DIGITAL

SOUND

STUDIES

EDITED BY

MARY CATON LINGOLD

DARREN MUELLER

& WHITNEY TRETTIEN

DIGITAL
SOUND
STUDIES

DIGITAL SOUND STUDIES

EDITED BY

Mary Caton Lingold,

Darren Mueller,

and Whitney Trettien

Cover art: Heather Gordon, *Frequencies of the Equal Tempered Scale*,
2017. 30″ × 30″. Oil on canvas. Photo by Alex Maness

CONTENTS

PREFACE

MARY CATON LINGOLD, DARREN MUELLER,
AND WHITNEY TRETTIEN

It is not at all lost on us, the irony of writing a book about the importance of digital scholarship. The truth is that the journey that brought us—the editors—here began with a simple question: How can scholars write about sound *in sound?* We sensed that the digital turn was an auspicious opportunity for sonic scholarship—that now, at last, when interrogating matters of the audible world it would be easier to incorporate sounds themselves into academic argumentation. We imagined multisensory web interfaces that would seamlessly embed audio into writing, open access databases full of recordings, and experimental sound pieces distributed effortlessly across social media. We wanted to breach the cultural impasse and give sound center stage in an intellectually rich digital space.

These were pipe dreams, but they were also possibilities that we set out to pursue in our own creative-critical work. Our big questions led us to the proverbial toolshed, where we tried to produce something approaching the visionary potential of what we eventually came to call digital sound studies. As is often the case, when we looked around to see what other work was being done in this vein, we discovered a great deal of innovation occurring across multiple fields and in different types of institutions. Scholars were composing apps for playing with sound, designing signal processors, publishing podcasts, and creating scholarly communities online. Eager to bring this work into the conversation, we began by building a digital home for experimental scholarship. We solicited provocative work in digital sound studies to be part of a custom-built web collection entitled *Provoke! Digital Sound Studies.*[1]

Since then, each of us has gone on to produce different kinds of multimodal scholarship. With some input from others, including Darren, Mary

Caton founded the Sonic Dictionary, a digital collection of audio recordings created and curated by students in sound studies courses across institutions. She has also collaborated on Musical Passage: A Voyage to 1688 Jamaica, which tells the story of some of her research in the form of a digital, audio-rich custom website. Whitney is writing a hybrid print/digital book and has engineered an innovative journal, *thresholds*, that presses further against the boundaries of scholarly writing and collaboration. At the Eastman School of Music, Darren founded the Media, Sound, and Culture Lab as a site for faculty and students to explore digital sound scholarship, digital pedagogy, and various forms of creative scholarship. An ethos of collaboration is essential to each of these developing projects, a legacy of our work together that initially began in 2011. For us, working closely across disciplinary boundaries remains key to the advance of scholarship on and off the page.

In fact, it was our work on *Provoke!* that revealed to us the necessity of this book. Each medium offers its own capacities—affordances, in the digital parlance—and individual projects by themselves only tell part of the story. A great deal of intellectual labor went into the composition and creation of *Provoke!* and the individual projects featured there. To substantiate and make legible the productive modes of thought driving digital sound studies, a much broader, more in-depth conversation needed to take place. This is just the sort of thing that books—and especially collections that feature multiple voices bound together with a single vision—can accomplish. Digital humanities praxis is made possible by the modes of intellectual inquiry and argumentation that humanists are well trained for. But this book shows that the opposite is also true: that born-digital scholarship generates rigorous intellectual inquiry of the sort well suited to the long-form essay. Identifying and bearing out the fruits of the deeply entangled relationship between these two forms of composition is what this collection sets out to do.

Sound productively unsettles many of our ingrained assumptions about the limitations and possibilities of both print and digital authorship. For instance, books can seem frustratingly silent, but as any good reader knows, they can communicate sound quite effectively. In contrast, digital media feels like a natural home for audio, but designing for sound on the web can be challenging. This is why we need to bring the insights of sound studies to bear upon the emergent field of digital humanities. By provoking both fields toward an experimental and soundful engagement with one another, we envision *digital sound studies* will become an interdiscipline born at the intersection of analysis and innovation.

The contributors in this book practice critical listening to reveal the role

of sonic life in digital spaces. They also model how to use digital methods both to enhance the study of auditory culture and, literally, to amplify sound in the academy. This book is therefore for sound studies scholars who wish to understand how digital humanities methods might enhance their own research, and it is for digital humanists who seek to enrich their work with sound. It is also for students and scholars across disciplines who are struggling to make sense of the digital turn and its impact on scholarship, the classroom, and wider publics. To seize this moment is to embark on a great experiment, one with upsides and downsides. Not all digital sound scholarship will be transformative. But by being provocative—by giving *voice* to thought—digital sound studies creates the possibility for new kinds of understanding that can do justice to forms of sonic knowledge: the ancient, the fledgling, the yet-to-be imagined.

NOTE

1 *Provoke!* can be accessed at http://soundboxproject.com, or https://doi.org/10.7924/G8H12ZXR.

ACKNOWLEDGMENTS

MARY CATON LINGOLD, DARREN MUELLER,
AND WHITNEY TRETTIEN

This collection is an ensemble piece. It began as a collaboration between three graduate students, supported by Duke University's PhD Lab in Digital Knowledge and the Franklin Humanities Institute; it comes to an end with twenty-six additional digital sound studies coconspirators across two published collections, digital and print. To those who have entrusted us with sharing their work—Salvador Barajas, Myron Beasley, Danah Bella, Regina Bradley, Liz Canfield, Steph Ceraso, Tanya Clement, Rebecca Geoffroy-Schwinden, Alex Gomez, Kevin Gotkin, W. F. Umi Hsu, Michael Kramer, Corrina Laughlin, Andrew McGraw, Robert Peterson, John Priestley, Richard Cullen Rath, Aaron Shapiro, Liana Silva, Jonathan Sterne, Kenneth Stewart, Jennifer Stoever, Jon Stone, Joanna Swafford, Aaron Trammel, Jonathan Zorn—we offer our heartfelt appreciation and thanks.

This collection would have been impossible without the many individuals who read our writing, helped design our website, navigated tricky issues of digital archiving on our behalf, provided technical support or feedback, or simply offered their friendship and encouragement. They are, in alphabetical order: Dan Anderson, Elizabeth Ault, Ian Baucom, Allison Belan, David Bell, Rachel Bergmann, Nicholas Bruns, Chris Chia, Ashon Crawley, Cathy Davidson, D. Edward Davis, Laurent Dubois, Craig Eley, Dave Garner, Monica Hairston-O'Connell, Marc Harkness, Guo-Juin Hong, Robin James, Meredith Kahn, Paolo Mangiafico, Charles Mangin, Jonna McKone, Louise Meintjes, Liz Milewicz, Brian Norberg, Dan Partridge, Jentery Sayers, Will Shaw, Kevin Smith, Amanda Starling Gould, Jonathan Sterne, Stewart Varner, Jacqueline Waeber, Priscilla Wald, and Mary Williams. We also wish to express our deepest thanks to Elizabeth Ault, Ken Wissoker, and the entire

team at Duke University Press for their unflinching support and belief in this project.

Finally, we would like to thank our partners Eric Olsten, Phil Torres, and Stephanie Westen for sharing our frustrations and joys throughout this long process.

INTRODUCTION

MARY CATON LINGOLD, DARREN MUELLER,
AND WHITNEY TRETTIEN

Cats meow over the whir of cars passing by. A grainy shuffling,
barely distinguishable from the hiss of the tape, echoes in an
apartment before two distinct thumps overwhelm the mix. A floor
creaks in the distance; a whistling sigh sounds as a bus driver
lifts a foot from the brake.

