, Modernity* (New York: Columbia University Press, 2000), 123–53.
- 7 Ibid.
- 8 Eric W. Rothenbuhler and John Durham Peters, "Defining Phonography: An Experiment in Theory," *Musical Quarterly* 81, no. 2 (summer 1997): 246 (first quotation), 252 (second quotation), 260.
- 9 The argument is fully developed in Rick Altman, "The Material Heterogeneity of Recorded Sound," in *Sound Theory, Sound Practice*, ed. Rick Altman (New York: Routledge, 1992), 15–31.
- 10 Raymond Williams, "Base and Superstructure in Marxist Cultural Theory," in *Problems in Materialism and Culture* (London: Verso, 1980), 47.

- 11 Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, trans. Harry Zohn (New York: Schocken, 1968), 221.
- 12 Gilles Deleuze, *The Logic of Sense*, trans. Mark Lester (New York: Columbia University Press, 1990), 259.
- 13 Benjamin, "The Work of Art," 243, 233, 232.
- 14 See, e.g., Kristin Thompson's well-known work on early cinema as a studio art in David Bordwell, Janet Staiger, and Kristin Thompson, *The Classical Hollywood Cinema: Film Style and Mode of Production to 1960* (New York: Columbia University Press, 1985), 155–240.
- 15 Sarah Thornton, *Club Cultures: Music, Media, and Subcultural Capital* (Hanover, N.H.: Wesleyan University Press, 1996), 42–43.
- 16 Lastra, *Sound Technology and American Cinema*, 131.
- 17 Deleuze, *The Logic of Sense*, 257, 262.
- 18 Barry Truax, *Acoustic Communication* (Norwood, N.J.: Ablex, 1984), 8–9.
- 19 For a discussion of Western Electric's development of electric recording, see Andre Millard, *American on Record: A History of Recorded Sound* (New York: Cambridge University Press, 1995), 140–44. For an account of the development of electroacoustic measurements, see Emily Thompson, "Mysteries of the Acoustic: Architectural Acoustics in America, 1800–1932" (Ph.D. diss., University of Pennsylvania, 1992), 265–76.
- 20 "The Human Voice Is Human on the New Orthophonic Victrola," advertisement proof, NWA, series I, box 294, folder 1.
- 21 This is Latour and Woolgar's often-cited point that representations of processes are attempts to delimit and order them. While Latour and Woolgar's analysis was based on laboratory notes (as is some of mine), it can also be generalized to descriptions of mechanical processes outside strictly "scientific" contexts. See Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton, N.J.: Princeton University Press, 1986), 45–53, 244–52.
- 22 Andreas Huyssen, "Mass Culture as Woman: Modernism's Other," *Studies in Entertainment*, ed. Tania Modleski (Bloomington: Indiana University Press, 1986), 188–207. See also Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (Chicago: University of Chicago Press, 1992), 11–35; Richard Leppert, *The Sight of Sound: Music, Representation, and the History of the Body* (Berkeley and Los Angeles: University of California Press, 1993); David Nasaw, *Going Out: The Rise and Fall of Public Amusements* (New York: Basic, 1993); and Richard Ohmann, *Selling Culture: Magazines, Markets, and Class at the Turn of the Century* (New York: Verso, 1996). On women and the telephone, see Michèle Martin, "Hello, Central?": *Gender, Technology, and Culture in the Formation of Telephone Systems* (Montreal:

McGill-Queen's University Press, 1991); and Lana F. Rakow, *Gender on the Line: Women, the Telephone, and Community Life* (Urbana: University of Illinois Press, 1992).

- 23 Elisha Gray's patent caveats for the telephone employ similar artistic conventions.
- 24 For a discussion of the ear phonograph and the tympanic in general, see chapter 1.
- 25 Bugs and other devices for recording sonic events that were not specifically being produced for reproduction were developed over the course of the 1920s and 1930s. A cultural history of electronic eavesdropping has yet to be written, although Clinton Heylin's *Bootleg: The Secret History of the Other Recording Industry* (New York: St. Martin's, 1995) offers some interesting tidbits on the early history of secret recordings.
- 26 My argument here echoes that of Jürgen Habermas in *Structural Transformation of the Public Sphere* (Cambridge, Mass.: MIT Press, 1989), 31–43, 159–74. In order for a cultural practice to cohere and operate effectively, it needs spaces. Thus, for Habermas, the shift from salons to suburbs creates a physical crisis in the possibility of a public sphere. I am arguing here that the spatiality of reproduction is also essential to the very existence of reproducibility itself, not in some abstract sense, but in the real existence of phone lines and booths, recording and radio studios, and parlors and homes for listeners.
- 27 Chichester Alexander Bell, entry dated 1 March 1882, Home Notes, bk. 2, p. 15, AGB, box 25, folder "Bell, C. A. Scientific Experiments 1881–4," 2d folder.
- 28 Eldridge Johnson, quoted in *Talking Machine World*, September 1910, 47.
- 29 Steven Jones, "A Sense of Space: Virtual Reality, Authenticity, and the Aural," *Critical Studies in Mass Communication* 10 (1993): 238–52.
- 30 C. E. Le Massena, "How Opera Is Broadcasted: Difficulties That Must Be Overcome in Order to Obtain the Best Results; How Singers Must Be Especially Drilled and Grouped, and How the Opera Must Be Revised, Interpreted, and Visualized to Make Up for the Lack of Action, Costumes, and Scenery; Artists Are Put in a Musical Straitjacket; Moving, Whispering, Even Deep Breathing a Crime," *Radio Broadcast*, August 1922, 286. The lengthy subtitle suggests the degree to which studio workers understood music's abstraction from event to sound.
- 31 For an interesting contemporary case, see the discussion of hip hop and recording in Greg Dimitriadis, *Performing Identity/Performing Culture: Hip Hop as Text, Pedagogy, and Lived Practice* (New York: Peter Lang, 2001), 15–34. Dimitriadis's argument parallels mine: as hip hop moved from a live to

