

SOUND PRACTICES FOR DIGITAL HUMANITIES

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In much of our experience our different senses do not unite
to tell a common and enlarged story.

— JOHN DEWEY, *Art as Experience*

The coaster steadily clicks and clacks until it gets to the peak of the hill, slowing until there are just a few punctuated beats—then comes the whooshing rush of the stomach-sinking drop. Riding a rollercoaster is an immersive, holistic sonic experience. Wooden rollercoasters elicit an especially unique affective response that cannot be replicated in smoother, faster, and much quieter steel speed coasters. The distinct thunderous roar produced by the wooden tracks is experienced not only through the ears but through the entire body. The feeling of the rattling, clattering sound is what propels and intensifies the journey for riders; their bodily experiences are inextricably linked to the jarring sounds of the coaster.

While not every sonic encounter is as exhilarating as a rollercoaster ride, it is not unusual to experience sound as a sensorially invigorating event. Standing near the stage at a concert, playing an instrument, or simply driving one's car when a Mack truck zooms by are multisensory, as opposed to merely auditory, sonic experiences. Though listening is almost always associated with the ears, these examples make clear that the experience

of sound is not limited to a single sense. Indeed, the convergence of sight, sound, and touch (and sometimes smell and taste) is in part what makes sonic interactions so engrossing and compelling.

Yet when sound is incorporated into digital environments, the multisensory potential of sound tends to be dismissed or forgotten. Specifically, in most digital scholarship sound is treated as a *semiotic resource* rather than an *experience*. Sound files that are embedded into websites, blogs, digital archives, and other audio projects are used to enhance or exemplify the content of an accompanying textual narrative, to serve as narratives in and of themselves (e.g., podcasts, interviews), or to enrich visual media (e.g., digital maps, video soundtracks, and voiceovers). Other than the fact that sound can be heard—for those of us with working ears—there is not much difference between the typical ways that sound is incorporated into digital scholarship and more traditional alphabetic forms of scholarship. Like text, sound is presented as information that is ripe for interpretation and analysis. The dissemination of meaningful sonic information in digital scholarship takes precedence over users' embodied experiences—the ways in which users physically interact with and are affected by sound at the level of the senses.

There is certainly scholarship that calls for or works best in more traditional audio formats. However, to approach sonic scholarship exclusively as another site of meaning making is to ignore both the distinct affordances of composing in digital contexts and the fact that living, sensing, nerve-filled human bodies—not just ears and brains—interact with it.¹ As the editors note in the introduction to this collection, “Dealing with sound means dealing with the lived experience of people.” Alongside digital projects that resemble familiar textual scholarship, how might the *lived experiences* of listeners play a more salient role in the production of digital sound studies work? How might we account for and learn from the sonic experiences of all *bodies*—including deaf or hard-of-hearing individuals—and how might such bodily experiences inform digital design?

This essay proposes several “sound practices” that are intended to help scholars account for fully embodied kinds of sensory engagement; these practices amplify the ecological relationship between sound, bodies, and environments. The term “sound practices” refers to more than the literal sounding of digital scholarship. The definition of sound as “exhibiting or based on thorough knowledge and experience” resonates with these practices as well.² Drawing from and extending this definition, sound practices are intended to encourage scholars to produce work that is grounded in a

thorough knowledge of the ideas they are exploring and a thorough knowledge of the diverse ways that bodies experience sound. That is, sound practices imply a thoughtful consideration of one's own and others' embodied listening experiences during the processes of creating, designing, publishing, and interacting with digital sound scholarship.

As evidenced by the range of dynamic work in this collection, we are still in the early, noisy stages of figuring out what “counts” as digital sound studies; it is an area of digital humanities that is being invented as it grows. With the potential for invention and growth in mind, this essay adopts a generous, roomy conception of digital sound studies that includes the type of small-scale sonic experiments featured in the digital counterpart to this book. While the sound practices identified will ideally prove useful to digital scholars writ large, they are aimed at those interested in using sound to immerse listeners in sensory-rich experiences. Such creative-critical projects can energize and broaden the scope of digital sound studies (and digital humanities) by emboldening scholars to take more imaginative, playful, and inclusive approaches to sonic scholarship.