It was fall 2011 and the three of us were crowded around a laptop, listening. The recording we heard came from the Jazz Loft Project, a collection of digitized audio captured by photojournalist W. Eugene Smith between 1957 and 1965. An obsessive sound collector, Smith left his reel-to-reel recorder running nonstop in his rundown New York City loft. Offering more than four thousand hours of audio, the collection is prized for including rare jam sessions with jazz greats like Thelonious Monk, Sonny Rollins, and Charles Mingus. In addition to documenting an iconic era in jazz, Smith recorded all kinds of ephemeral sounds: snippets of phone conversations, fragments of radio and television broadcasts, the roar of buses driving past the loft. This important collection of reel-to-reel tapes was recently digitized and housed on 5,087 CDs thanks to the work of documentarian Sam Stephenson. We wanted to learn more about the process of digitizing a massive collection of audio recordings, so we were meeting with the archive's cataloger, Dan Partridge, who had just played us the clip.[1]

"It took me weeks," he admitted, "but I finally figured out what those thumps are. It's Smith's cats, playing with the microphone." Dan spent his days in a quiet basement, his ears locked under headphones, listening to the recordings on a computer. As he listened, scrubbing the audio back and forth to hone in on particular noises, his ears became attuned to what he was hearing, and he began to develop a mental map of the acoustic space in Smith's loft. Eventually he could interpret sounds that would be unin-

telligible to a casual listener—understanding indistinct commotion, for instance, as a cat jumping onto a table. Once he had identified the content of a recording, Dan would scribble down his observations on paper. These handwritten notes were then logged in a spreadsheet. Dan's descriptions are now part of the collection's finding aid and thus render an impenetrably large amount of audio data accessible to researchers.

If we were asked to point to a project that demonstrates the potential of digital media to improve sound-based research, we might well suggest the Jazz Loft Project. Yet, as we learned that day in the basement, nothing about realizing the transformative potential of digital scholarship is as straightforward as it might seem.

Take, for instance, the very notion of "digital media." Sitting between a cabinet of CDs, a box of reel-to-reel tapes, a pile of handwritten notes, and a computer screen displaying a spreadsheet, we confronted a tangle of technologies knit together in ways far more complex than the simple modifier "digital" would indicate. Dan was listening to CDs that store digitized copies of Smith's original reel-to-reel recordings, but since each format encodes sonic data differently, the timestamps on the tapes do not correspond precisely to those on the CDs; what is halfway through the first reel may come at the beginning of the fourth CD, for instance. Moreover, even though the audio data on the CD is "digital," it was at that point still locked on physical media in a basement cabinet. Listening to a particular sound would require finding not only the right CD but a CD player—an increasingly rare bit of technology. While in theory, then, digital copies are more manipulable and "spreadable" than their analog counterparts, in practice they are no more accessible to the average listener than reel-to-reel tapes. From the researcher's perspective, this shift from one platform to another currently signals little more than a loss in fidelity for the Jazz Loft Project.

It is, of course, technologically possible to rip data from the CDs and post the clips online for streaming, assuming one has access to the right software and a server. Yet, again, what is technologically possible is not so easily realized in messy reality, especially when multiple institutions have investments in the material. A knot of competing copyright claims leave the digital collection in legal limbo: the musicians (or their estates) claim the rights to their performances; Smith's estate has claim to the reel-to-reel tapes, which live at the University of Arizona; while Duke University owns the digitized copies on the CDs. Streaming an audio archive for educational purposes would seem to fall under "fair use" in the United States, but the courts have interpreted this exception narrowly for audio recordings, and

indeed what counts as an "educational purpose" is largely untested when it comes to sound. Moreover, the length of copyright protections—seventy years after the author's death—means that, realistically, much of the material in the Jazz Loft Project may not be available to the public for decades. And that's just the situation in the United States. It is often unclear what rights and responsibilities attend to an individual accessing U.S.-copyrighted materials for educational purposes from a physical location that is outside of the United States. Thus, outdated and ambiguous laws continually hamper the use of digital sounds in humanities research and teaching.

Even if the Jazz Loft Project were somehow able to overcome these seemingly insurmountable technological, institutional, and legal hurdles and could post the entire collection online for free public streaming, visitors would still face the challenge of finding discrete sounds and clips within four thousand hours of audio. Which is to say the collection is all but useless to researchers or even casual browsers without the textual metadata that Dan Partridge authored. Only through the intermediary of his knowledge and time—the hours he spent retuning his ears to the pitch of Smith's loft—did uninterpreted noise become keyword-searchable as the voice of Charles Mingus or a radio broadcast. Using pattern recognition to automate these search and discovery tasks in large corpora of audio is an active field of research, and it is possible that one day artificial intelligences will be able to take over for Dan, identifying Mingus's voice with minimal human intervention. For now, though, this labor is performed with human wetware, usually by a single cataloger (or a small group of catalogers) whose intellectual frameworks, interests, and knowledge of the subject shape the metadata and thus influence what type of research the collection supports. While digital media thus create a space of possibility for the study of sound, critical, interpretive labor fulfills this potential, not the technology itself.

As the Jazz Loft Project demonstrates, the humanities are in a moment of transition: between analog and digital; between the "old" methods and the "new"; between potential for change and the structures that hold it back. On the one hand, it has never been easier to build and access sonic archives or incorporate sound into scholarship. On the other, the ease with which sonic or audiovisual work can be shared and produced does not mean that academic writing, publishing, graduate training, or tenure and promotion have caught up with the possibilities. And so we—scholars of sound and technology—find ourselves at a crossroads. This book dwells in these various interstices as both a testament to the transformative value of experimenting with digital tools and a reinvestment in interpretive practices that

always attend to the human. As our contributors demonstrate, amplifying the humanities through digital scholarship does not oppose close listening and deep historical analysis. Rather, these humanistic modes of interpretation provide the very foundation of digital sound studies.

The scratching and thumping that begin this essay perfectly encapsulate these tensions. When the cats batted Eugene Smith's microphone so many decades ago, the sounds that resonated in his loft were not the same as the commotion that we hear in the recording. Rather, they are "artifacts" of the technology itself: anomalies in the signal that draw our attention to the network of wires, transducers, and magnetic tape that enabled audio reproduction. By making audible the systems that are designed to be invisible—by letting us hear the presence of the microphone in the room—such glitches document the material conditions that make recording possible. The design of the microphone, its placement in Smith's loft, the nature of how those magnetic tapes encode and store sonic information, the altered nature of that information once it is digitized: these structures all shape sonic experience, whether we acknowledge them in our scholarship or not. This is true now more than ever, as digital technologies become both more ubiquitous and more entangled. Studying sound in the second decade of the twenty-first century demands that researchers pay critical attention to technologies, and especially to their invisibilities and silences.

No scholars are better placed to critically interpret, historicize, and seize the potential of the epistemological shifts brought about by the digital era than those who can interpret the cats' improvisational performance. The tools we use to listen to and reproduce sound are changing—along with forms of authorship and critical inquiry—and this book provides a blueprint for making sound central to research, teaching, and publishing practices. Using sound in one's work is not only imminently doable for humanities scholars today, it is, as this volume argues, urgently necessary. Digital sound studies holds the possibility of changing the text-centric and largely silent cultures of communication in the humanities into more richly multisensory experiences, inclusive of diverse knowledges and abilities.

Scholars have been carving out space for what we call digital sound studies for decades. Challenging the humanities to listen more closely—to attend, that is, not only to *what* but also to *how* we hear—sound studies scholars have productively theorized the sonic technologies that mediate and con-

struct our experiences.[2] This growing body of research has taught us that sound has a politics; it can be gendered and racialized, used both to liberate people from and reinscribe determinative social categories. Sound has ethical implications and can help to build community or, conversely, to torment prisoners. It can elicit fear as easily as it produces longing or nostalgia. Even what counts as "sound" or "signal" and what gets dismissed as "noise" can differ dramatically across listening practices and auditory cultures.[3] Sound studies, then, places sounds in their cultural, historical, and social contexts. Dealing with the production, distribution, experience, poetics, or historicization of sound, as sound scholars have done, means dealing with the lived experiences of people.