- a studio performance setting, the form, sound, content, and meaning of the music changed significantly.
- 32 Thomas A. Watson, *The Birth and Babyhood of the Telephone* (reprint, n.p.: American Telephone and Telegraph Co., Information Department, 1934), 28.
 - 33 "Phonograph Singers," *Phonogram II* 2, no. 1 (November 1900): 7.
 - 34 Early studio manager quoted in E. W. Mayo, "A Phonographic Studio," *Antique Phonograph Monthly* 6, no. 6 (June 1980): 7. Mayo speculates that the studio in which this manager worked was Bettini's.
 - 35 Herbert A. Shattuck, "The Making of a Record," *Phonogram II* 2, no. 5 (March 1901): 183–84.
 - 36 Leon Alfred Duthernoy, "Singing to Tens of Thousands: Impressions of an Artist during His First Radio Concert," *Radio Broadcast*, November 1922, 49.
 - 37 *Ibid.*, 50–51.
 - 38 *Ibid.*, 51.
 - 39 Max Weber, *The Protestant Ethic and the Spirit of Capitalism*, trans. Talcott Parsons (New York: Scribner's, 1958), 181.
 - 40 Watson, *Birth and Babyhood of the Telephone*, 27.
 - 41 This account is taken from Tim Brooks, "The Last Words of Harry Hayward: A True Record Mystery," *Antique Phonograph Monthly* 1, no. 6 (June–July 1973): 1, 3–9.
 - 42 Jacques Attali, *Noise: The Political Economy of Music*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1985), 101.
 - 43 William Howland Kenney, *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1930* (New York: Oxford University Press, 1999), 11; Ruth Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic, 1983); J. Macgregor Wise, "Community, Affect, and the Virtual: The Politics of Cyberspace," in *Virtual Publics: Policy and Community in an Electronic Age*, ed. Beth Kolko (New York: Columbia University Press, 2003). See also Miles Orvell, *The Real Thing: Imitation and Authenticity in American Culture, 1880–1940* (Chapel Hill: University of North Carolina Press, 1989).
 - 44 *Columbia Disc Records Catalogue, 1904*, personal collection of George Kimball. Thanks to George Kimball for sharing this document with me.
 - 45 Based on a listening survey of descriptive specialties on file at the Library of Congress Recorded Sound Reference Center. With the exception of an industry magazine reporting that a young woman had accidentally come across the testimonials of a murderer and fainted, I have yet to discover an account of someone listening to this kind of recording. Listener response is,

thus, difficult to gauge except to note that the genre died out in the late 1910s.

- 46 Rudolf Arnheim, *Radio*, trans. Margaret Ludwig and Herbert Read (London: Faber and Faber, 1936), 42.
- 47 Kristin Thompson, "The Formulation of the Classical Style, 1909–28," in *The Classical Hollywood Cinema: Film Style and Production to 1960*, by David Bordwell, Janet Staiger, and Kristin Thompson (New York: Columbia University Press, 1985), 157–73.
- 48 J. Andrew White, "Report on the Broadcasting of the Dempsey-Carpentier Fight by RCA" (typescript apparently copied by George H. Clark from the original report), GHC, series 135, box 532. Pittsburgh's KDKA did one better by broadcasting a voice description of the fight based on telegraph transmissions from Hoboken, N.J., where operators listened to the RCA transmission. See Thomas White, "'Battle of the Century': The WJY Story" (available on-line at <http://www.ipass.net/~whitetho/wjy.htm>; last accessed 18 January 2001).
- 49 Roland Barthes argues that there are two levels of signification: denotation, which is the propositional content of the message, and connotation, which is the effective content of the message. For instance, a photograph of a black Algerian soldier saluting the French flag denotes the event but connotes a much more insidious colonial message. See Roland Barthes, "The Photographic Message," in *A Barthes Reader*, ed. Susan Sontag (New York: Hill and Wang, 1982), 194–210.
- 50 Bruno Latour, "Mixing Humans and Nonhumans Together: The Sociology of a Door-Closer," *Social Problems* 35, no. 1 (June 1988): 298–310.
- 51 Robert V. Bruce, *Bell: Alexander Graham Bell and the Conquest of Solitude* (Boston: Little, Brown, 1973), 181.
- 52 Jacques Attali (*Noise*, 87) writes that, in antiquity, the power to record sound was reserved for the gods. Perhaps the hope was to extend this power to rulers.
- 53 Bruce, *Bell*, 197. Bruce recounts the entire episode on pp. 193–97.
- 54 "Telephony: Audible Speech by Telegraph," *Scientific American*, suppl. 48 (25 November 1876): 765. For a discussion of visual verification of earlier audio technologies, see chapters 2 and 3.
- 55 Millard, *America on Record*, 24–25.
- 56 Watson, *Birth and Babyhood of the Telephone*, 25.
- 57 Claude S. Fischer, *America Calling: A Social History of the Telephone to 1940* (Berkeley and Los Angeles: University of California Press, 1992), 60.
- 58 "The Telephone: Professor Bell's Lecture in Music Hall Last Evening: A Novel Entertainment—History of the Telephone Invention—Music and

- Speech from Somerville and Providence,” unattributed newspaper clipping, EG, box 2, folder 3.
- 59 John Durham Peters, *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 180.
- 60 Latour and Woolgar, *Laboratory Life*, 154–68, 236–44.
- 61 Charles Sumner Tainter, “The Talking Machine and Some Little Known Facts in Connection with Its Early Development,” 7, CST, series I, box 1, folder 5, Home Notes, 1881, 3:22–23, CST, series II, box 2, folder 4, and Home Notes, 1881, 3:25, CST, series II, box 2, folder 4. See also Charles Sumner Tainter, Home Notes, 1881, 2:67, CST, series II, box 2, folder 3, Home Notes, 1881, 3:5, CST, series II, box 2, folder 4, Home Notes, 1882, 8:99, CST, series II, box 2, folder 9.
- 62 “A Red Letter Day for Photophony!” (anonymous typescript copy of A. G. Bell’s “Work-Room Notes. Vol. 1,” 158), AGB, box 256, folder “Photophone—Miscellany.”
- 63 Thomas A. Edison, “The Phonograph and Its Future,” *Telegraphic Journal*, 15 June 1878, 250. Edison’s article also marks one of the earliest uses of fidelity, in this case referring to the ability of the reproducing needle and embossed tinfoil fully to reverse the recording process. The question of permanence as it is dealt with here and elsewhere is the subject of chapter 6.
- 64 Charles Sumner Tainter, Home Notes, 1881, 1:19, 39, 41, 65, 87, 95, CST, series II, box 2, folder 2, Home Notes, 1881, 3:7, 19, 23, 73, 83, CST, series II, box 2, folder 4, Home Notes, 1881, 4:5–7, CST, series II, box 2, folder 5, Home Notes, 1882, 8:57, CST, series II, box 2, folder 9, Home Notes, 1883, 11:83–93, CST, series II, box 2, folder 10, and Home Notes, 1883, 12:85, CST, series II, box 2, folder 11.
- 65 Chichester Alexander Bell, entry dated 11–13 February 1882, Home Notes, 2:5–8, AGB, box 25, folder “Bell, C. A. Scientific Experiments 1881–4,” 2d folder.
- 66 Charles Sumner Tainter, Home Notes, 1882, 8:101 (see also 99–101), CST, series II, box 2, folder 9.
- 67 Charles Sumner Tainter, Home Notes, 1881, 2:9, CST, series II, box 2, folder 3. See also Charles Sumner Tainter, Home Notes, 1881, 3:25, CST, series II, box 2, folder 4.
- 68 Chichester Alexander Bell, entry dated 17 February 1882, Home Notes, 2:11, AGB, box 25, folder “Bell, C. A. Scientific Experiments 1881–4,” 2d folder.
- 69 For example, Charles Sumner Tainter, Home Notes, 1882, 8:87, CST, series II, box 2, folder 9, and Home Notes, 1883, 12:25, CST, series II, box 2, folder 13.