Sound practices ask scholars to rethink and work around the constraints of digital composition—from two-dimensional screen space to the limited audio capabilities of digital devices—to produce more holistic sonic experiences. What follows, then, is an exploration of the various possibilities for creating digital sonic interactions that go beyond exclusively ear-centric modes of listening; for producing digital sonic experiences that are more similar to the kinds of intense, affectively powerful experiences of sound in physical environments; and for designing heightened, flexible, and immersive sensory experiences in digital contexts. In the spirit of this collection, the sound practices outlined below serve as provocations for initiating more substantive conversations about the multisensory possibilities of digital sound studies scholarship.

Sound Practice #1

Consider how different bodies with a range of sensory capacities and diverse needs might interact with sound-based digital projects.

Thinking about how audiences will intellectually respond to and make use of sound in digital scholarship is a standard practice. I would argue, however, that there needs to be more emphasis placed on accounting for how

different kinds of bodies might interact with and have access to sound in digital spaces. Rather than assuming that all bodies are uniform—that all listeners listen in the exact same way—composers of sonic scholarship need to acknowledge and plan for an audience that consists of a diverse range of bodies with various sensory capacities and learning needs.

As a starting point for creating more inclusive digital experiences, scholars working with sound could benefit greatly from having more explicit conversations with disability studies scholars (and vice versa).³ In recent years sound studies scholars such as Mara Mills and Gerard Goggin have begun to explore disability in relation to media history and technological innovation.⁴ While issues of disability and access have been spurring lively discussions in textual sound studies scholarship, they have been largely ignored in the actual production of sonic scholarship. As a result much digital audio work is still being created for an “ideal” listener, thus excluding a broad swath of the population with disabilities and learning needs—most notably people who are deaf or hard-of-hearing—from interacting with and contributing to this work.

Increasing access should mean more than making sonic material available and presenting it in ways that will be useful for scholars from different disciplinary backgrounds. It is also critical to provide users with multiple modes and pathways to engage with and understand sonic scholarship; flexibility must become a key part of the design process. In other words, increasing accessibility will require scholars to practice universal design. As Jay Dolmage and Cynthia Lewiecki-Wilson write, universal design is a concept that “holds that one should design spaces and learning environments for the broadest possible access.”⁵ Adopting universal design as a fundamental practice is a necessary and critical step toward the creation of more inclusive sound-based work in digital environments.⁶

Universal design played a central role in the development of my own digital sound experiment for *Provoke!* My project, “A Tale of Two Soundscapes,” examines the relationship between sound and embodied experience in two strikingly different sonic environments: a small town near the Smoky Mountains of North Carolina and the city of Pittsburgh, Pennsylvania. The approach to listening that I enact in “A Tale of Two Soundscapes” offers an alternative to strictly ear-centric modes of listening and amplifies sound as a multisensory experience. The creation of this audiovisual narrative, as well as the extensive research that emerged from it, heightened my awareness of the unique ways that different bodies engage with and make sense of sound in a range of environments. In the digital context I was designing for, one

of my goals was to provide multiple ways for users with various listening capacities and preferences to interact with and understand my project. Thus, users who may not be able to hear the audio can read the transcript, which makes available both the written language for my voiced script and descriptions of the nondiscursive sounds that occur in conjunction with my voice. In addition, I included a video of still images that helps to visually contextualize the two contrasting soundscapes that are being explored, and the script provides time markers for users who want to compare what is happening in the text with what is happening in the video.

Significantly, users have the option to interact with these different media in whichever way(s) best suits their needs and purposes. By offering users various choices for accessing the same material, I tried to follow the lead of disability studies scholars like Stephanie Kerschbaum, who writes, “Those who design and produce multimodal texts and environments need to incorporate redundancy across multiple channels in order to make digital texts more—not less—flexible, and they should enable customization and manipulation of these texts.”⁷ While developing “A Tale of Two Soundscapes,” I became acutely aware of the ways that redundant design can effectively facilitate multiple pathways for interaction. As a result, this piece was designed to give users the option to listen to the audio only, or to listen to the audio while following along with the transcript, or to read the transcript on its own or while interacting with the video, or to listen to the audio and watch the video simultaneously. I also included longer clips of the isolated soundscape tracks for listeners who want a chance to focus on individual field recordings without the distraction of a voiceover. These longer clips provide a point of comparison for the ways in which the field recordings were manipulated and edited in the main audio narrative, calling attention to the mediation inherent in the creation of sound-based digital work. As I found out, redundant design serves a dual purpose: it gives users multiple ways to engage, and in doing so it makes other forms of intellectual work possible. In this case, it makes the process of composing transparent (and therefore available for examination) by revealing how I did and did not alter original field recordings. Accessible design, then, need not be approached in a strictly practical way; it has both utilitarian and intellectual functions.