One field has acknowledged the political complexity of sound since its inception: black studies. Generations of black cultural critics and authors have drawn deeply from music and sound in their writing. For instance, W. E. B. Du Bois frames each chapter in his classic *Souls of Black Folk* (1903) with excerpts from spirituals, which he theorizes as "sorrow songs" central to the African American experience.[4] Black studies has also had to confront sonically encoded racist stereotypes, such as those made popular in the United States through blackface minstrelsy and the use of "negro dialect" in early radio and television.[5] As a result scholars in the field have long been well attuned to the complex cultural significance of sound.[6] More recently, work at the intersection of sound studies and black studies has turned to technology to reveal its mediating effect on black aesthetic traditions. Fred Moten, for example, attends to the way the recording studio filters the philosophical conception of blackness in the work of Marvin Gaye.[7] Scholarship centered on popular music similarly assumes a form of culture making via technological reproduction, as can be seen in the work of Alexander Weheliye, Mark Anthony Neal, and Daphne Brooks.[8] In other cases, technology takes a more central role, as with Louise Meintjes's view of urban recording studios in South Africa that depicts the negotiation between races and ethnicities created by apartheid.[9] In this multidisciplinary body of work, scholars have shown that sound can serve many purposes: it can mobilize resistance, be a tactic of social negotiation, or contribute to structures of oppression and racialized representation.

The emergence of mechanical audio reproduction inspired scholars working within multiple fields to consider the social effects of mass distribution. This is especially true of cultural studies, where the technologization of sound was explored by many foundational theorists in the early to mid-twentieth century: Theodor Adorno, Walter Benjamin, and Roland

Barthes were followed by early media historians such as Walter Ong and Marshall McLuhan.[10] For these thinkers, the advent of new audiovisual technologies—the phonograph, film, radio, and eventually television—presented an opportunity to reconsider the relationship between technological and cultural production. Their work explores how the seemingly anti-human world of machines produces the modern political subject, extends the human body, and splits sounds from their sources, especially the human voice.[11] Some feared technology more than others. For instance, whereas Adorno (and later Jacques Attali) feared mass media's effect on culture, Benjamin seized on the power of the new medium of radio to disseminate ideas to the public, producing between eighty and ninety popular broadcasts on topics as wide-ranging as urban archaeology, literary tropes, and ancient history.[12] McLuhan, too, embraced popular media, making a cameo appearance in Woody Allen's *Annie Hall*. By treating audiovisual culture as a function of its technological reproduction, these early theorists laid the groundwork for the emergence of media and communication studies in the second half of the twentieth century.

A later generation of media scholars challenged the Marxian, modernist skepticism of technology that undergirds so much of this early work on the reproduction of sound. Technology is not non- or antihuman, they argued, but rather is always both producing and produced by human culture. That is, our listening practices are a product of the technologies that frame them, as much as the designs of our devices are shaped—literally—by the human body and the ways it listens.[13] Jonathan Sterne makes this point forcefully in *The Audible Past*, where he authors a cultural history of sound reproduction that upsets what he terms the "audiovisual litany"—the idea that sound and sight are mutually exclusive senses.[14] Other authors also explore the interconnectedness of sound, listening bodies, and technologies. Emily Thompson, writing about urban soundscape in the early twentieth century, reveals how mastery over sound in concert halls, churches, offices, and Hollywood soundstages was a cultural problem that sought technological solutions from the burgeoning field of acoustical science.[15] Lisa Gitelman attends to ways in which sound is always linked to multiple modes and media, showing the foundational role that visualist and tactile practices like reading, writing, and inscription played in the design of Edison's phonograph.[16] Together, this generation of media studies scholars reveals how the history of sound technology is always knit to the creation, production, and distribution of cultural memory and to the spaces of work, entertainment, and family.[17]

The wide-scale adoption of digital technologies at the end of the twentieth century brought a new set of concerns to the emerging field of sound studies, especially for those scholars who focus on music. Mark Katz and DJ Spooky, for instance, have situated seemingly "digital" practices like sampling within longer histories of sonic production, demonstrating the continuity between past and present.[18] Others, especially Tara Rodgers, have convincingly pushed for more inclusive histories of electronic music and the sound arts that include the contributions of women and people of color to the development of digital audio techniques.[19] Playback devices and instruments have been of particular interest, and Michael Bull's work on the iPod, Paul Théberge's work on synthesizers, and Mack Hagood's work on noise-canceling headphones elucidate how digital technologies mediate our relationship to sonic space in new ways.[20] Within and alongside research on digital music has flourished a renewed interested in materiality within media studies, especially the layered relationships between platforms, interfaces, and digital file formats.[21] Together, these digitally inflected approaches to sound ask media and digital studies scholars to think across software and hardware, and across forensic and formal materialities, and to continue to attend to the social and the cultural.

The fields of ethnomusicology, anthropology, and folklore also have their own long and storied relationship with technologies of sound. In the first half of the twentieth century, researchers in these nascent disciplines pioneered the use of portable recording equipment for collecting vernacular music.[22] The scripts they created for preserving sonic life influenced documentarians like Eugene Smith and survive today in the methods many ethnographers use to record their research in "the field." Early on, recording technology seemed to provide an efficient means to a noble end—preserving and venerating cultural forms that had previously been ignored. Over the years, however, it became clear that recording devices are not neutral mechanical objects: they play an agentive role in what is often a hierarchal encounter between researcher and subject. For instance, many prominent twentieth-century sound collectors were white scholars in positions of power making a living off of performances by rural, indigenous, and black and brown musicians.[23] In their recent returns to the early history of sound-based research, scholars Erika Brady, Benjamin Filene, Karl Hagstrom Miller, and others have illuminated the profoundly politicized nature of recording technologies as well as their lasting impact on the formation of academic fields, the music industry, and the preservation of vernacular culture in museums and archives.[24] Here, Steven Feld has been an innovator, composing soundscapes alongside more

traditional print monographs to make explicit the way in which his own field recordings were always aesthetically manipulated.[25]

Because of the fraught histories of early sound collections, many of the institutions now housing them are grappling with how to preserve this material equitably in an era of mass digitization. Archivists and scholars —including Diane Thram, Sylvia Nannyonga-Tamusuza, Andrew N. Weintraub, and others—are asking what it might mean to repatriate digital sonic artifacts to their communities of origin.[26] Digitization would seem like a promising way to ensure that communities have access to their cultural heritage, but because reliable internet is a rare and costly commodity in many parts of the world, and especially in the global South, transmitting data online is untenable.[27] Furthermore, the history of economic exploitation surrounding much of this material means that some communities may not want their sonic artifacts to be widely available online. The U.S.-based Radio Haiti Archive is experimenting with disseminating digitized recordings from its collection to institutions and people in Haiti using USB sticks, a method of media transfer popular in areas where internet downloading and streaming are logistically difficult.[28] In an era when the vast majority of scholars are using digital devices on a regular basis, it is more important than ever to heed the lessons from our predecessors and carefully consider the ethical implications of seemingly benign technologies. For digital sound scholars, this means being particularly cognizant of the fact that internet access does not equate to universal access and being mindful that issues of power and publicity remain fraught.

As scholars of sound increasingly confront digital technologies, we find ourselves in conversation with digital humanities. Like sound studies, this interdisciplinary network encompasses a wide range of theories and practices loosely bound together by an interest in digital tools and technologies. On one end of its spectrum, critics such as Richard Grusin, Grant Wythoff, and others focus on culture and theory, drawing on methods from media and film studies to narrate the deep histories and philosophical implications of new technologies. Alex Galloway has clearly articulated the motivation behind such work in a recent interview with Melissa Dinsman: "The humanities needs to stop thinking of computation as an entirely foreign domain, and instead consider computers to be at the heart of what they have always done, that is, to understand society and culture as a technical and symbolic system."[29] Others within digital humanities take a more hands-on approach by building digital tools and platforms for humanities research. This work often emerges from lab-like research environments and includes

projects such as Omeka, a curation platform for the web built at George Mason University's Roy Rosenzweig Center for History and New Media; Voyant Tools, a web-based text analysis platform built in collaboration between scholars at McGill University and the University of Alberta; and experimental text-visualization tools like Juxta and Ivanhoe, built at the University of Virginia's Institute for Advanced Technology in the Humanities. A particularly vibrant subfield of work right now, which can go by the name text mining or culturonomics, uses "big data" to analyze large bodies of text, image collections, and even audiovisual materials.[30]