- 70 John Corbett, *Extended Play: Sounding Off: From John Cage to Dr. Funkenstein* (Durham, N.C.: Duke University Press, 1994), 36.
- 71 Jean-Louis Baudry, "Ideological Effects of the Basic Cinematographic Apparatus" and "The Apparatus: Metapsychological Approaches to the Impression of Reality in Cinema," in *Narrative, Apparatus, Ideology: A Film Theory Reader*, ed. Philip Rosen (New York: Columbia University Press, 1986), 286–98, 299–318; Laura Mulvey, *Visual and Other Pleasures* (Bloomington: Indiana University Press, 1989).
- 72 Alexander Graham Bell to Chichester A. Bell and Charles Sumner Tainter, 14 June 1885, AGB, box 256, folder "Charles Sumner Tainter." Bell's letter was also probably an artifact of the Volta Laboratory's running out of money and needing to seek new sources of income. See Tainter, "The Talking Machine," 73–75, 96–99.
- 73 No known recordings of Alexander Graham Bell's voice survive from this period.
- 74 See David Morton, *Off the Record: The Technology and Culture of Sound Recording in America* (New Brunswick, N.J.: Rutgers University Press, 2000), 76–86.
- 75 In "Machines, Music, and the Quest for Fidelity: Marketing the Edison Phonograph in America, 1877–1925," *Musical Quarterly* 79 (spring 1995): 131–75, Emily Thompson distinguishes between two types of tone tests, one featuring major artists in large halls of major cities, the other using less-renowned artists in small towns (the latter was far more common).
- 76 *Ibid.*, 149.
- 77 "Two Good Ones from Wichita, Kansas," *Phonogram II* 3, no. 5 (September 1901): 77.
- 78 The reviews are discussed in Thompson, "Machines, Music, and the Quest for Fidelity," 157. Although Thompson wants to privilege consumption at the abstract level (in the persona of the consumer), this privilege disappears in her analysis; the Edison Company, advertisers, promoters, performers, machines, and listeners are all actors in her history—a history that appears to be driven at least as much by capitalization and management planning as by consumption.
- 79 Victor Talking Machine Co., "No Need to Wait for Hours in the Rain," WBA, phonographs box 1, folder 33.
- 80 "The Acme of Realism," advertisement in *Phonogram II* 2, no. 5 (March 1901): 187.
- 81 Letter to the Editor, *Phonogram II* 3, no. 2 (June 1901): 29.
- 82 Stuart Hall, "The Narrative Construction of Reality: An Interview with Stuart Hall," *Southern Review* 17 (March 1984): 8.

- 83 “Dr. Jekyll and Mr. Hyde,” clipped, undated AT&T advertisement from *Town and Country*, NWA, telephone box 1, folder “AT&T #4.”
- 84 “Telephone Etiquette,” NWA, telephone box 1, folder “AT&T #4”; New York Telephone Co., “Courtesy between Telephony Users,” WBA, telephone box 3, folder “NY Telephone #2,” and “The Bell Telephone: For Cheap and Instantaneous Communication by Direct Sound,” WBA, telephone box 2, folder “NY Telephone #2.”
- 85 “Courtesy between Telephony Users.”
- 86 Undated letter on U.S. House of Representatives letterhead, AGB, box 255, folder “Phonograph Correspondence.”
- 87 Charles Sumner Tainter, “The Graphophone,” *Electrical World*, 14 July 1888, 16, and “The Talking Machine,” 85.
- 88 Sales tags for gramophone, dated 1894, EB, scrapbook 3.
- 89 Owner’s manual for seven-inch American Hand Gramophone, dated 1894, EB, scrapbook 3.
- 90 The lack of standardized pitch and rotation speed has proved to be a significant problem when early ethnographic recordings are replayed today. Although some ethnographers had the foresight to use a pitch pipe or some other method by which pitch could be standardized, even these markers can be unclear. In some cases, recording engineers have not been able to discern whether the pitch pipe was tuned to A or C.
- 91 Edison Phonograph Works, *Inspector’s Handbook of the Phonograph* (Orange, N.J., 1889), passim, National Museum of American History, Division of Mechanisms.
- 92 “The Victor System of Changeable Needles Gives You Complete Musical Control,” *Ladies Home Journal*, June 1913, 68.
- 93 E.G., “The Brunswick Method of Reproduction: Certainly Different! Certainly Better!” *Ladies Home Journal*, August 1920, 179. Brunswick offered a built-in tone arm with multiple needles. This tradition continues—in other forms, e.g., equalization—with consumer electronics down to the present day.
- 94 “Another Famous Tower,” clipping from *Wireless Age*, May 1925, GHC, series 60, box 331; “Loud Speaker Qualities: A Most Important Feature in Listening: Results of a Test,” GHC, series 60, box 331; “The End of a Perfect Howl,” *Radio Broadcast*, July 1922, n.p. (advertising section); “Stop Buzzing and Sizzling,” *Radio Broadcast*, July 1922, n.p. (advertising section).
- 95 “Ye Telephonists of 1877: Harmonious Internal Working,” in *Lightning Flashes and Electric Dashes: A Volume of Choice Telegraphic Literature, Humor, Fun, Wit, and Wisdom, Contributed to by All of Principal Writers in the Ranks*

of *Telegraphic Literature as Well as Some Well-Known Outsiders, with Numerous Wood-Cut Illustrations* (New York: W. J. Johnston, 1877).

- 96 Geo. S. Beetle to Elisha Gray, 13 August 1877, EG, box 2, folder 4.
- 97 On the quality of telephone sound, see also Fischer, *America Calling*, 166–67.
- 98 Barry Pain, “Diary of a Baby,” *The Reader*, October 1906, 566. Thanks to Adrienne Berney for sending me this source.
- 99 “We Thought It Was a Bunch of Tin Cans,” spoof advertisement clipped from *Judge* magazine, n.d., GHC, series 169, box 579a.
- 100 “A Piercing Shriek . . .,” GHC, series 169, box 572.
- 101 “Broadcasting Close to Nature,” clipping from the *Boston Post*, Tuesday, 13 May 1924, GHC, series 169, box 572.
- 102 “Somebody’s . . . All for \$7.35,” GHC, series 169, box 572.
- 103 “Our Tattler,” *Phonogram II* 4, no. 5 (March 1902): 67.
- 104 Carolyn Marvin, *When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century* (New York: Oxford University Press, 1988), 191–231.
- 105 Typescript dated 4 April 1877, AGB, box 386, folder “Telephone: Series of Lectures, Boston, April, May 1877.”
- 106 “A True Mirror of Sound: Bettini Micro-Phonograph: Micro-Diaphragms for Phonograph and Graphophone,” National Museum of American History, Library.
- 107 “Columbia Grafonola De Luxe,” WBA, phonographs series 3, box 5, folder 7.
- 108 “The Trill of Galli-Curci’s Voice as It Rises and Soars,” advertisement, *Radio Broadcast*, June 1922, 4.
- 109 “Stupendous Advance over Former Recording Instruments,” NWA, series I, box 294, folder 1.
- 110 “All the Roundness and Warmth of the Original,” advertisement proof, NWA, series I, box 294, folder 1.
- 111 “My Voice Being Reflected Back to Me,” advertisement proof, NWA, series I, box 293, folder 1.
- 112 “Its Performance Is Gorgeous, Amazing,” advertisement proof, NWA, series I, box 294, folder 1.
- 113 “Reproduces the Spirit of the Interpreter,” advertisement proof, NWA, series I, box 294, folder 1; “Glittering Symphony Music—Colorful Fabrics of Sound for Your Music Library,” advertisement proof, NWA, series I, box 294, folder 1.
- 114 Millard, *America on Record*, 142–47.
- 115 John Mowitt, “The Sound of Music in the Era of Its Electronic Reproducibility,” in *Music and Society: The Politics of Composition, Performance, and*