Though I tried to make my project accessible to a broad audience, I do not mean to suggest that it is ideal for every user in every situation. That would be impossible. As the authors of “Multimodality in Motion” remind us, “Universal design is a process, a means rather than an end. There’s no such thing as a universally designed text. There’s no such thing as a text

that meets everyone's needs. . . . But to say that no text will be universally accessible is not a justification for failing to consider what audiences are invited into and imagined as part of a text."⁸ Universal design is something that everyone can strive for and work toward. Choosing to think seriously about who might be listening to and interacting with our work will open up new possibilities for who is "invited into and imagined as being a part of" the digital sound studies community.⁹

At the same time, it is important to recognize that designing projects for an abstract broadest possible audience is not enough. It is also essential to consider how individual users actually interact with published work. One of the advantages of publishing digital scholarship is that it does not have to remain static and fixed like most print publications. The fact that digital work can be changed and revised gives authors a chance to get feedback from individual users and continue to tweak their work based on reported suggestions or accessibility issues.¹⁰ Scholars can encourage such feedback by providing statements of access on their main project pages, including contact information, so that users with questions or concerns can reach them directly.¹¹

As Dolmage convincingly argues, accounting for both universal design and usability, or how people are able to interact with digital scholarship (or not), can result in productive conversations that get projects closer to achieving the broadest possible access.¹² Rather than only making "corrections" to digital audio work because of accessibility complaints—what is referred to as "retrofitting" in the disability studies community—relying on both universal design and usability is a way for authors to produce scholarship that is widely accessible from the start, and to collaborate with users via discussing and discovering new ways of inclusion.¹³

Increasing access to sound scholarship is necessary first and foremost because all listeners—regardless of sensory capacities and bodily needs—deserve the opportunity to participate in and contribute to this exciting and steadily growing area of digital humanities. Further, the participation and contributions that result from increased access could expand and augment digital sound studies in important ways. I could envision, for instance, digital audio projects by deaf scholars that enact their individual sonic experiences, thus contributing to understandings of listening as a body-specific, multisensory practice; or perhaps digital work that focuses on how various kinds of embodied experiences influence the ways in which individuals respond to and make sense of sound in different contexts. Indeed, though I have chosen to focus on disability in this discussion, it is equally import-

ant to represent and perform embodied experiences of race, gender, class, age, ethnicity, and sexual orientation in digital scholarship. Such bodily experiences have a profound effect on how people engage with the sonic world. If a more diverse range of bodies and bodily practices was welcomed into and encouraged to take part in the conversation, imagine what insights and boundary-pushing projects might emerge.¹⁴ Cultivating a more inclusive digital sound studies community by devoting substantial attention to embodied experiences will lead to a richer, more capacious intellectual and creative space for digital scholarship.

Sound Practice #2

Take fuller advantage of the spatial and aesthetic features of digital sound projects to create more immersive user experiences.

In contrast to the immersive experience of sound in three-dimensional spaces, it is easy to forget that sound in digital spaces is located in an environment at all. If they can see, listeners engage with sound while looking at flat, two-dimensional images on a screen. If they can hear, they listen through minuscule speakers or tiny earbuds that diminish the effects of sound. Though sonic composition for digital environments has its limitations, it seems to me that scholars can enliven the *experience* of their sonic work by taking fuller advantage of spatial and aesthetic affordances in digital spaces. That is, in addition to treating sound as an object that is the analytical focal point of digital sound studies scholarship, we might also use sound as a way to create more dynamic digital environments—digital spaces that bodies navigate and experience via multiple senses.