At some moments these various strands of digital humanities have been antagonistic, and even the term "digital humanities" has created controversy. Some worry that the field has a far too comfortable relationship with systems of power that cultural criticism has long sought to challenge.[31] The scarcity of funding often exacerbates such tensions, especially in an era when the humanities are facing institutional pressure and falling enrollments. However, the digital turn has also reinvigorated conversations around the importance of humanities research and the often underappreciated, if not invisible, institutional structures that make our fields possible. For instance, digital humanities serves as a point of intersection between librarianship and scholarship, and libraries have become the de facto home for digital research on many campuses. These collaborations have led to the development of electronic collections that bring long-neglected authors and underrepresented histories to the public eye.[32] They have also galvanized discussions around the politics and long-term preservation of data in the humanities while advancing the cause of open access.[33] Publishing, too, has served as a point of intersection between different strands of work, as stakeholders across the humanities work together to develop digital platforms that speed up publication timelines and develop new protocols for peer review.[34] While the expansiveness of digital humanities, both as a field and as a "tactical" term that enables humanists to secure funding, has made it notoriously difficult to define, practitioners across all fields of study share an interest in exploring how digital media are transforming humanistic research.[35]

If sound studies and digital humanities have been confronting similar questions about praxis in the humanities and the nature of critical method, one might reasonably ask: Why has there been so little interest in sound within digital humanities? One answer lies in the text-centricity of the field, a bias that is baked into its institutional history. As a discipline, digital humanities locates its origin in Father Roberto Busa's *Index Thomisticus*,

a concordance of every word in the works of Thomas Aquinas built using punch-card computing.[36] Its earliest journal is *Literary and Linguistic Computing;* among its earliest projects are electronic editions of literary works, leading to the formation of the Text Encoding Initiative (TEI) in the 1980s.[37] Digital humanities scholars generally communicate on Twitter and via long-running, heavily curated listservs like the Humanist rather than podcasts, favoring reading and typing over listening and speaking. While the early decades of the twenty-first century have seen the field expand significantly, including the creation of a new "AudioVisual Materials" Special Interest group of the Alliance for Digital Humanities Organizations, sound remains perhaps the least utilized, least studied mode within digital humanities. Few projects and fewer tools incite scholars to *listen*.

Yet this bias against sound is also a function of the nature of digital information itself. From the earliest days of personal computing, users interacted with machines through typed instructions issued through the command line. Vestiges of this interface are present in the ubiquitous search box of the web, where all content is parsed as a string of characters. Dependence on text within digital spaces persists in the user tagging that makes sound searchable on sites like SoundCloud and Genius, as well as in the more formal textual markup structures used to describe and organize digital content in projects like the Jazz Loft Archive. Simply put, making audio content accessible means rendering it as text. Even at its most abstract level, digital technology is built on a binary structure that mediates all data through strings of characters, which are then manipulated using text-based instructions. Thus even as we tend to imagine digital technologies as infinitely flexible, their fundamental unit is the discrete mark, the physical trace identified visually. This simple fact has given rise to a visualist orientation that continues to plague screen culture.

The silence of digital platforms has broader implications for teaching and research. Though rarely described as such, the sonic culture of the academy has always shaped what it is possible to know and to communicate. Many of the academy's most sacred practices involve the entanglement of text and oral performance, such as the dialogic and Socratic methods of lectures, conference papers, and colloquium presentations. Classrooms and seminars are inherently noisy spaces where students voice opinions, tap keyboards, and flip the pages of books. As much as focused study seems to be silent, the oral and the aural never recede from academic practices. Some digital platforms, like video conferencing, have amplified these aspects of academic communication, enabling scholars and students to speak

across vast distances. Others silence our interactions. For example, many humanities scholars have criticized online learning for commodifying the education process, but collectively we must also recognize the impact of these changes on sensing bodies. Digital learning environments transform noisy spaces to silent screens, where students interact with their instructors and classmates almost entirely via written language. The proliferation of silence via text-oriented digital technologies affects individual learners and educators differently.

What forms of knowledge—and what embodied experiences—are diminished by the humanities' reliance on text and visualist methods? And whose voices are going unheard in the digital turn? Bringing sound studies into meaningful conversation with digital humanities has the power to inspire new questions and foment new methods that are radically different from those of print. By foregrounding sonic experience, this collection begins answering these questions, using auditory culture to probe the assumptions of digital tools and technologies in academic life. Engaging deeply with sound, as our contributors collectively argue, untethers scholars from their reliance on text-based modes of knowledge, revealing the structural biases built into the apparatus of scholarship and transforming the epistemic grounds upon which such conversations can be had.

Publishing venues and researchers are already challenging the biases of the contemporary media environment through multimodal scholarship. A variety of journals including *Kairos, Liminalities,* and *Computers and Composition Online,* blogs like *Sounding Out!,* and platforms such as Scalar have created venues for born-digital work that encourage exploration and experimentation while building on established traditions of academic writing and argumentation.[38] The creative use of new media is at play in a number of projects that combine audio with a wide range of digitally archived material. Sharon Daniel's "Public Secrets" is an interactive (and intentionally public) audio archive of interviews with incarcerated women who pointedly describe the prison industrial complex and its injustices.[39] The historically focused Freedom's Ring, a product of the Martin Luther King, Jr., Research and Education Institute at Stanford University, mirrors the audio from King's iconic "I Have a Dream" speech with his written draft so that users experience both versions of the speech simultaneously. An "index" links this audiovisual rendering of King's speech to a number of digitized archival documents relevant to the performance and its political moment.[40] Similarly, Emily Thompson's "The Roaring Twenties," a complement to her monograph *The Soundscape of Modernity,* employs New York City noise ordinances in the 1920s

to explore everyday contestations of the urban soundscape.⁴¹ These innovative projects create reading and listening experiences that give agency to the user, thereby challenging the unidirectionality of conventional scholarly writing. It is also significant that each project was created collaboratively: Freedom's Ring was developed under the direction of Evan Bissell in partnership with Beacon Press's King Legacy Series and the MLK Institute at Stanford; Thompson's with the help of web designer Scott Mahoney; and Daniel's with support from the design team at *Vectors* journal. Like much digital humanities work, digital sound studies is changing the model for academic production by moving away from single-authored, single-argument work toward collaborative, multimodal projects that allow for multiple pathways and target broad audiences.

This volume cuts across the wide-ranging disciplines engaged in sound-based research, encompassing literature, performance, disability, anthropology, black studies, history, information science, and more. However, the contributors refrain from engaging solely in field-specific debates, speaking instead to the broader issues, opportunities, and challenges that emerge from thinking about and with sound in digital environments. Part I, "Theories and Genealogies," lays the historical and conceptual groundwork for this exploration by linking digital sound studies to important shifts in academic thought and practice that took place in the twentieth century. Historian Richard Cullen Rath narrates the history of his encounters with digital methods, beginning with his experiences as a student. For more than two decades he has studied a rare historical document of African-diasporic music in Jamaica. An early adopter of MIDI technology, over the years Rath has combined digital and analog methods to create playable historical replicas of instruments and to interpret the music. This essay meditates on the importance of digitally informed "ethnohistory" for illuminating the cultural contributions of enslaved Africans and subaltern histories.

Myron Beasley anchors digital sound studies praxis in the critical moves of black radicalism and embodied performance. In an engaging narrative that unfolds like tracks on an album, Beasley draws on Zora Neale Hurston's work to show how her innovative uses of technology to record folk culture in her native Florida connect to the performance of a DJ sampling her voice on a laptop in a Harlem cafe. Beasley also explores the politics of metadata and the problems caused by the way archives misrepresent Hurston's schol-

arship by identifying her work with her white male colleagues. This chapter thus narrates a genealogy of digital sound studies rooted in black feminist theory, performance, and ethnographic practice. Through an exploration of Walter Ong's theories of orality and rhetoric, Jon Stone's essay also explores how sound often operates as the connective tissue at this particular moment of technological hybridity when the term "digital" signals work that is participatory, spontaneous, and often noisy. The essay begins with Stone's encounter with a single digital sound object: a YouTube video of CHOIR! CHOIR! CHOIR! (an ad hoc vocal ensemble in Toronto) performing Phil Collins's "In the Air Tonight." Stone riffs on the digitally mediated performance to introduce what he calls "digital humanity"—the connective potential of today's technologies.