- Reception*, ed. Richard Leppert and Susan McClary (New York: Cambridge University Press, 1987), 194; Peter Manuel, *Cassette Culture: Popular Music and Technology in North India* (Chicago: University of Chicago Press, 1993). To Manuel's examples, we could add the popularity of "lo-fi" recording techniques in North American genres like hardcore punk and techno.
- 116 Oliver Read and Walter L. Welch, *From Tin Foil to Stereo: Evolution of the Phonograph* (Indianapolis: H. W. Sams, 1976), 237–75. See also Roland Gelatt, *The Fabulous Phonograph: From Edison to Stereo* (New York: Appleton-Century, 1965), 219–28.
- 117 Tony Faulkner, "FM: Frequency Modulation or Fallen Man?" in *Radio-text(e)*, ed. Neil Strauss (New York: Semiotext[e], 1993), 61–65; Lawrence Lessig, *Man of High Fidelity: Edwin Howard Armstrong* (New York: Bantam, 1956). Lessig's biography is very much a great-man narrative, but it does provide some useful historical information on FM and Armstrong.
- 118 Tainter, "The Talking Machine," 34. Similarly, "The Telephone" (article clipping dated March 1878, AGB, box 305, folder "Telephone, Printed Matter 1877–1925") lamented the "feebleness" of telephonic speech while praising the invention of the telephone itself.
- 119 Incomplete clipping from the "*Cam. (N.Y.) Advertiser*," 8 December 1888, EB, Berliner scrapbook 2.
- 120 *Electrical World*, 29 June, 375.
- 121 "E. Berliner's Multiphone (Multiplex Gramophone)," program for an undated public performance, EB, Berliner scrapbook 2.
- 122 "Fake Records," *Phonoscope* 2, no. 11 (November 1898): 10. The *Phonoscope* was essentially an extension of the Edison empire, so criticism of the gramophone cannot be taken to be impartial.
- 123 "Gramophone Is Suppressed: It Took Martial Law to Do It in St. Petersburg," *New York Times*, Sunday, 17 October 1909, C2.
- 124 "May Be Heard Ten Miles Away," *Phonogram II* 2, no. 2 (December 1900): 71. The article goes on to argue that this (likely entirely fictional) invention was in fact accomplished by Edison at the unlikely date of 1879, with a machine called the "aerophone . . . for projecting the human voice an indefinite distance" (73–75).
- 125 "An Instrument of Satan," *Phonogram II* 2, no. 3 (January 1901): 99; "January Notes," *Phonogram II* 2, no. 3 (January 1901): 127.
- 126 Anne McClintock, *Imperial Leather: Race, Gender, and Sexuality in the Colonial Contest* (New York: Routledge, 1995), 223–26; and Ohmann, *Selling Culture*, 203–5.
- 127 Sigmund Spaeth, *Listening* (New York: Federal-Brandes, 1927), 4, 5, NWA, radio box 1, Kolster folder.
- 128 *Ibid.*, 7, 9, 19, 20, 28.

- 129 This is Lastra's argument concerning the "identity" theorists whom he criticizes. His point, albeit argued on different grounds, is also that copies are not necessarily best understood as debased versions of an original. See Lastra, *Sound Technology and American Cinema*, 126–27.
- 130 It is also possible to celebrate this irrevocable difference between real and copy: for John Mowitt, the advent of the recording studio testifies "to the technological advances that made the present priority of cultural consumption over cultural production possible" ("The Sound of Music," 175). But the recording studio ties those possibilities for listening intimately to the possibilities for production. The relative weight of production or consumption is not the question here.

6. A Resonant Tomb

- 1 "Fewkes Collection, 39 ('40') taken from the Passamaquoddy Indians, 10 taken from the Zuñi Indians—includes non-field recordings," transcription made ca. 1980 by a Library of Congress sound engineer of cylinders (now barely audible) recorded by the anthropologist Jesse Walter Fewkes in the 1890s, Library of Congress, American Folklife Center, folder "Fewkes, Jesse Walter." The epigraph is a transcription of a test recording of Fewkes's voice.
- 2 C. B. Lewis, "Mr. Bowser's Tribulations," *Phonogram II* 2, no. 4 (February 1901): 151 (reprinted from an unspecified issue of *McClure's*).
- 3 D. L. LeMahieu, *A Culture for Democracy: Mass Communication and the Cultivated Mind in Britain between the Wars* (Oxford: Clarendon Press, 1988), 89.
- 4 Avital Ronell, *The Telephone Book: Technology—Schizophrenia—Electric Speech* (Lincoln: University of Nebraska Press, 1989), 438.
- 5 "Microphone Inventor Is Resident of the Capital," *Washington Post*, Sunday, 21 June 1925, EB, Berliner scrapbook 1.
- 6 Susan Douglas argues that spiritualism in fact helped shape the radio craze of the 1920s. See her *Listening In: Radio and the American Imagination from Amos 'n Andy and Edward R. Murrow to Wolfman Jack and Howard Stern* (New York: Random House, 1999), 40–48. Ronell (*The Telephone Book*, 245–50) makes a similar point about telephony, focusing on Thomas Watson's interest in spiritualism. See also Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham, N.C.: Duke University Press, 2000)—which arrived in my hands too late to be seriously addressed in this book.
- 7 I discuss the exteriority of sound in the introduction and first three chapters.
- 8 John Durham Peters, *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 147.