One way to create more immersive sonic experiences for users is to learn to think more like acoustic designers. Acoustic designers (sometimes called acoustic engineers) are sound professionals who design, change, and/or enhance the acoustical environment of particular spaces—from restaurants to concert halls to parks. Though acoustic design is a complex interdisciplinary field, here I want to amplify a basic acoustic design principle that I find relevant for digital sound studies: *acoustic designers treat sound as an element that is connected to and influenced by a larger aesthetic and spatial network.*¹⁵

Consider, for example, the acoustic design of the lobby of an office building.¹⁶ The lobbies of buildings are places where socializing is expected, and thus they are designed to be sonically lively places. To add some extra noise

and life into the space, acoustic designers would design or manipulate the spatial and aesthetic features of lobbies—via ample open space, high curved ceilings, hard surfaces like marble or concrete—to produce a reverberant environment, or a space where sound persists after the original sound is produced. Reverberation makes it seem as if there is more sound filling a space than actually exists, giving the space a warm, energetic atmosphere that makes people feel like it is appropriate to talk loudly and be more social. However, since the rest of the building is dedicated to traditional office space where acoustics need to enable productive (i.e., less disruptive) working conditions, acoustic designers would design a quieter, deader acoustical environment to cue people to be less animated and social as they move through the building. In other words, the acoustics of the space would need to be designed to signal people to adjust their behavior accordingly: the rooms would be smaller and box-like to prevent reverberation, the hallways and office walls would be built with more insulation or sound-absorbing materials, and so on. Good acoustic designers are always conscious that the ways people experience and respond to sound in an environment are inextricably connected to the aesthetic and spatial features of the design.¹⁷

While digital spaces are significantly different from three-dimensional spaces like the lobby of a building, being more cognizant of sound as a design element that is connected to and shaped by other features of an environment can help scholars produce more cohesive, immersive projects. Taking advantage of the spatial and aesthetic affordances of digital audio involves considering questions such as: How do I want listeners to move through and experience my project? How might I make the various digital spaces of my project more sonically distinct from one another? How does the experience I created enact the themes or arguments or stories I want to present? How do the aesthetic features (colors, textures, layout) influence the ways that listeners might experience sound? How can I enable nonhearing individuals to experience a sonic project, and in turn, how might addressing issues of access lead to a better design in general? In sum, approaching digital work like an acoustic designer requires thinking about sonic scholarship as a *holistic experience* for users.

Sharon Daniel's digital project "Public Secrets" serves as an excellent model of creative-critical sound scholarship that is designed with the holistic experiences of users in mind. In "Public Secrets," Daniel takes users along with her into the sprawling prison-industrial complex in central California to hear the testimonies of women prisoners. There are many interesting features of the design, which masterfully integrates sound, text, visual

elements, and movement. What I find most striking, though, is the way that Daniel uses sound to draw (hearing) listeners into the experience.¹⁸ In the opening sequence she verbally describes the scene of the prison. Her vocal track is layered with heavy music—a sorrowful, repetitive melody punctured by snare drums—as well as the ambient soundscape of the prison itself. The layered sounds immediately position listeners within the environment of the prison while evoking the tone or feeling of the space.

Once users officially enter the project, they can choose different theme-based pathways to navigate through it. Clicking on these themes triggers more startling sounds: the creaking, locking, and slamming sounds of a heavy iron door. These sounds work to incorporate users into the prison experience. By making users “occupy” the same sonic space as the prisoners, Daniel is blurring the line between inside and outside. Other design elements echo and intensify this blurring. The primarily black-and-white color scheme reflects the drastic differences between inside and outside (and is perhaps meant to conjure up other binaries: good and bad, right and wrong, etc.). However, the algorithmic structure of the project causes the black-and-white spaces of the screen to constantly shift depending on where users click, thus enacting the idea that things are not as clear-cut—as black and white—as they may appear. Sound, color, layout, movement, space. These integrated features of the design all serve to drive home Daniel’s main point: that the prison-industrial complex affects all of us, not just the lives of those women on the inside, whose hidden, incarcerated bodies are afflicted with racism, sexism, poverty, abuse, and addiction. We are all implicated in this networked system despite the boundaries we try to create between “us” and “them.”