Stone's essay delivers readers to part 2, which highlights the way scholars are using social media and digital pedagogy to build communities of thought around sonic research. The editorial team behind the *Sounding Out!* blog single-handedly transformed the look, feel, and sound of contemporary sound studies by instigating a conversation online that unites a wide-ranging field. Importantly, they have brought voices from the margins into the center by curating and promoting sound studies work through the site's social media presence. In their essay, Aaron Trammell, Jennifer Stoever, and Liana Silva examine the affective labor entailed in the act of building a strong digital community and provide a biography of their project. Regina Bradley's series of YouTube interviews about the significance of the music group OutKast similarly shifts the conversation in her field to be more inclusive of regionalisms of the American South in the study of hip-hop. She reached new public and academic audiences while building a multimedia archive of cultural criticism. In her essay, she documents the intellectual outcomes of this work and creates a template for others wishing to embark on a similar method of digital sound research and publication. W. F. Umi Hsu brings this ethos of community building to the classroom, where they ask their students to engage in audio-ethnography in collaboration with local middle schoolers. By producing sound recordings in collaboration with community partners, Hsu's students learn that sonic methods can challenge hierarchies and build bridges across cultures and generations. Hsu explores their students' insights and experiences to demonstrate that turning to sound amplifies the already transformational aspects of digital pedagogy.

Each of the scholars in part 3, "Disciplinary Translations," traverses boundaries to build new conceptual frameworks for digital sound studies. In her essay, Tanya Clement explains that the metadata conventions

of information science create significant barriers for data-driven digital sound scholarship. Clement is the principal investigator of the NEH-funded project High Performance Sound Technologies for Access and Scholarship (HiPSTAS), which aims to harness the capacity of big-data analytics for the study of spoken-word audio collections. Clement's investigation is crucial for securing the potential for digital sound studies to enhance the research potential of large audio collections through innovative computational analysis and discovery. Yet her observations remain rooted in practices of close listening that attend to the nuances of sonic meaning in cultural life.

Michael Kramer takes aim at the frustrating ubiquity of visualization techniques in digital humanities by flipping the script and remediating visual media such as maps and photographs as sonic data. His avant-garde methods of "sonification" demonstrate that sound-based research can be meaningful for scholars working with visual culture. A historian by training, Kramer listens to seemingly "silent" visual artifacts from the historic Berkeley Folk Festival archive, showing how to interpret the sounds encoded in images through a deeply multimodal praxis. Trained in literary studies, and a researcher of Victorian music, Joanna Swafford shows how digital methods enable her to present her work to different disciplines. Faced with the challenges of writing about the nuances of musical notation for a literary audience, she designed an open-source tool, Augmented Notes, that makes it possible for people who do not read music to learn more about the relationship between musical scores and performance. Her digital solution, however, has multiple potential applications that may be used across fields to animate notational music for a variety of purposes.

Part 4 "Points Forward" to the next wave of digital sound scholarship by identifying key challenges that the field needs to address. Digital humanists are just beginning to develop methods of assessment and evaluation that recreate the rigor of peer review, a practice not without its own critics.[42] Rebecca Geoffroy-Schwinden identifies what makes digital scholarship about historical sounds effective while reviewing key projects that examine the cultural history of sound. She also narrates her own efforts to bring to life the music of the French Revolution on the platform Scalar. Geoffroy-Schwinden argues that digital explorations of sonic history must do more than simply attempt to recreate the sounds of the past; these projects must also contextualize the listening perspectives of historical subjects. She shows that without understanding what made sound interpretable and meaningful to those who produced and heard it, even cutting-edge digital

work fails to live up to its promise. Finally, Steph Ceraso considers the multisensory aspects of sonic experience as a means of rethinking ways to incorporate sound into born-digital scholarship. Beginning with observations from her own work, she offers three "sound practices" for helping scholars recognize the multifaceted ways in which sound is embodied. She tackles a range of issues—from universal design to the tactility of sound—as a means of illustrating a simple but powerful point: the work of digital sound studies necessitates creative thinking that pushes against conventional wisdom.

In an afterword on the futures of digital sound studies, Jonathan Sterne responds to the collection in an interview with the editors. This conversation—a print remediation of a Skype session that occurred in four different places at once—reflects on the shifts in both academic and technological culture that brought us to this moment. Sterne discusses the institutional infrastructures that will need to change in order to sustain the momentum behind work at the juncture of sound studies and digital humanities. He also identifies themes humming behind each of the essays in terms of digital publication—the platforms that enable it and its relationship to academic prestige. This interview, as with the rest of this volume, is a textual artifact of digital sonic practice.

Sterne's commentary is a fitting place to end as it broadens the conversation to examine the institutional frameworks that make digital sound studies possible. For multimodal scholarship to continue to grow, it must be met with significant institutional imagination and collaboration. Scholars need librarians to aid with accessing and archiving digital materials to ensure the long-term preservation and sustainability of emerging forms of scholarship. Librarians need the financial and organizational support of their universities, and they need an open line of communication with academic publishers and for-profit companies about the possibilities and limitations of electronic scholarship. Administrators need to be shown, and to recognize when shown, the intellectual value of formal experimentation and creativity within the broader goals of the humanities. Mentors need to encourage junior scholars to take risks while clearly apprising them of what they stand to gain, as well as what they may lose, within their particular institutional cultures and career trajectories. Educators need training, time, and professional development to begin learning how to integrate new technologies into the classroom in ways that prepare students to be active participants in twenty-first-century media cultures without losing sight of the core values of the humanities. Navigating this dense network of stakeholders is

difficult and often risky work, especially for junior scholars who increasingly find themselves needing to abandon the advice of senior academics and forge a path for their own future within a rapidly changing discipline.

The contributors in this volume are doing just that. By being students of their own cultural moment, they harness the transformative potential of digital technologies and platforms to amplify underrepresented voices, write alternative histories, reimagine the classroom experience, and design capacious new modes of scholarship and publishing. That is to say, digital sound studies scholars combine the creative use of sonic technologies with an informed critical inquiry of them, merging the lessons of digital humanities and the "maker" movement with a thoughtful analysis of digital culture, new media, and the sonic possibilities of technologized learning spaces.[43]

Sonic technologies are not unified objects with clear intent or singular uses; rather, they are always open to appropriation by users whose actions transform the technology itself. Just as the portable reel-to-reel recorder catalyzed Eugene Smith's project, the proliferation of digital technologies creates a space for sound scholars to revisit the media and modes that motivate all stages of the research process. Digital sound scholars are tinkerers, inventors, explorers, and collaborators whose experimentations with new forms of knowledge production transform diverse fields while transcending disciplinary borders. As sound scholars draw on the innovations of digital humanities and, in turn, digital humanities becomes amplified, digital sound studies enriches the academy as a whole with the power of sonic experience.

NOTES

1 After discovering Smith's tapes at the University of Arizona, the Jazz Loft Project's program director, Sam Stephenson, spearheaded efforts to preserve them at Duke University's Center for Documentary Studies, where we listened to the newly digitized reel-to-reel recordings. The digital collection is now housed at Duke's Rubenstein Rare Book and Manuscript Library. For more on the history of the collection, see Stephenson, *Jazz Loft Project.* Some audio recordings can be heard on the project's website, www.jazzloftproject.org (accessed January 13, 2018).

2 Since 2003, several key sound studies volumes and collections have been published. For a view of the field's history, see the introduction in Sterne, *Sound*

Studies Reader. Back and Bull's *Auditory Culture Reader* takes a cultural studies approach, while Pinch and Bijsterveld's *Oxford Handbook of Sound Studies* focuses more on media and technology. Erlmann's *Hearing Cultures* and Smith's *Hearing History* gather historical work on sound; Novak and Sakakeeny's *Keywords in Sound* emphasizes ethnography. For perspectives from film studies, a significant precursor to the emergence of sound studies, see Beck and Grajeda's *Lowering the Boom.* The largest and most comprehensive edited volume that covers many overlapping subjects—for example, culture, ecology, listening, sound and space, and media (television, film, radio)—is the four-volume set *Sound Studies,* also edited by Michael Bull. We are indebted to Brian Kane, on the sound studies listserv on Google Groups, who suggested that differentiating sound studies anthologies according to their scholarly perspectives would be helpful.