- 9 In addition to the account in Douglas's *Listening In*, see Peters, *Speaking into the Air*, 188–94; and John Morley, *Death, Heaven, and the Victorians* (Pittsburgh: University of Pittsburgh Press, 1971), esp. 19–31, 102–11.
- 10 Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, Calif.: Stanford University Press, 1999), 5–13 (quotation from 13). See also Peters, *Speaking into the Air*, 137–76; Peters's provocative observation of “the unity of communication at a distance and communication with the dead” (248) captures this transhistorical impulse quite well.
- 11 John Philip Sousa, “The Menace of Mechanical Music,” *Appleton's Magazine* 8 (September 1906): 278–84, 279. See also William Howland Kenney, *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1945* (New York: Oxford University Press, 1999), 31.
- 12 Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic, 1983), 73. See also Kenneth Kiple and Kreimhild Conee Ornelas, eds., *The Cambridge World History of Food* (New York: Cambridge University Press, 2000), 2:1314; and Waverly Lewis Root and Richard de Rochemont, *Eating in America: A History* (New York: William Morrow, 1976).
- 13 Sousa's aesthetic criticisms of recorded music were of the zero-sum variety—listening to recorded music would discourage the production of “live” music and lower Americans' musical tastes. See Kenney's discussion of Sousa in *Recorded Music in American Life*, 31. And see also Sousa, “The Menace of Mechanical Music.”
- 14 Amy Lawrence, *Echo and Narcissus: Women's Voice in Classical Hollywood Cinema* (Berkeley and Los Angeles: University of California Press, 1991), 13–14; James Lastra, *Sound Technology and American Cinema: Perception, Representation, Modernity* (New York: Columbia University Press, 2000), 61–91; Theodor Adorno, “The Curves of the Needle,” trans. Thomas Levin, *October*, no. 55 (winter 1990): 54.
- 15 On the history of the body, see also my discussion in the introduction. The reference to biopower is taken from the last section of Michel Foucault, *The History of Sexuality*, vol. 1, *An Introduction*, trans. Robert Hurley (New York: Vintage, 1978), 133–59.
- 16 Christine Quigley, *The Corpse: A History* (Jefferson, N.C.: McFarland, 1996), 62.
- 17 Christine Quigley, *Modern Mummies: The Preservation of the Human Body in the Twentieth Century* (Jefferson, N.C.: McFarland, 1998), 5; Robert G. Mayer, *Embalming: History, Theory, and Practice*, 2d ed. (Stamford, Conn.: Appleton and Lange, 1996), 113.

- 18 Jean-Nicolas Gannal, *History of Embalming, and of Preparations in Anatomy, Pathology, and Natural History, Including an Account of a New Process for Embalming*, trans. Richard Harlan (Philadelphia: J. Dobson, 1840).
- 19 Quigley, *The Corpse*, 55.
- 20 Robert W. Habenstein and William M. Lamers, *The History of American Funeral Directing* (Milwaukee: Bulfin Printers, 1955), 328.
- 21 “A complaint was made to General Grant by the railroad companies of offensive odor from the bodies on trains going North. An order was issued to Jacob Weaver, Undertaker at Baltimore to board every train and remove all bodies that were offensive, put them into a vault, or enclose them in tight zinc boxes and notify their friends, and every embalmer at City Point was ordered to leave the army. Large numbers of bodies which had been dead only two or three days were taken from the trains” (*The Casket*, May 1892, quoted in Habenstein and Lamers, *The History of American Funeral Directing*, 334–35).
- 22 Robert Kastenbaum and Beatrice Kastenbaum, eds., *The Encyclopedia of Death* (Phoenix: Oryx, 1989), 109.
- 23 Habenstein and Lamers, *The History of American Funeral Directing*, 333.
- 24 *Ibid.*, 448.
- 25 Quigley, *The Corpse*, 56; Habenstein and Lamers, *The History of American Funeral Directing*, 335.
- 26 Kastenbaum and Kastenbaum, eds., *The Encyclopedia of Death*, 110.
- 27 E. W. Mayo, “A Phonographic Studio,” *Antique Phonograph Monthly* 6, no. 6 (June 1980): 7 (reprinted from the July 1899 issue of *Quaker Magazine*).
- 28 “A Wonderful Invention—Speech Capable of Indefinite Repetition from Automatic Records,” *Scientific American*, 17 November 1877, 304.
- 29 Jacques Derrida, *Of Grammatology*, trans. Gayatri Chakravorty Spivak (Baltimore: Johns Hopkins University Press, 1976), 4, 7.
- 30 “An Imperishable Phonograph Record,” *Phonogram II* 4, no. 6 (April 1902): 93 (reprinted from an unspecified edition of the *Kansas City Star*).
- 31 “The Indestructible Records,” NWA, phonograph box 1, folder 18, “Indestructible Records Company”; “Indestructible Phonographic Records Do Not Wear Out,” *ibid.*; Brian Philpot to Dealers, 30 September 1908, *ibid.*; Indestructible Record Co. to Clayton P. Olin, 1 April 1908, 2 April 1908, 21 July 1908, and 8 August 1908, *ibid.*; “Special” to Dealers, n.d., *ibid.*; Oliver Read and Walter L. Welch, *From Tin Foil to Stereo: Evolution of the Phonograph* (New York: Bobbs-Merrill, 1976), 96, 100, 103, 193, 197. Interestingly, some listeners and collectors have noted that the original celluloid Indestructible records did hold up well over repeated playings and long-term aging.
- 32 Leonard Petts, *The Story of “Nipper” and the “His Master’s Voice” Picture*

- Painted by Francis Barraud* (Bournemouth: Ernie Bayly for the Talking Machine Review International, 1983). See also Lawrence, *Echo and Narcissus*, 14.
- 33 Kittler, *Gramophone, Film, Typewriter*, 69.
 - 34 Morley, *Death, Heaven, and the Victorians*, 201 (Morley's pl. 1 is an image of a dog attending a cradle); Peters, *Speaking into the Air*, 161.
 - 35 See the images of attentive dogs in Richard Leppert, *The Sight of Sound: Music, Representation, and the History of the Body* (Berkeley and Los Angeles: University of California Press, 1993), 78, 167.
 - 36 Robert Feinstein, "His Master's Casket: Notes on Some Phonographic Undertakings," *Antique Phonograph Monthly* 6, no. 7 (July 1980): 1, 3–6.
 - 37 "The Strangest Funeral Ever Heard," *Phonogram I* 2, no. 11 (November 1892): 246–47.
 - 38 "Preached His Own Funeral Sermon by Phonograph," *Edison Phonograph Monthly* 3, no. 3 (May 1905): 12. For singers, see "A Phonograph at a Funeral," *Edison Phonograph Monthly* 3, no. 2 (April 1905): 10.
 - 39 Feinstein, "His Master's Casket," 6.
 - 40 Duplex Phonograph Co., "Let Us Send You This Two-Horn Duplex Phonograph on Trial Direct from Our Factory to Your Own Home," WBA, phonograph box 1, folder "Duplex Phonograph."
 - 41 "Form B-94," gramophone advertisement handbill, probably ca. 1894, EB, scrapbook 2.
 - 42 Quoted in Roland Gelatt, *The Fabulous Phonograph, 1877–1977* (New York: Appleton-Century, 1977), 29. The Victorian family album is discussed in chapter 4.
 - 43 "The Voice of the Late William J. Florence Is Always with Us, Thanks to Mr. Edison's Phonograph," *Phonogram I* 1, nos. 11–12 (November–December 1891): 253.
 - 44 "The Voice of the Dead," *Phonogram I* 2, no. 1 (January 1892): 8.
 - 45 "A Quartette of Australian Good Ones," *Phonogram II* 3, no. 6 (October 1901): 86.
 - 46 "August Notes," *Phonogram II* 3, no. 4 (August 1901): 63.
 - 47 For a discussion of delegation, see the previous chapter and also Bruno Latour, "Mixing Humans and Nonhumans Together: The Sociology of a Door-Closer," *Social Problems* 35, no. 1 (June 1988): 298–310.
 - 48 Adorno, "The Curves of the Needle," 54.
 - 49 "Voices of the Dead," *Phonoscope* 1, no. 1 (15 November 1896): 1.
 - 50 Leon Alfred Duthernoy, "Singing to Tens of Thousands: Impressions of an Artist during His First Radio Concert," *Radio Broadcast*, November 1922, 49–51. See the discussion in chapter 5.
 - 51 Kittler, *Gramophone, Film, Typewriter*, 55.