Much more could be said about the content and political implications of Daniel’s project. For the purposes of this discussion, though, I want to underscore that the use of nonverbal sound in “Public Secrets” is so effective because it is thoroughly integrated with various aesthetic and spatial features of the design. The sound is not employed as an isolated part of the project but as a salient component of its sensory and thematic experience as a whole. Daniel’s consideration of how bodies move through and participate in a space via multiple senses and modes is the key to creating an affectively powerful and thought-provoking experience for users—an experience that could not be accomplished through a more linear (or traditionally academic) version of her work.

By calling attention to “Public Secrets” as an example of what an acoustic design approach might look like in a digital environment, I do not mean

to suggest that every digital sound project needs to be or even can be an immersive experience. Clearly, the design one chooses would depend on the purposes and goals of the scholarship. It is also important to recognize that “Public Secrets” is a large-scale undertaking that was made possible through generous institutional funding and the support of *Vectors*, an innovative digital publishing platform. Though not every scholar will have access to such resources, I think that there is still a lot of room in both large- and small-scale digital sound studies work for experimenting; for designing more holistic experiences for users (as opposed to presenting sonic data or information)—for treating sound as an element that is connected to and influenced by the other features of a design. Work like Daniel’s has only begun to tap into the possibilities for producing distinctive, compelling digital sound environments. My hope is that her example will inspire more scholars to discover and create sensory-rich sonic experiences in their own projects, regardless of scope and scale.

Sound Practice #3

Explore and experiment with the physical effects of sound in digital contexts.

Digital work regularly takes advantage of the audible and visual possibilities of sound. The simple act of being able to incorporate audible files into digital environments is what caused the initial wave of enthusiasm for sonic forms of scholarship. In recent years, this scholarship has been evolving and extending in more synesthetic ways. For example, there have been an increasing number of sonification projects, such as Listen to Wikipedia and BitListen, that give sound to previously nonsonic information. Additionally, sound and music visualization projects—encouraged by free applications like Sonic Visualiser—are becoming more common in scholarship across the disciplines. However, the physical effects of sound, or the experience of sound as a form of touch, remains a largely uncharted area. This is not especially surprising since the experience of sound is etiolated in digital contexts. Listeners cannot feel the sounds they listen to on computers or phones like they can when they are standing in front of massive speakers at a club. Most digital audio formats and the technologies used to engage with them are not able to re-create these kinds of felt sonic experiences.

And yet, because the physical experience of sound is a significant part of how humans engage with and understand sound, it seems to me like

an area that is worthy of sustained inquiry and experimentation. While scholars such as Steve Goodman, Shelley Trower, and Michele Friedner and Stefan Helmreich have written thoughtfully about the physical, vibratory experience of sound in various contexts, I wonder how the physical effects of sound might be *performed* in digital environments.¹⁹ How might digital sound studies scholarship explore and possibly re-create the tactile experience of sound? What would scholarship look, sound, and *feel* like if more attention was paid to sound as a physical event?

Current trends in audio technologies that celebrate vibration as a novel feature of listening experiences may be a productive starting point for investigating the role of touch in digital sonic work. Skullcandy Crusher headphones (advertised as “#bassyoucanfeel”) enable listeners to feel the low frequency sounds of bass via vibration. As stated on the Skullcandy website, “Our designers wanted to fix the problem of a single sensory experience with conventional headphones. Combining audio with tactile senses creates a more realistic and immersive environment.”²⁰ Wearable technologies like the 3rd Space gaming vest also use tactile feedback to heighten the experience of sound in video games.²¹ Incorporating technologies like these into the design of future digital sound work—or at least presenting them as an option (“This scholarship works best with technology X”)—could help introduce tactile possibilities that allow for more fully embodied modes of engagement.