3   For more about the politics of noise, see Attali, *Noise;* Goodman, *Sonic Warfare;* Cusick, "An Acoustemology of Detention"; Novak, *Japanoise;* Cusick, "'You are in a place that is out of the world.'"

4   Du Bois, *Souls of Black Folk.*

5   On the cultural legacy of blackface minstrelsy, see Lott, *Love and Theft,* and Lhamon, *Raising Cain.* On the way dialect affected major spoken-word audio collections, see Taylor, "Saving Sound, Sounding Black."

6   Much of this this work examines the intersection of music and culture, albeit with a Euro-American bias. See Douglass, *Narrative of the Life;* Baraka, *Blues People;* Ellison and O'Meally, *Living with Music;* Davis, *Blues Legacies and Black Feminism;* and Southern, *Music of Black Americans.* The weight toward North America and Europe of this work is indicative of sound studies as a whole. Some exceptions, mostly from ethnomusicology, are Feld, *Sound and Sentiment;* Meintjes, *Sound of Africa!;* Novak, *Japanoise;* and Ochoa, *Aurality.* More recently, Gustavus Stadler criticized mainstream sound studies scholarship for having a significant race problem deriving from its own associations with technoculture; see Stadler, "On Whiteness and Sound Studies."

7   Moten, *In the Break,* 171–232.

8   Weheliye, *Phonographies;* Neal, *What the Music Said, Soul Babies,* and *Songs in the Key of Black Life;* and Brooks, "Nina Simone's Triple Play."

9   Meintjes, *Sound of Africa!*

10 Benjamin, "Work of Art in the Age of Mechanical Reproduction"; Adorno, *Essays on Music;* Barthes, *Image, Music, Text;* Ong, *Orality and Literacy;* and McLuhan, *Understanding Media.*

11 An in-depth exploration of this question can be found in Attali, *Noise,* and Jameson, "Postmodernism and Consumer Society." See also Deleuze, *Difference and Repetition,* and Chion, *Audio-Vision.*

12 Many transcriptions of these shows can be found in Benjamin and Rosenthal, *Radio Benjamin.*

13 For more on the body as a "sensing agent," see Helmreich, *Sounding the Limits*; Eidsheim, *Sensing Sound*; and Erlmann, "But What of the Ethnographic Ear?"

14 Sterne, *Audible Past*, 15–16.

15 Thompson, *Soundscape of Modernity*.

16 Gitelman, *Scripts, Grooves*.

17 For more on sonic technologies and the cultural practices of remembering, see Bijsterveld, *Sound Souvenirs*.

18 Katz, *Capturing Sound*, and Paul Miller, *Sound Unbound*.

19 Rodgers, *Pink Noises*.

20 Bull, *Sound Moves*; Théberge, *Any Sound You Can Imagine*; and Hagood, "Quiet Comfort." For more on the synthesizer, also see Evens, *Sound Ideas*.

21 For an introduction to such work, see the companion website to the Platform Studies series by MIT Press, edited by Ian Bogost and Nick Montfort (accessed January 13, 2018, http://platformstudies.com). For a thorough discussion of platform theory as it relates to audio technologies and cultures, see Sterne, *MP3*.

22 Portable recording devices have played a significant role in ornithology, too, enabling scientists and sound archivists, such as those at the Macaulay Library, to build large research collections of animal sounds recorded around the world by both experts and amateur bird enthusiasts. For more on the history of nature recordings, see Bruyninckx, "Sound Sterile,"and Eley, "A Birdlike Act."

23 The long history of representing performance traditions of indigenes, under-classes, and colonial others emerged from travel writing of the colonial period and assumes a distinct character with the rise of blackface minstrelsy in the nineteenth century. For more on the recording of African diasporic music in musical notation by white authors, see Radano, *Lying Up a Nation*, 164–229. For a digital sound project on one of these early works, see Dubois, Garner, and Lingold, *Musical Passage*.

24 Brady, *A Spiral Way*; Filene, *Romancing the Folk*; and Karl Miller, *Segregating Sound*. Scholars working on performance traditions from before the dawn of sound recording know all too well the constraints that technologies impose on research possibilities. Applied ethnomusicologists approach this problem by maintaining musical ensembles of traditional music, using performance as a form of public archive. See Harrison and Pettan, *Applied Ethnomusicology*; Harrison, "Epistemologies of Applied Ethnomusicology"; and Seeger, "Lost Lineages."

25 One example is Feld, *Voices of the Rainforest*, which is discussed in Feld, "A Sweet Lullaby." Scholars and libraries operating in the public sphere also have explored alternative ways of presenting sound. These include R. Murray Schafer's World Soundscape Project (an acoustic ecology project founded in the late 1960s) and the more recent activities at the Library of Congress's American Memory Project and the British Library Sound Archives. For more

on soundscapes, see Schafer, *Tuning of the World* and *Book of Noise;* Truax, *World Soundscape Project's Handbook;* and Harley, Minevich, and Waterman, *Art of Immersive Soundscapes.* Thanks to Steph Ceraso and Jonathan Sterne for pointing us toward these resources.

26 For some perspectives regarding these challenges, see Nannyonga-Tamusuza and Weintraub, "The Audible Future"; Thram, "Performing the Archive"; and Nannyonga-Tamusuza, "Documentation of the Wachsmann Collection."

27 For one investigation into the circulation of digital music in the global South, see Steingo, "Sound and Circulation."

28 Wagner, "Bringing Radio Haiti Home."

29 Dinsman and Galloway, "Digital in the Humanities."

30 On quantitative analysis in literary studies, see Moretti, *Graphs, Maps, Trees;* Jockers, *Macroanalysis;* and Underwood, *Why Literary Periods Mattered,* and his blog, the Stone and the Shell. Several university collectives are currently exploring data analysis approaches to the history of literature, including the Chicago Text Lab, the Stanford Literary Lab, and the .txtLAB at McGill. For interdisciplinary perspectives on distant reading in art and sound studies, respectively, see Manovich, "How to Compare One Million Images?," and Clement, "Distant Listening," as well as Clement's and Kramer's essays in this volume.

31 See, for instance, the work of the #transformDH collective and essays in the special issue of *differences* regarding the "Dark Side of Digital Humanities," especially McPherson, "Designing for Difference," and Barnett, "Brave Side of Digital Humanities."

32 Hartsell-Grundy, Braunstein, and Golomb, *Digital Humanities in the Library.*

33 Klein, *Interdiscipling Digital Humanities.*

34 For example, see Humanities Commons, a web-based networking platform for humanities scholars to share their research (accessed January 13, 2018, https://hcommons.org). On digital humanities and peer review, see Fitzpatrick, *Planned Obsolescence.*

35 On "tactical" digital humanities, see Kirschenbaum, "Digital Humanities As/Is." For a more general introduction to the field and its debates, see Gold, *Debates in the Digital Humanities;* Berry, *Understanding Digital Humanities;* Jones, *Emergence of Digital Humanities;* and Svensson and Goldberg, *Between Humanities and the Digital.*

36 See Jones, *Emergence of Digital Humanities.*

37 On the history of digital humanities, see Hockey, " History of Humanities Computing."

38 Scalar was created by the Alliance for Networking Visual Culture. Born out of a desire to integrate film excerpts more seamlessly into academic writing, the platform boasts sophisticated tools for including audio and visual material within digital texts. For more information, see their website, http://scalar.usc .edu/scalar (accessed January 13, 2018). Several other academic outlets, includ-

ing *Harlot*, have experimented with multimodal scholarship. For example, see Ceraso and Stone, "Sonic Rhetorics," *Harlot*'s special issue on sound.

39 Daniel, "Public Secrets."

40 Bissell, Freedom's Ring.

41 Other recent examples of web projects featuring sound include the London Sound Survey; McDonald, Every Noise at Once; and Wall, Virtual Paul's Cross Project.

42 Fitzpatrick, *Planned Obsolescence*.

43 For more about maker culture, see Ratto and Boler, DIY *Citizenship*, and Ratto, "Critical Making." Also see the accompanying website to the Maker Lab in the Humanities (MLab) at the University of Victoria, directed by Jentery Sayers (accessed January 13, 2018, http://maker.uvic.ca).