- 52 Alexander Graham Bell, typed transcription of an excerpt from *Laboratory Note Books*, Sunday, 22 January 1888, AGB, box 256, folder “Phonograph-Smithsonian.”
- 53 Library of Congress, Recorded Sound Reference Center, early recording optical disk.
- 54 Gary Gumpert, *Talking Tombstones and Other Tales of the Media Age* (New York: Oxford University Press, 1987), 5.
- 55 Mattei Calinescu, *Five Faces of Modernity: Modernity, Avant-Garde, Decadence, Kitsch, Postmodernism* (Durham, N.C.: Duke University Press, 1987), 13.
- 56 Janet Lyon, *Manifestoes: Provocations of the Modern* (Ithaca, N.Y.: Cornell University Press, 1999), 203.
- 57 Jacques Attali, *Noise: The Political Economy of Music*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1985), 101.
- 58 See, e.g., Kittler, *Gramophone, Film, Typewriter*, 3.
- 59 Johannes Fabian, *Time and the Other: How Anthropology Makes Its Object* (New York: Columbia University Press, 1982), 17.
- 60 Philip J. Deloria, *Playing Indian* (New Haven, Conn.: Yale University Press, 1998), 106. Both racial categories, *Native American* and *white*, are, of course, fraught with internal contradictions and complexities. I am *not* claiming a single, unified purpose or experience for either group (since there were many important ethnic and political divisions among whites and Native Americans), although I do think that this binary division is heuristically useful because it a founding dichotomy for the thinking that went into federal policy and for Native American responses to federal policy—as well as for ethnology and ethnography.
- 61 Francis Paul Prucha, *The Great Father: The United States Government and the American Indians*, abridged ed. (Lincoln: University of Nebraska Press, 1986), 153.
- 62 Peter Nabokov, ed., *Native American Testimony: A Chronicle of Indian-White Relations from Prophecy to the Present, 1492–1992* (New York: Penguin, 1991), 146, 237, 258, 259; Frederick E. Hoxie, “Exploring a Cultural Borderland: Native American Journeys of Discovery in the Early Twentieth Century,” *Journal of American History* 79, no. 3 (December 1992): 970–71.
- 63 Lewis Henry Morgan, *League of the Ho-Dé-No-Sau-Nee, or Iroquois* (Rochester, N.Y.: Sage and Bros., 1851), ix, and *Ancient Society*, ed. Leslie White (Cambridge, Mass.: Harvard University Press, 1964), 40; Robert F. Berkhofer Jr., *The White Man’s Indian: Images from Columbus to the Present* (New York: Vintage, 1978), 54. On the influence of Boas, see Curtis M. Hinsley Jr., *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology, 1846–1910* (Washington, D.C.: Smithsonian Institution Press, 1981).

- 64 Fabian, *Time and the Other*, 21.
- 65 Hoxie, "Exploring a Cultural Borderland," 973.
- 66 John Peabody Harrington, lines composed in 1922, quoted in Erika Brady, *A Spiral Way: How the Phonograph Changed Ethnography* (Jackson: University Press of Mississippi, 1999), 52.
- 67 Hoxie, "Exploring a Cultural Borderland," 993. See also Russel Thornton, *American Indian Holocaust and Survival: A Population History since 1492* (Norman: University of Oklahoma Press, 1987), passim.
- 68 Brady, *A Spiral Way*, 52–59; "Past Is Present: Women's Money and the 'Study of Man': The Hemenway Expeditions, Part II," *Anthropology Newsletter*, April 1988, 12. Hemenway may, in fact, have been a major motivating (as well as economic) force in Fewkes's use of recording in the field.
- 69 Joseph Charles Hickerson, "Annotated Bibliography of North American Indian Music North of Mexico" (M.A. thesis, Indiana University, 1961), 10–12.
- 70 "I believe that the memory of Indians for the details of a story is often better than that of white men" (Jesse Walter Fewkes, "A Contribution of Pasmamaquoddy Folk-Lore," *Journal of American Folk-Lore* 3, no. 9 [October–December 1890]: 258).
- 71 *Ibid.*, 277. Fewkes supports this claim with a list of words that, he said, he learned to pronounce by listening to a phonograph and then having an Indian offer the correct English translation.
- 72 Benjamin Ives Gilman, "Zuni Melodies," *Journal of American Ethnology and Archaeology* 1 (1891): 63–91; John Comfort Fillmore, "The Zuni Music as Translated by Mr. Benjamin Ives Gilman," *Music* 5 (1893–94): 49–56; "Professor Stumpf on Mr. Gilman's Transcription of the Zuni Songs," *Music* 5 (1894): 649–52. See Hickerson's narrative of the debate in "Annotated Bibliography, 20–22. Interestingly, some years later, Theodor Adorno would come to see the virtue of sound recording to be its affinity for listening as examination, for attention to technical and melodic detail. See Thomas Y. Levin, "For the Record: Adorno on Music in the Age of Its Technological Reproducibility," *October*, no. 55 (winter 1990): 45.
- 73 Brady, *A Spiral Way*, 63; Michael Yates, "Percy Grainger and the Impact of the Phonograph," *Folk Music Journal* 4 (1982): 265–75.
- 74 See Franz Boas, "The Limitations of the Comparative Method in Anthropology," *Science* 4, no. 103 (18 December 1896): 901–8.
- 75 Jesse Walter Fewkes, "Additional Studies of Zuni Songs and Rituals with the Phonograph," *American Naturalist*, November 1890, 1095, 1098.
- 76 Fewkes, "Contribution," e.g., 259, 272–75.
- 77 "The Phonograph and the Mojave," *Antique Phonograph Monthly* 1, no. 1 (January 1973): 2.

