

“A FOREIGN SOUND TO YOUR EAR”

Digital Image Sonification for
Historical Interpretation

MICHAEL J. KRAMER

So don't fear if you hear a foreign sound to your ear.

— BOB DYLAN, “It's Alright Ma (I'm Only Bleeding)”

INTRODUCTION: Mance Lipscomb's Silhouette

Photographs are visible, but photography is not only a “visual” practice.

— MARGARET OLIN, *Touching Photographs*

We see a musician's back in silhouette. He sits in a chair, on an outdoor stage, facing away from view. A microphone stand rises in front of him while an acoustic guitar head, with its tuning pegs, juts out from one side of his body. You can just make out the horizontal stripes on the back of his work shirt. There is a large audience before him, sitting in steeply raked rows. In contrast to his shadowy form, their bodies are illuminated by sunlight (fig. 8.1).

The image is silent, of course; we cannot hear anything. Nonetheless, as a visual portrayal of a powerful sonic moment, it speaks volumes. Taken at



FIGURE 8.1 Mance Lipscomb performs at the Berkeley Folk Music Festival, July 1963. Photographer unknown (possibly Philip Olivier). COURTESY OF BERKELEY FOLK FESTIVAL ARCHIVE AT NORTHWESTERN UNIVERSITY SPECIAL COLLECTIONS.

a folk music festival, the photograph conveys the intense attention this lone performer commands from the crowd. The man on stage is African American songster Mance Lipscomb, a sharecropper and musician from Navasota, Texas. He performs on a beautiful summer day in 1963 at the Berkeley Folk Music Festival, which took place annually between 1958 and 1970 on the University of California's flagship campus. The photograph captures the second appearance of Lipscomb at the Berkeley festival after his debut at the 1961 event. Assisted in his journey to California by folklorist Chris Strachwitz, this working-class black man, raised under the oppressive conditions of Jim Crow segregation, appears before a primarily white, middle-class audience.¹ Lipscomb plays his bluesy acoustic songs at the Greek Amphitheater. The venue, whose construction was funded by California newspaper magnate William Randolph Hearst at the turn of the twentieth century, was modeled after the ancient open-air venue at Epidaurus. It was intended to serve as a symbol of Berkeley's aspirations to become the "Athens of the West."² That afternoon in the summer of 1963, at the crown jewel of California's prestigious postwar system of public higher education, in a space designed to link modern American democratic aspirations to classical antiquity, a man born to slaves took center stage.³

The photograph resides in the Berkeley Folk Music Festival Archive, which is housed in Northwestern University's Charles Deering McCormick Library of Special Collections and consists of over 35,000 artifacts. Currently in the process of digitization, the archive's holdings include business records, correspondence, notes, publicity materials, and much more, but the richest documentation is visual: posters, programs, and especially photographs, of which there are over 10,000.⁴ This particular image captures a crucial moment of folk-revival transformation. In the click of the camera, Mance Lipscomb emerges from the shadows into the light, from the margins of society to a new place of prominence. We get to see the African American songster in the process of dissolving from one role into another—we watch the silhouette of a rural Texas sharecropper becoming a global folk music legend.

There is plenty to notice in the visual details of this photograph, but the Berkeley Folk Music Festival was, as its name suggests, a fundamentally aural event. As images such as this one go digital, can computational analysis reveal more about the sonic dimensions of the festival—and about the place of sound in historical understanding more broadly? To be sure, we cannot (at least not yet) magically recover the music being made in the instant when this photograph was taken. What we can do is move between the optic and the aural through new circuits of computational exploration to bring out concealed historical information and to generate more compelling historical interpretations. This chapter argues that through practices of digital image sonification we can expand what Fred Gibbs and Trevor Owens call “the hermeneutics of data and historical writing.”⁵ The digital “remediation” of the image—its passage from an earlier mode of representation into binary data—provides an opportunity to open ears as well as eyes more fully to the echoes of the past.⁶ We not only can access but also experience and analyze artifacts and evidence in fresh ways to produce better history from our source materials.

Viewing a digital version of Mance Lipscomb's silhouette at the Berkeley Folk Music Festival in 1963 means that at one level we are no longer looking at the original photograph. We are instead looking at it through many removes: a digital version of a photographic print taken from a negative that used chemical processes to register light on bodies and objects in a past moment. Scanned digital images do some hard travelin', and these displacements may be troubling to the historically minded. Is the past receding from view as primary sources shift from older modes of mediation such as print

and photography to the digital domain? Are we taking one more step back from the original moment in time? I contend no. Digitization does not necessarily mark a loss of access to evidence. Nor does it inevitably distort the past.⁷ As this essay investigates, remediation becomes an opportunity for developing more critical thinking about the ontology—which is to say the very being—of what historical sources are and, from there, for harnessing the specific qualities of encoded digital data to foster more sensitive interpretations of history.