Assistive technologies offer further opportunities for experiencing sound as a form of touch. Psychology professor Frank Russo and his research team recently invented a chair that is intended to enhance musical experiences for deaf and hard-of-hearing audiences. The “emoti-chair,” Russo explains, is able to “separate out the frequencies and present them to different parts of the body. We’ll take the high frequencies and we’ll present them to the upper part of the back. We’ll take the lower frequencies in the music signal and we’ll present them to the lower part of your back.”²² Rather than simply re-creating a general feeling of vibration, the chair offers a more precise experience of music by pinpointing where certain frequencies resonate in the body. The emoti-chair is a great example of how assistive technologies that were designed for people with disabilities could enrich human experience more broadly. As Graham Pullin points out, specialized products that are created because of “issues around disability [can] catalyze new design thinking and influence a broader design culture in return.”²³ Digital sound projects that examine and play with the bodily locations of felt frequencies

via technologies like the emoti-chair might facilitate entirely new ways of interacting with digital sound scholarship for everyone—not just people with disabilities.²⁴ Indeed, as I have stressed throughout this essay, addressing issues of accessibility often results in designs that are broadly beneficial to users as opposed to directed only toward a specific group of users.

Designing projects that involve supplemental technologies will of course raise issues of cost and access. To make tactile experiences a more prominent feature of digital audio work, scholars will need to continue to discuss and troubleshoot the technical and conceptual challenges of creating scholarship with and for these kinds of vibratory audio technologies. However, such projects do not necessarily have to be costly, large-scale endeavors. I could imagine work that takes advantage of the vibratory features of ordinary consumer products like smartphones. A phone application, perhaps, that provides vibratory feedback in relation to an environment's noise level might be an interesting digital tool for making individuals more aware of their embodied experience of sound in different spaces. If an environment has particularly low decibel levels, the phone would automatically buzz intermittently; in environments with high decibel levels, the phone would vibrate more frequently. Tactile feedback would call users' attention to their own physical experiences of sound in a space (something that people often shut out or ignore), thus alerting them to record and geo-tag the decibel information through the app. This hypothetical vibration-based app would enable users to construct a digital map of place-based bodily experiences of sound in their communities, thus helping others to find or avoid the sonic spaces that best suit their needs or preferences.

Of course, the fact that existing technologies present scholars with tactile possibilities does not mean that these technologies should be universally adopted. (“I want to make users feel this sound because I can.”) Scholars need to think seriously about how tactile information or force-feedback mechanisms would enhance their work—about what the ability to feel sound in digital scholarship would allow listeners to do or understand that would not be possible (or as effective) using only text, sound, and/or visual elements. That is, digital scholars should consider the distinct affordances of making sound available as a tactile experience for users. While the kinds of technologies mentioned above have limitations and may not be useful for every project, at the very least they have the potential to open up a productive area of inquiry for exploring touch/tactility in digital sound studies.

Enlivening Digital Sound Studies

The sound practices I have outlined in this chapter are intended to invigorate digital sound studies scholarship by accounting for the lived, multisensory experiences of a broad audience. Adopting and expanding on these practices can result in more engaging, flexible, and affectively powerful sonic compositions and digital tools. To make an impact, however, sound practices cannot merely be taken up by individual scholars. Just as importantly, editors of digital journals who publish sonic scholarship and the institutions that fund such work must be willing to accept and accommodate experimental, sensory-rich, and widely accessible digital sound studies projects. In other words, implementing sound practices is going to require collaboration. No single individual has access to all of the technical skills, knowledge, resources, technologies, and/or bodily experiences that are needed for the kinds of sonic work I have proposed. Thus, as in most digital humanities endeavors, it will be necessary to collaborate to find the right combination of people to turn ideas into reality. As I see it, the challenge of infusing digital sound studies with more experience-based, body-conscious scholarship will be to organize networks of diverse bodies with a range of different needs, capacities, cultural identities, skill sets, disciplinary backgrounds, and professional positions. Such networks will bring us closer to a more inclusive, creatively thriving digital sound studies community—a community that I hope will make enough noise to be seen, heard, and felt in digital humanities.