- 78 Brady, *A Spiral Way*, 59; Curtis Hinsley Jr., “Ethnographic Charisma and Scientific Routine: Cushing and Fewkes in the American Southwest, 1879–1893,” in *Observers Observed: Essays on Ethnographic Fieldwork*, ed. George Stocking (Madison: University of Wisconsin Press, 1983).
- 79 Richard K. Spottwood, ed., *Religious Music, Solo and Performance* (LP available from the Library of Congress Music Division, Recorded Sound Section, Washington, D.C., 20540), liner notes for track B9.
- 80 Description paraphrased from Fewkes, “Contribution,” 262.
- 81 For a fuller elaboration of this argument, see chapter 5.
- 82 Edmund Nequetewa, “Dr. Fewkes Plays Like a Child,” in Nabokov, ed., *Native American Testimony*, 228, 229. For the full account, see *ibid.*, 227–29.
- 83 Brady, *A Spiral Way*, 31.
- 84 Joan Mark, *A Stranger in Her Native Land: Alice Fletcher and the American Indians* (Lincoln: University of Nebraska Press, 1988), 223, 231–32, 254.
- 85 *Ibid.*, 254–55, 305.
- 86 Brady, *A Spiral Way*, 99.
- 87 “Perpetuating the Beauty of the Indian,” *Ladies Home Journal* 24 (April 1907): 26.
- 88 Brady, *A Spiral Way*, 78–80.
- 89 Frances Densmore, “The Study of American Indian Music,” in *Frances Densmore and American Indian Music: A Memorial Volume*, ed. Charles Hoffman (New York: Museum of the American Indian Heye Foundation, 1968), 102, 105.
- 90 *Ibid.*, 105 (re Henry Thunder), 106 (quotation).
- 91 “The transcribing of records is seldom done in the field” (*ibid.*, 109).
- 92 *Ibid.*, 103 (quotation), 109 (on problems determining pitch).
- 93 D. K. Wilgus, *Anglo-American Folksong Scholarship since 1898* (New Brunswick, N.J.: Rutgers University Press, 1959), 232 (argument about transcription vs. preservation), 160 (quotation). See also Brady, *A Spiral Way*, 62. I write of Wilgus’s point as a hypothesis because it is not universally true; the American Museum of Natural History and other institutionally backed and organized traditions quickly developed an ethos of preservation that has resulted in a collection of very usable cylinders from the 1910s and 1920s (Marilyn Graf, archivist, Indiana University, Archives of Traditional Music, telephone interview by author, 25 September 1998). My point here is simply that this ethos of preservation had to be learned; permanence was not inherent in the medium or in the machine.
- 94 “*Fewkes Collection*, 39 (‘40’) taken from. . . .”
- 95 Fewkes, “Contribution,” 258–59.
- 96 Anthony Seeger and Louise Spear, eds., *Early Field Recordings: A Catalogue*

of *Cylinder Collections at the Indiana University Archives of Traditional Music* (Bloomington: Indiana University Press, 1976), 11.

- 97 Read and Welch, *From Tin Foil to Stereo*, 40–41; Kay Kaufman Shulemay, “Recording Technology, the Record Industry, and Ethnomusicological Scholarship,” in *Comparative Musicology and the Anthropology of Music*, ed. Bruno Nettl and Philip V. Bohlman (Chicago: University of Chicago Press, 1991), 282.
- 98 For instance, Read and Welch (*From Tin Foil to Stereo*, 76) write of a particularly “promising find of Bettini cylinders [discovered] near Syracuse, N.Y. in 1952, some of them in a barn.” It included records by various opera artists famous at the turn of the twentieth century, and some were “excellent recordings, others poor.” The Bettini example illustrates the haphazard nature of archiving practices from the early history of recording. In this particular case, the preservation of the recordings (and their discovery) appears to have been more or less accidental.
- 99 “‘Being Dead, He Yet Speaketh,’” *Phonogram I* 2, no. 11 (November 1892): 249.
- 100 J. Mount Beyer, “Living Autograms,” *Phonogram I* 3, no. 1 (January 1893): 298.
- 101 “Notes,” *Phonogram II* 4, no. 4 (February 1902): 51.
- 102 Philip Mauro to Alexander Graham Bell, 11 March 1904, AGB, box 255, folder “Phono-Correspondence.”
- 103 George List, foreword to *A Catalog of Phonorecordings of Music and Oral Data Held by the Archives of Traditional Music* (Boston: G. K. Hall, 1975), iv; Erich Von Hornbostel, “The Problems of Comparative Musicology,” in *Hornbostel Opera Omnia I*, ed. Klaus P. Wachmann, Dieter Christensen, and Hans-Peter Reinecke (The Hague: Martinus Nijhoff, 1975), 252.
- 104 Dieter Christensen, “Erich M. von Hornbostel, Carl Stumpf, and the Institutionalization of Comparative Musicology,” in *Comparative Musicology and the Anthropology of Music*, ed. Bruno Nettl and Philip V. Bohlman (Chicago: University of Chicago Press, 1991), 204–5.
- 105 Von Hornbostel, “The Problems of Comparative Musicology,” 252. Von Hornbostel also notes the possibility afforded by synchronized films and recordings for the study of work songs, “music of secular feasts, theater and in particular, dance music” (*ibid.*, 268).
- 106 Von Hornbostel quoted in Kittler, *Gramophone, Film, Typewriter*, 3–4.
- 107 Von Hornbostel, “The Problems of Comparative Musicology,” 270.
- 108 “Library of Congress Plans to Preserve American Folksongs in National Collection,” *U.S. Daily* (Washington, D.C.), 21 April 1928, C2. For a fuller discussion of the history of folk-song collections at the Library of

Congress, see Peter Bartis, "A History of the Archive of Folk Song at the Library of Congress: The First Fifty Years" (Ph.D. diss., University of Pennsylvania, 1982).

- 109 "Preserving the Songs of a Dying Nation," *Phonogram II* 1, no. 3 (July 1900): 80.
- 110 Marilyn Graf, archivist, Indiana University, Archives of Traditional Music, telephone interview by author, 25 September 1998.
- 111 Dennis Hastings, "Reflections on the Omaha Cylinder Recordings," in *Omaha Indian Music: Historical Recordings from the Fletcher LaFlesche Collection* (Library of Congress catalog no. 84-743254), ed. Dorothy Sara Lee and Maria La Vigna (Washington, D.C.: Library of Congress, 1985), liner notes.
- 112 Brady, *A Spiral Way*, 108–9.
- 113 *Ibid.*, 124.

Conclusion: Audible Futures

- 1 Karl Marx and Friedrich Engels, "The Communist Manifesto," in *The Marx-Engels Reader*, 2d ed., ed. Robert C. Tucker (New York: Norton, 1978), 476; Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge*, trans. Geoff Bennington and Brian Massumi (Minneapolis: University of Minnesota Press, 1984), 3. See also Perry Anderson, *Origins of Postmodernity* (New York: Verso, 1988).
- 2 Some conclusions are scholarly summations. Others retrace the territories of their books as if from above. Still others veer widely off on tangents. On the argumentative difficulty of the conclusion, see Bruce Lincoln, *Discourse and the Construction of Society: Comparative Studies of Myth, Ritual, and Classification* (New York: Oxford University Press, 1989), 171–72.
- 3 See Pierre Bourdieu, *Outline of a Theory of Practice*, trans. Richard Nice (New York: Cambridge University Press, 1977), 164–71. The term *doxa* has a history that can be traced back through twentieth-century sociology, medieval Christian theology, and Platonic thought, but, here, I am using it in Bourdieu's sense.
- 4 See Michael Bull, *Sounding Out the City: Personal Stereos and Everyday Life* (New York: New York University Press, 2000).
- 5 On the home studio, see Paul Théberge, *Any Sound You Can Imagine: Making Music/Consuming Technology* (Hanover, N.H.: Wesleyan University Press, 1997). On virtual reality, see Steven Jones, "A Sense of Space: Virtual Reality, Authenticity, and the Aural," *Critical Studies in Mass Communication* 10 (1993): 238–52.