We should keep in mind, of course, that no artifact prior to the digital—whether it be text, sound recording, moving image, or object—offers an entirely transparent view of history. They are all mediations of one sort or another. With their odd combination of immediacy and distancing, photographs are an especially uncanny mode of representation, as commentators such as Roland Barthes and Susan Sontag have famously noted.⁸ When a 1963 photograph of Mance Lipscomb moves into digital form, it becomes the newest link in an ongoing chain of representational reconfigurations stretching back to the moment in time itself. And even that moment has a medial quality in that Lipscomb's appearance at the Berkeley Folk Music Festival took place within a performance context and within a history of folk revival values, ideas, expectations, and relationships.⁹ Here is not merely "raw data" to be plotted, measured, and visualized in some reductive quantitative manner, but rather a remediated representation of the past that can be processed and analyzed—both by computers and by humans—through methods made possible by its shift in underlying format to the digital domain.¹⁰

What is intriguing about that underlying format is that digitized photographs are more ductile, modular, and pliable in relation to other artifacts when all move into the compatible state of binary code. Computers, in this sense, are convergence machines: they bring into one unified underlying form what previously were quite different types of mediation.¹¹ In the digital domain, we might still speak of images, sounds, or text as distinct categories, but at the computational level they are all now bits and bytes, electronic on-and-off pulsations.

What can we do with this convergence into binary code? Among digital humanities scholars, a kind of synesthetic approach is emerging. Texts get charted, physical spaces interactively mapped, sounds graphed. The urge, however, is almost entirely to visualize data.¹² The optic dominates. Yet as a sonic event, the Berkeley Folk Music Festival asks that we also attend to

the aural. We might do so by adding “sonification” to the mix alongside visualization.¹³

What follow are descriptions of three experiments with digital image sonification. Each seeks to reveal new interpretations of the Berkeley Folk Music Festival and the history of the U.S. folk music revival in the 1960s and to examine post–World War II American cultural history more broadly.¹⁴ Taken together, they present the outlines of a hermeneutic approach to digital data that centers on shifting images into the domain of sound through their shared form as computer code.¹⁵ First, *digital sound design* draws on practices in theater and cinema production to pair related images and sounds. These pairings, even if taken from different events, moments in time, or locations, offer new combinatory representations of the past that illuminate—amplify might be the more accurate term—historical meanings. Second, *data fusion* brings together digital data to produce a new multimedia object, and with it fresh historical knowledge. Finally, *data sonification* unleashes sounds from the data of the visual medium itself; hearing the data of an image allows one to see it differently; this expanded sensory access to evidence provides an impetus to more accurate and original historical interpretation. These three activities—digital sound design, data fusion, and direct sound sonification—remind us that the digital has the capacity to deepen our understanding of the past if we use computers inventively. In the digital medium, we can do more than just stare at Mance Lipscomb’s silhouette; we can also more fully sound out its significance.

DIGITAL SOUND DESIGN: A Mount Rushmore of the Folk Revival

Sustained interpretative engagement, not efficient completion of tasks, would be the desired outcome.

— JOHANNA DRUCKER, “Performative Materiality and Theoretical Approaches to Interface”

The trio of faces and upper bodies forms a kind of Mount Rushmore of the folk revival. Photographed in 1964, blues songster “Mississippi” John Hurt, Appalachian folk singer Arthel Lane “Doc” Watson, and Berkeley master of ceremonies as well as songwriter, folk singer, and professor of oceanography Sam Hinton stand together, shoulder to shoulder, backstage at the Greek Amphitheater during the Berkeley Folk Music Festival (fig. 8.2).



FIGURE 8.2 “Mississippi” John Hurt, Sam Hinton, and Arthel “Doc” Watson at the Berkeley Folk Music Festival, 1964. PHOTOGRAPH BY KELLY HART. COURTESY OF BERKELEY FOLK FESTIVAL ARCHIVE AT NORTHWESTERN UNIVERSITY SPECIAL COLLECTIONS.

There is no known audio of Hurt, Hinton, and Watson performing at the 1964 Berkeley festival; however, the three performers were making studio recordings (as well as live recordings at other venues) at the time. In digital sound design, these audio tracks can be paired up with the image in combinatory patterns that heighten our sense of the ways in which the formal details in the photograph and audio recordings relate to larger cultural contexts and interpretive ideas.