WORKS CITED

Adorno, Theodor W. *Essays on Music*. Introduction, commentary, and notes by Richard D. Leppert. Berkeley: University of California Press, 2002.

Attali, Jacques. *Noise: The Political Economy of Music*. Minneapolis: University of Minnesota Press, 1985.

Back, Les, and Michael Bull, eds. *The Auditory Culture Reader*. New York: Berg, 2003.

Baraka, Amiri. *Blues People: Negro Music in White America*. New York: W. Morrow, 1963.

Barnett, Fiona M. "The Brave Side of Digital Humanities." Special issue, "Dark Side of the Digital Humanities," *differences: A Journal of Feminist Cultural Studies* 25, no. 1 (2014): 64–78.

Barthes, Roland. *Image, Music, Text*. New York: Noonday Press, 1977.

Beck, Jay, and Tony Grajeda, eds. *Lowering the Boom: Critical Studies in Film Sound*. Urbana: University of Illinois Press, 2008.

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." In *Illuminations*, edited by Hannah Arendt. New York: Schocken Books, 1986.

Benjamin, Walter, and Lecia Rosenthal. *Radio Benjamin*. New York: Verso, 2014.

Berry, David, ed. *Understanding Digital Humanities*. New York: Palgrave Macmillan, 2012.

Bijsterveld, Karin, ed. *Sound Souvenirs: Audio Technologies, Memory, and Cultural Practices*. Amsterdam: Amsterdam University Press, 2009.

Bissell, Evan, dir. Freedom's Ring. Accessed June 10, 2014. http://freedoms-ring .org/?view=Speech.

Brady, Erika. *A Spiral Way: How the Phonograph Changed Ethnography*. Jackson: University Press of Mississippi, 1999.

Brooks, Daphne A. "Nina Simone's Triple Play." *Callaloo* 34, no. 1 (2011): 176–97.

Bruyninckx, Joeri. "Sound Sterile: Making Scientific Field Recordings in Ornithology." In *The Oxford Handbook of Sound Studies*, edited by Trevor Pinch and Karin Bijsterveld. New York: Oxford University Press, 2012.

Bull, Michael. *Sound Moves: iPod Culture and Urban Experience*. New York: Routledge, 2007.

Bull, Michael, ed. *Sound Studies: Critical Concepts in Media and Cultural Studies.* New York: Routledge, 2013.

Ceraso, Steph, and Jon Stone, eds. "Sonic Rhetorics." Special issue, *Harlot* 9 (2013). Accessed June 10, 2014. http://harlotofthearts.org/index.php/harlot/issue/view/9.

Chion, Michel. *Audio-Vision: Sound on Screen*. Translated by Claudia Gorbman. New York: Columbia University Press, 1994.

Clement, Tanya, et al. "Distant Listening to Gertrude Stein's 'Melanctha': Using Similarity Analysis in a Discovery Paradigm to Analyze Prosody and Author Influence." *LLC: Journal of Digital Scholarship in the Humanities* 28, no.4 (2013): 582–602.

Cusick, Suzanne. "'You are in a place that is out of the world': Music in the Detention Camps of the 'Global War on Terror.'" *Journal of the Society for American Music* 2, no. 1 (2008): 1–26.

Cusick, Suzanne. "An Acoustemology of Detention in the 'Global War on Terror.'" In *Music, Sound and the Reconfiguration of Public and Private Space*, edited by Georgina Born. New York: Cambridge University Press, 2013.

Daniel, Sharon. "Public Secrets." *Vectors: Journal of Culture and Technology in a Dynamic Vernacular*, Perception Issue, 2, no. 2 (2007): n.p. http://vectors.usc.edu/projects/index.php?project=57.

Davis, Angela Y. *Blues Legacies and Black Feminism: Gertrude "Ma" Rainey, Bessie Smith, and Billie Holiday*. New York: Pantheon Books, 1998.

Deleuze, Gilles. *Difference and Repetition*. New York: Columbia University Press, 1994.

Dinsman, Melissa, and Alexander R. Galloway. "The Digital in the Humanities: An Interview with Alexander Galloway." *Los Angeles Review of Books*, March 27, 2016. https://lareviewofbooks.org/article/the-digital-in-the-humanities-an-interview-with-alexander-galloway.

Douglass, Frederick. *Narrative of the Life of Frederick Douglass: An American Slave.* Boston: Published at the Anti-Slavery Office, 1845.

Dubois, Laurent, David K. Garner, and Mary Caton Lingold. Musical Passage: A Voyage to 1688 Jamaica. Accessed September 5, 2016. http://musicalpassage.org.

Du Bois, W. E. B. *The Souls of Black Folk*. New York: Dover, 1994.

Eidsheim, Nina. *Sensing Sound: Singing and Listening as Vibrational Practice.* Durham, NC: Duke University Press, 2015.

Eley, Craig. "A Birdlike Act: Sound Recording, Nature Imitation, and Performance Whistling." *Velvet Light Trap* 74 (Fall 2014): 4–15.

Ellison, Ralph, and Robert G. O'Meally. *Living with Music.* New York: Random House, 2002.

Erlmann, Veit, ed. "But What of the Ethnographic Ear? Anthropology, Sound, and the Senses." In *Hearing Cultures: Essays on Sound, Listening, and Modernity,* edited by Veit Erlmann, 1–20. New York: Berg, 2004.

Evens, Aden. *Sound Ideas: Music, Machines, and Experience.* Minneapolis: University of Minnesota Press, 2005.

Feld, Steven. *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression.* Philadelphia: University of Pennsylvania Press, 1982.

Feld, Steven. "A Sweet Lullaby for World Music." *Public Culture* 12, no. 1 (2000): 145–71.

Feld, Steven. *Voices of the Rainforest.* Rykodisc, RCD 10173, 1991.

Filene, Benjamin. *Romancing the Folk: Public Memory and American Roots Music.* Chapel Hill: University of North Carolina Press, 2000.

Fitzpatrick, Kathleen. *Planned Obsolescence: Publishing, Technology, and the Future of the Academy.* New York: New York University Press, 2011.

Gitelman, Lisa. *Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era.* Palo Alto, CA: Stanford University Press, 1999.

Gold, Matthew K. *Debates in the Digital Humanities.* Minneapolis: University of Minnesota Press, 2012.

Goodman, Steve. *Sonic Warfare: Sound, Affect, and the Ecology of Fear.* Cambridge, MA: MIT Press, 2010.

Hagood, Mack. "Quiet Comfort: Noise, Otherness, and the Mobile Production of Personal Space." *American Quarterly* 63, no. 3 (2011): 573–89.

Harley, James, Pauline Minevich, and Ellen Waterman, eds. *Art of Immersive Soundscapes.* Regina, Saskatchewan: University of Regina Press, 2013.

Harrison, Klisala. "Epistemologies of Applied Ethnomusicology." *Ethnomusicology* 56, no. 3 (2012): 505–29.

Harrison, Klisala, and Svanibor Pettan. *Applied Ethnomusicology: Historical and Contemporary Approaches.* Newcastle-Upon-Tyne, UK: Cambridge Scholars Publishing, 2010.

Hartsell-Grundy, Arianne, Laura Braunstein, and Liorah Golomb, eds. *Digital Humanities in the Library: Challenges and Opportunities for Subject Specialists.* Chicago: Association of College and Research Libraries, 2015.

Helmreich, Stefan. *Sounding the Limits of Life: Essays in the Anthropology of Biology and Beyond.* Princeton, NJ: Princeton University Press, 2016.

Hockey, Susan. "The History of Humanities Computing." In *A Companion to Digital Humanities,* edited by Susan Schreibman, Ray Siemens, and John Unsworth. Oxford, UK: Blackwell, 2004.

Jacqueline, Wernimont. "Hearing Eugenics." *Sounding Out!,* July 18, 2016. https://soundstudiesblog.com/2016/07/18/hearing-eugenics.

Jameson, Fredric. "Postmodernism and Consumer Society." In *Postmodernism and Its Discontents,* edited by E. Ann Kaplan. New York: Verso, 1988.