NOTES

- 1 Scholarship that explores the senses as integrated rather than separating and/or privileging individual senses has been gaining momentum in recent years, particularly in anthropology and digital media theory. For an excellent overview of this work, see Porcello et al., “Reorganization of the Sensory World.”
- 2 Merriam-Webster Online, s.v. “Sound (adj.),” definition 3b, accessed November 29, 2017, www.merriam-webster.com/dictionary/sound.
- 3 The call to pay more attention to issues of disability and access has been sounded in the larger digital humanities community as well. George H. Williams writes, “It is imperative that digital humanities work takes into account the important insights of disability studies in the humanities, an interdis-

- disciplinary field that considers disability ‘not so much a property of bodies as a product of cultural rules about what bodies should be or do.’” “Disability, Universal Design,” 202.
- 4 Mills, “Deaf Jam,” and “Hearing Aids”; Goggin, “Cellular Disability.”
 - 5 Dolmage and Lewiecki-Wilson, “Refiguring Rhetorica,” 26.
 - 6 For additional information about the origins of universal design and why it is vital for digital humanities more broadly, see Williams, “Disability, Universal Design.”
 - 7 Kerschbaum, “Modality.”
 - 8 Yergeau et al., “Multimodality in Motion.”
 - 9 The Web Accessibility Initiative of the World Wide Web Consortium website contains guidelines and instructions, as well as links to resources about accessibility and design.
 - 10 Of course, the ability to change and revise digital projects also depends on who is hosting the project, what kind of relationship the host has to the author, and what types of labor people are willing to put into the continuation of a project. Asking the editor or host of one’s project about issues of accessibility and possible changes is a good practice, particularly in the early stages of design.
 - 11 I have provided a basic statement of access on the main page of “A Tale of Two Soundscapes” and would welcome feedback. For a brief and helpful explanation of how to write accessibility statements, see Watson, “How to Write an Accessibility Statement.”
 - 12 Dolmage, “Evolving Pedagogy,” and “Disability, Usability.”
 - 13 For more on retrofitting, see Yergeau et al., “Multimodality in Motion.”
 - 14 My emphasis on more diversity in digital sound studies scholarship echoes similar calls by a number of digital humanities scholars and organizations. For instance, the position statement created at THATCamp SoCal reads: “We recognize that a wide diversity of people is necessary to make digital humanities function. As such, digital humanities must take active strides to include all the areas of study that comprise the humanities and must strive to include participants of diverse age, generation, skill, race, ethnicity, sexuality, ability, nationality, culture, discipline, areas of interest. Without open participation and broad outreach, the digital humanities movement limits its capacity for critical engagement” (PhDeviante et al., “Towards an Open Digital Humanities”). I see accessible design and an attention to usability at the level of the body as key to achieving more open participation.
 - 15 Thompson’s *Soundscape of Modernity* and Blesser and Salter’s *Spaces Speak* provide a wealth of information on acoustic design, sound and architecture, and acoustical technologies.
 - 16 This example is based on information from interviews I conducted with professional acoustic designers while doing research for my current book project. For more information on my forthcoming book, visit www.stephceraso.com (accessed November 29, 2017).

- 17 Sterne's "Sounds like the Mall of America" presents a fascinating, in-depth example of how acoustic environments are designed strategically to persuade people to behave in particular ways.
- 18 In terms of accessibility, "Public Secrets" provides written transcripts of the prisoners' testimonies. However, one of the limitations of this project is that it does not include captions for nondiscursive sound. Adding textual information for ambient sounds as they occur would further expand access to deaf and hard-of-hearing audiences.
- 19 Goodman, *Sonic Warfare*; Friedner and Helmreich, "When Deaf Studies"; Trower, *Senses of Vibration*.
- 20 Skullcandy Crusher: Inspiration behind Bass You Can Feel, March 29, 2013. www.skullcandy.com/blog/2013/03/29/crusher-inspiration-behind-bass-you-can-feel.
- 21 TN Games, 3rd Space Vest (accessed April 13, 2014, <http://tngames.com/products>).
- 22 Mahoney, "Sound (and Sight and Feel)."
- 23 Pullin, *Design Meets Disability*, xiii.
- 24 The emoti-chair, for example, has the potential to improve products like the BoomChair, which features "interactive vibration motors" that heighten the experience of sound in video games, music, and movies. The experience of vibration in the BoomChair does not yet provide a location-specific and precise vibratory experience and could thus benefit from the design and technology used in emoti-chairs. BoomChair Official Site (accessed April 12, 2014, www.boomchair.com).

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