Borrowed from film, television, and theater production, concepts of sound design pay close attention to how sound *accompanies* visual representation and vice versa.¹⁶ In the digital medium, sound design offers a framework for uniting—or more precisely, collaging—previously unlinked historical images and sounds to bring them into perceptual and analytic play with one another. It harnesses a kind of “maker” approach for historical interpretation.¹⁷ To be sure, one could do much of this without digital technology: a carousel of slides and an old-fashioned cassette boom box might do the trick; so too might historical re-creations of past musical events.

These fictitiously bring “alive” the past by inventively mixing sound and images. Digital technology does not break with these approaches but rather enhances them in two ways: through intensified “versioning” that allows one to compare many different iterations of sonic and visual materials; and through the introduction of chance operations and generative possibilities derived from algorithmic manipulations.¹⁸

To be clear, my goal is not to join recordings of Mississippi John Hurt, Doc Watson, or Sam Hinton to the “Mount Rushmore” image of them because doing so would offer an unmediated and pure path back to the past. Instead, my efforts turn in precisely the other direction, embracing the remix as historical consciousness itself. To experiment with digital sound design is to engage with fraught but lively alignments and realignments of image and sound across impossible distances of time. It is to reassemble evidentiary elements in creative ways to better understand the past, not magically revisit it as some kind of fantastical virginal state. The many sonic and visual details of a digital sound design strike against each other synesthetically, reminding us that we only can know the past as a constellation of fragments that are always in motion, pushing and pulling on each other, producing a fecundity of interpretive truths out of their relational juxtapositions and associations as intermixed evidence.¹⁹

To start, let us look at the image of Mississippi John Hurt, Sam Hinton, and Doc Watson without sound. The trio stand before a wall backstage at the Hearst Greek Amphitheater in July 1964. Hurt, the blues songster from Avalon, Mississippi, looks off to his left, warmly, with the hint of a smile on his lips and his acoustic guitar clutched in the crook his right elbow and shoulder. Hinton, the professor of oceanography who served as master of ceremonies at the Berkeley Folk Music Festival, looks down with a goofy grin, his thin, striped tie stretched straight within the lapels of his tweed blazer. The blind multi-instrumentalist Doc Watson holds a banjo from a shoulder strap slung over his plaid jacket, pulling it slightly off-kilter, his hair neatly parted, but with a tuft sticking up in the back. It is an extraordinary image in its own right, conveying distinctive qualities that many in the folk revival projected onto these three famous revival performers: Hurt’s softness and sweetness, Hinton’s genial and endearing awkwardness, and Watson’s unflappability.

Taken by festival staff photographer Kelly Hart on his Pentax camera, the photograph also, perhaps accidentally, reveals a lurking ideological urge within the 1960s folk movement: it is the dream of constituting an integrated, harmonious collective out of the fragmented and painful inequalities of

race, class, age, and region in the United States, particularly the American South. With the civil rights movement reaching a crest of confrontational activity during the summer of 1964—often known as Freedom Summer after the name given to the interracial campaigns to register African American voters in the Jim Crow South—Hurt, Hinton, and Watson become a kind of symbolic string band trio, giving us the look of a more ideal America, unified in song. They do so at a festival that took place in the very same campus spaces that would soon be taken over by the influential Free Speech Movement, underway at Cal in the fall of that same year.²⁰

But what was the song this symbolic string band trio was playing, exactly? How do we better hear as well as see this harmonious image of musical, racial, and regional communion? Digitization holds some possibilities. Once digitized, the image can be integrated with recordings of Hurt, Hinton, and Watson from that same period to create a digital sound design that asks the beholder to pivot between image and sound, to hear what these musicians sounded like in 1964 in relation to what they look like in the photograph, and to be able to do so in a mutating relationship of notes to visual details.