Jockers, Matthew. *Macroanalysis: Digital Methods and Literary History*. Urbana: University of Illinois Press, 2013.

Jones, Steven E. *The Emergence of Digital Humanities*. New York: Routledge, 2014.

Katz, Mark. *Capturing Sound: How Technology Has Changed Music*. Berkeley: University of California Press, 2004.

Kirschenbaum, Matthew. "Digital Humanities As/Is a Tactical Term." In *Debates in the Digital Humanities*, edited by Matthew K. Gold. Minneapolis: University of Minnesota Press, 2012.

Klein, Julie Thompson. *Interdisciplining Digital Humanities: Boundary Work in an Emerging Field*. Ann Arbor: University of Michigan Press, 2015.

Lhamon, W. T. *Raising Cain: Blackface Performance from Jim Crow to Hip Hop*. Cambridge, MA: Harvard University Press, 1998.

Lott, Eric. *Love and Theft: Blackface Minstrelsy and the American Working Class*. New York: Oxford University Press, 1995.

Manovich, Lev. "How to Compare One Million Images?" In *Understanding Digital Humanities*, edited by David Berry. New York: Palgrave Macmillan, 2012.

McDonald, Glenn. Every Noise at Once. Accessed July 6, 2015. http://everynoise.com/engenremap.html.

McPherson, Tara. "Designing for Difference." Special issue, "Dark Side of the Digital Humanities." *differences: A Journal of Feminist Cultural Studies* 25, no. 1 (2014): 177–88.

McLuhan, Marshall. *Understanding Media: The Extensions of Man*. Cambridge, MA: MIT Press, 1994.

Meintjes, Louise. *Sound of Africa! Making Music Zulu in a South African Studio*. Durham, NC: Duke University Press, 2003.

Miller, Karl Hagstrom. *Segregating Sound: Inventing Folk and Pop Music in the Age of Jim Crow*. Durham, NC: Duke University Press, 2010.

Miller, Paul (a.k.a. DJ Spooky That Subliminal Kid). *Sound Unbound: Sampling Digital Music and Culture*. Cambridge, MA: MIT Press, 2008.

Moretti, Franco. *Graphs, Maps, Trees: Abstract Models for Literary History*. New York: Verso, 2005.

Moten, Fred. *In the Break: The Aesthetics of the Black Radical Tradition*. Minneapolis: University of Minnesota Press, 2003.

Nannyonga-Tamusuza, Sylvia. "Written Documentation of the Klaus Wachsmann Music Collection: Repatriating the Past to Present Indigenous Users in Uganda." In *African Musics in Context: Institutions, Culture, Identity*, edited by Thomas Solomon. Kampala, Uganda: Fountain Publishers, 2015.

Nannyonga-Tamusuza, Sylvia, and Andrew N. Weintraub. "The Audible Future: Reimagining the Role of Sound Archives and Sound Repatriation in Uganda." *Ethnomusicology* 56, no. 2 (Spring 2012): 206–33.

Neal, Mark Anthony. *Songs in the Key of Black Life: A Rhythm and Blues Nation*. New York: Routledge, 2003.

Neal, Mark Anthony. *Soul Babies: Black Popular Culture and the Post-Soul Aesthetic.* New York: Routledge, 2002.

Neal, Mark Anthony. *What the Music Said: Black Popular Music and Black Public Culture.* New York: Routledge, 1999.

Novak, David. *Japanoise: Music at the Edge of Circulation.* Durham, NC: Duke University Press, 2013.

Novak, David, and Matt Sakakeeny, eds. *Keywords in Sound.* Durham, NC: Duke University Press, 2015.

Ochoa Gautier, Ana María. *Aurality: Listening and Knowledge in Nineteenth-Century Colombia.* Durham, NC: Duke University Press, 2014.

Ong, Walter J. *Orality and Literacy: The Technologizing of the Word.* New York: Methuen, 1982.

Pinch, Trevor, and Karin Bijsterveld, eds. *The Oxford Handbook of Sound Studies.* New York: Oxford University Press, 2012.

Radano, Ronald M. *Lying Up a Nation: Race and Black Music.* Chicago: University of Chicago Press, 2003.

Ratto, Matt, and Megan Boler, eds. *DIY Citizenship: Critical Making and Social Media.* Cambridge, MA: MIT Press, 2014.

Ratto, Matt. "Critical Making: Conceptual and Material Studies in Technology and Social Life." *Information Society* 27, no. 4 (2011): n.p. https://doi.org/10.1080/01972243.2011.583819.

Rawes, Ian. The London Sound Survey. Accessed July 6, 2015. www.soundsurvey.org.uk.

Rodgers, Tara. *Pink Noises: Women on Electronic Music and Sound.* Durham, NC: Duke University Press, 2010.

Schafer, R. Murray. *The Book of Noise.* Indian River, Ontario: Commercial Press, [1968] 1998.

Schafer, R. Murray. *The Tuning of the World.* New York: Knopf, 1977.

Seeger, Anthony. "Lost Lineages and Neglected Peers: Ethnomusicologists Outside Academia." *Ethnomusicology* 50, no. 2 (2006): 214–35.

Smith, Mark M., ed. *Hearing History: A Reader.* Athens: University of Georgia Press, 2004.

Southern, Eileen. *The Music of Black Americans: A History.* New York: Norton, 1971.

Stadler, Gustavus. "On Whiteness and Sound Studies." *Sounding Out!*, July 6, 2015. http://soundstudiesblog.com/2015/07/06/on-whiteness-and-sound-studies.

Steingo, Gavin. "Sound and Circulation: Immobility and Obduracy in South African Electronic Music." *Ethnomusicology Forum* 24, no. 1 (2015): 102–23.

Stephenson, Sam. *The Jazz Loft Project.* Durham, NC: Duke University Press, 2009.

Sterne, Jonathan. *The Audible Past: Cultural Origins of Sound Reproduction.* Durham, NC: Duke University Press, 2003.

Sterne, Jonathan. *MP3: The Meaning of a Format.* Durham, NC: Duke University Press, 2012.

Sterne, Jonathan, ed. *The Sound Studies Reader.* New York: Routledge, 2012.

Svensson, Patrik. "Beyond the Big Tent." In *Debates in the Digital Humanities,* edited by Matthew K. Gold. Minneapolis: University of Minnesota Press, 2012.

Svensson, Patrik, and David Theo Goldberg. *Between Humanities and the Digital.* Cambridge, MA: MIT Press, 2015.

Taylor, Toniesha L. "Saving Sound, Sounding Black, Voicing America: John Lomax and the Creation of the 'American Voice.'" *Sounding Out!,* June 8, 2015. http://soundstudiesblog.com/2015/06/08/john-lomax-and-the-creation-of-the-american-voice.

Théberge, Paul. *Any Sound You Can Imagine: Making Music/Consuming Technology.* Hanover, NH: Wesleyan University Press, 1997.

Thompson, Emily Ann. *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933.* Cambridge, MA: MIT Press 2002.

Thram, Diane. "Performing the Archive: Repatriation of Digital Heritage and the ILAM Music Heritage Project SA." In *African Musics in Context: Institutions, Culture, Identity,* edited by Thomas Solomon. Kampala, Uganda: Fountain Publishers, 2015.

Truax, Barry. *The World Soundscape Project's Handbook for Acoustic Ecology.* Vancouver, BC: A.R.C. Publications, 1978.

Underwood, Ted. The Stone and the Shell. Blog. Accessed January 13, 2018. https://tedunderwood.com.

Underwood, Ted. *Why Literary Periods Mattered: Historical Contrast and the Prestige of English Studies.* Palo Alto, CA: Stanford University Press, 2013.

Wagner, Laura. "Bringing Radio Haiti Home, One Step at a Time." H-net, June 29, 2016. https://networks.h-net.org/node/116721/blog/h-haiti-blog/132330/bringing-radio-haiti-home-one-step-time.

Wall, John N., PI. Virtual Paul's Cross Project. Accessed June 10, 2014. http://vpcp.chass.ncsu.edu.

Weheliye, Alexander G. *Phonographies: Grooves in Sonic Afro-Modernity.* Durham, NC: Duke University Press, 2005.