- 6 George Wilhelm Friedrich Hegel, *Philosophy of Right*, trans. T. M. Knox (Oxford: Clarendon, 1952), 13. Clearly, this gestures toward a whole debate in the human sciences about scholars' distance from their objects of study. Without rehearsing that whole debate here, let me simply acknowledge that there are both advantages and disadvantages to maintaining scholarly distance from one's object of study.
- 7 *Ibid.*, 12–13.
- 8 To be fair to Hegel, he was writing in a monarchy. To disown one's own purchase on a society may be a rhetorical maneuver meant to avoid possible persecution.
- 9 Lawrence Grossberg, *We Gotta Get Out of This Place: Popular Conservatism and Postmodern Politics* (New York: Routledge, 1992), 1.
- 10 Walter Ong, *The Presence of the Word: Some Prolegomena for Cultural and Religious History* (Minneapolis: University of Minnesota Press, 1981), 311–24.
- 11 Plato, *Phaedrus*, in *Collected Dialogues of Plato*, ed. Edith Hamilton and Huntington Cairns, trans. R Hackforth (Princeton, N.J.: Princeton University Press, 1961), 475–525; Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, trans. Thomas Burger (Cambridge, Mass.: MIT Press, 1989).
- 12 R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Turning of the World* (Rochester, N.Y.: Destiny, 1994), 215–16.
- 13 As Steven Feld has shown with respect to the Kaluli, a busy and cacophonous soundscape can be a part of a rich cultural life, even in less-populous cultures. See Steven Feld, "Aesthetics as Iconicity of Style (Uptown Title); or (Downtown Title) 'Lift-up-over Sounding': Getting into the Kaluli Groove," in *Music Grooves*, Charles Keil and Steven Feld (Chicago: University of Chicago Press, 1994), 115–31.
- 14 Oskar Negt and Alexander Kluge, *The Public Sphere and Experience: Toward an Analysis of the Bourgeois and Proletarian Public Sphere*, trans. Peter Labanji, Jamie Owen Daniel, and Assenka Oksiloff (Minneapolis: University of Minnesota Press, 1993); Nancy Frasier, *Justice Interruptus: Critical Reflections on the "Postsocialist" Condition* (New York: Routledge, 1997); Dan Schiller, *Theorizing Communication: A History* (New York: Oxford University Press, 1996).
- 15 On the necessity of reconsidering the question of social form in social theory, see, e.g., Roberto Unger, *Social Theory: Its Situation and Its Task: A Critical Introduction to "Politics," a Work in Constructive Theory* (New York: Cambridge University Press, 1987); Iris Marion Young, *Justice and the Politics of Difference* (Princeton, N.J.: Princeton University Press, 1990); and David Harvey, *Spaces of Hope* (Berkeley and Los Angeles: University of California Press, 2000).

- 16 Jacques Derrida, *Speech and Phenomena and Other Essays on Husserl's Theory of Signs*, trans. David B. Allison (Evanston, Ill.: Northwestern University Press, 1973), 70–87; Gayatri Chakravorty Spivak, “Can the Subaltern Speak?” in *Marxism and the Interpretation of Culture*, ed. Cary Nelson and Lawrence Grossberg (Urbana: University of Illinois Press, 1988); Paul Carter, *The Sound In-Between: Voice, Space, Performance* (Kensington: New South Wales University Press, 1992); Briankle Chang, *Deconstructing Communication* (Minneapolis: University of Minnesota Press, 1996), 187–220; John Durham Peters, “The Gaps of Which Communication Is Made,” *Critical Studies in Mass Communication* 11, no. 2 (1994): 117–40, and *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 33–108.
- 17 Raymond Cohen, *Culture and Conflict in Egyptian-Israeli Relations: Dialogue of the Deaf* (Bloomington: Indiana University Press, 1990); D. D. Khanna and Kishmore Kumar, *Dialogue of the Deaf: The India-Pakistan Divide* (Delhi: Konark, Advent, 1992); Lord Beloff, *Britain and the European Union: Dialogue of the Deaf* (London: Palgrave, 1996).
- 18 Susan Plann, *A Silent Minority: Deaf Education in Spain, 1550–1835* (Berkeley and Los Angeles: University of California Press, 1997), 13–15; James Woodward, *How You Gonna Get to Heaven If You Can't Talk with Jesus? On Depathologizing Deafness* (Silver Spring, Md.: T.J., 1982); Brenda Jo Brueggemann, *Lend Me Your Ear: Rhetorical Constructions of Deafness* (Washington, D.C.: Gallaudet University Press, 1999), 30–33; Horst Biesold, *Crying Hands: Eugenics and Deaf People in Nazi Germany*, trans. Henry Friedlander (Washington, D.C.: Gallaudet University Press, 1999), 13–27; Joachim-Ernst Berendt, *The Third Ear: On Listening to the World*, trans. Tim Nevill (New York: Owl, 1988), 11–13.
- 19 Oliver Sacks, *Seeing Voices: A Journey into the World of the Deaf* (Berkeley and Los Angeles: University of California Press, 1989), xi. See also Lennard Jeffries, *Enforcing Normalcy: Disability, Deafness, and the Body* (New York: Verso, 1995); Plann, *A Silent Minority*, 1–9; Harlan Lane, *When the Mind Hears: A History of the Deaf* (New York: Random House, 1984); Richard Winefield, *Never the Twain Shall Meet: Bell, Gallaudet, and the Communications Debate* (Washington, D.C.: Gallaudet University Press, 1987); and Douglas Baynton, *Forbidden Signs: American Culture and the Campaign against Sign Language* (Chicago: University of Chicago Press, 1996).
- 20 Walter Benjamin, *Illuminations*, trans. Harry Zohn (New York: Schocken, 1968), 222.
- 21 C. Wright Mills, *The Sociological Imagination* (New York: Oxford University Press, 1959), 3–24; Karl Marx, *Economic and Philosophic Manuscripts of 1844*, trans. Martin Milligan (New York: International, 1968), 140–41; Malcolm

Bull, "Where Is the Anti-Nietzsche?" *New Left Review*, ser. 2, no. 3 (May/June 2000): 121–45; Unger, *Social Theory*, 18–25.

- 22 Jay Allison, "About Quest for Sound" and "Introduction to the Quest," both available on-line at <http://www.npr.org/programs/lfsound/quest/index.html> (last accessed November 2001).

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