As an exercise in digital sound design, I created a collage of Hurt's version of the African American spiritual "Mary, Don't You Weep" (recorded by Peter V. Kuykendall at Wynwood Recording Studio in Falls Church, Virginia, in March 1964) and Doc Watson's version of the Dock Boggs song "Country Blues," which was released on Watson's debut album for Vanguard Records, also in 1964.²¹ The process of editing the two tracks together, interspersing verses and sections into and out of one another using the free sound-editing software Audacity, caused me to pay far more careful attention to the music's content, tone, and more subtle performative dimensions (fig. 8.3).²²

I became far more sensitive to Hurt's loping fingerpicked guitar style, so laconic yet determined, as Watson's relentless clawhammer banjo attack intrudes on it. The timbres ring out in such contrast: Hurt's thuddy, steady guitar playing compared to Watson's twangy picking, which pushes forward, clanging with urgency. Yet the two sounds are connected: when the performances were collaged, the syncopations of Hurt's melodic work on the upper strings of his guitar suddenly resembled Watson's banjo work. And the North Carolinian's great rhythmic sense, undergirding his cascades of notes, became crucial to his playing when juxtaposed against the famous, thumping tick-tock of Hurt's thumbed bassline, such a quintessential part of his sound. Here are two styles of playing stringed instruments that are quite different, they share certain qualities.²³

The texts of each song are different, too—indeed almost opposite each

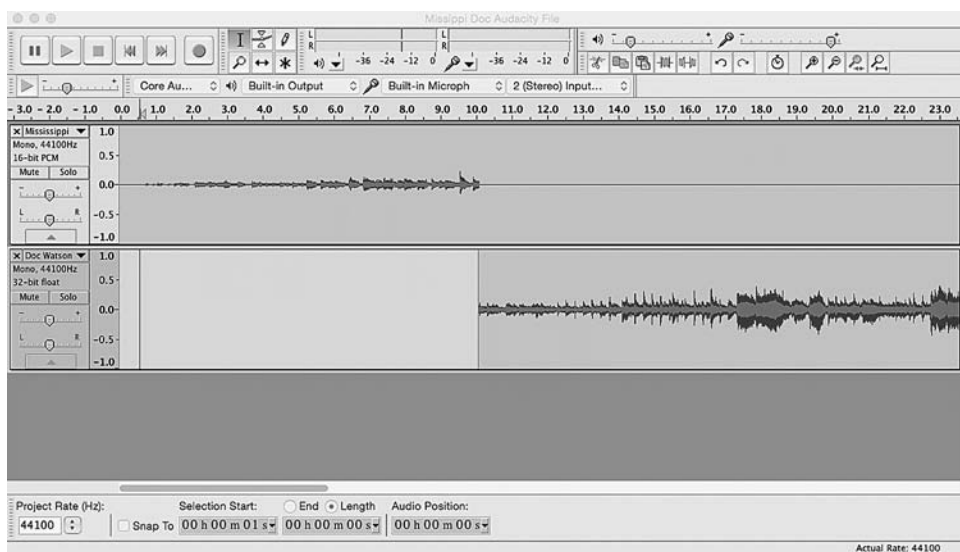


FIGURE 8.3 Remixing Mississippi John Hurt and Doc Watson in Audacity sound-editing software.

other. Hurt sings a religious hymn while Watson performs a sinner’s lament. The character in “Mary, Don’t You Weep” almost seems to be singing to himself, but his story is one of collective perseverance: “If I could I surely would stand on the rock where Moses stood . . . Pharoah’s army got drowned, oh Mary don’t you weep.” The character in Watson’s “Country Blues” sings to an audience but speaks of inner demons driving him to ruin: “Come all you good time people, while I’ve got money to spend.” Hurt’s words are about endurance while Watson’s are about a kind of explosion of agony. Hurt’s are testimonial, while Watson’s are confessional. Yet the words start to intersect with each other as well, in the sense that both musicians’ songs emphasize strength in the face of struggle, a refusal to look away from pain, fear, or threats of annihilation.

Stylistic musical comparison is one thing, but collaging Hurt’s and Watson’s respective sound recordings to then listen to them while looking at the photograph of the two men along with Sam Hinton asks us to more carefully consider how the image works as symbolic commentary both within and on the folk revival. It is, of course, just a photograph snapped backstage of these three stars of the folk scene, and yet the performers carry representational meaning and affective energy with their bodies. Because I purposely left Hinton’s music out of the mix to emphasize his role as inter-

loper and interlocutor, the digital sound design intensifies the question of how the South was represented, how its presence lurked, in the image. I had noticed the question of region in a superficial manner when simply looking at the photograph, but the more I looked and listened simultaneously, the more geographic negotiations began to ring out. The image offers a rich iconographic representation of the folk music revival's intense focus on the South even as it took place way out West. At Berkeley, in images such as this one, the desire to remix the American South's legacy of racial segregation and oppression is prominently on display. I did not see this until I heard it: collaging Hurt's and Watson's music as a soundtrack for looking at Hart's photograph revealed the regional interplay between South and West as antagonistic race relations were reimagined into new, more integrated formations.

Sound also heightened my awareness that the very bodies of the figures themselves make this symbolic racial and regional remixing possible. After all, these bodies, viewable, are most known for the sounds they made. To deliver to the image their sonic power as folk-revival performers in 1964 allows the intersections of body, music, culture, race, and region to emerge more evocatively. Sound and image together, in other words, produce a greater sense—both sensorially and semantically—of the meanings buried within the appearance of Hurt and Watson flanking Hinton. Listening to the audio collage, I suddenly noticed how these men's bodies took on archetypal demeanors (some might say stereotypical projections) of the folk-revival imagination. The camera positions Hurt, the former Mississippi farmhand, with an inner calm and deep empathy for others. There is a slight slump to his shoulders, but he is not defeated. These are shoulders that could bear weight, and did.²⁴ The stockiness of his chest is more pronounced, too. In life he was a small man, but not a slight one. His posture presents not weak humility so much as a strong inner reserve. Sound and image here converge: his individual poise and communal energy, the quiet, whispered quality of his singing style, seem to trace the creased wrinkles around his eyes and mouth. And another quality appears, too, one central to the reception of Hurt within the revival: his sly trickster sensibility. The edge of something more devilish below the sweetness, some kind of little, indestructible lilt, starts to dance across the surface of his gaze, turned away from the camera and toward some horizon beyond the frame of the image.²⁵ This photograph from 1964 does not “come to life,” but the semantic and even the affective dimensions of the interaction between photographer, folk-revival milieu, and figures in the image itself do.

If Mississippi John Hurt's music and image together intensify an understanding of his appeal as an easy-going African American songster within the folk-revival imagination, Doc Watson becomes the fiercely independent Appalachian mountain man.²⁶ Listening to him perform while looking closely at the photograph, I began to consider his toughness, the ferocity lurking behind his friendly smile, and, most of all, the way he turned the seeming disability of his blindness into an assertion of selfhood. Paired with his performance of "Country Blues"—a rounder's testimonial of stubborn rage, pride, fury, and shame—Watson's appearance in the photograph more deeply communicates his role as a heroic figure within the folk-revival context. As with Hurt, Watson's body and sound combine to carry an entire range of associations about race, class, gender, and region. He is the white bluesman, the hearty Appalachian farmer drinking moonshine, the millworker on a bender, the gentle sage on a front porch in the mountains, all rolled into one. As a performer, Watson drew on all these projections placed upon him by folk revivalists, using them for his own expressive ends, finding his own place within—and sometimes through—their mediations.

Additional sonic experiments with the design led me to consider not only race and region but also class as a dimension of the photograph. Using Audacity, I panned the respective tracks to extreme ends of the stereoscopic spectrum, as if to echo the ways in which Hurt and Watson flank the middle-class Californian Sam Hinton. Was one end of the spectrum the Mississippi Delta, the other Appalachia? Yes, but the panning effect also made me consider the commonalities between rural black and white working-class experiences within southern life. Hurt and Watson came from different regions, but the structuring economic and class forces at work in their seemingly divergent agrarian settings were not entirely dissimilar. Delta cotton plantations and Appalachian cotton mills had many things in common, from the cotton itself to the kinds of hierarchies of power that arose from harvesting it and bringing it to market in industrialized modes of production.²⁷ Heard in stereo, Hurt and Watson were not only far apart; they also, as the photograph suggests, shared certain class origins that brought them into the same space. Even the very sounds they made arose from circulations of musical styles across the divisions of region and race, but not necessarily of class position, within the South.²⁸ The use of two-channel panning heightened my awareness not only of differences but also of similarities between the two men, particularly in contrast to Hinton as the more middle-class figure, who stands quite literally in the middle between them.

These basic efforts to bring image and sound together reaped valuable

interpretive results, but computation offered additional possibilities by allowing access to the chance operations made available through algorithmic experimentation. For instance, within Audacity one can apply a sliding-time-scale/pitch-shift filter to audio data. Rather than alter the audio myself by consciously pairing audio with image, I momentarily ceded greater autonomy to the software program and its automated calculations by employing the filter. This has an air of *avant-garde*, John Cage compositional philosophy to it, but introducing chance into the sounds also paradoxically became a means for deeper, more precise historical scrutiny.²⁹ When I applied the sliding-time-scale/pitch-shift filter to my audio remix and played it while looking at the image, I started to notice issues of gender even more profoundly than I had in past viewing/listenings. My use of the filter let the computer determine when pitch rose or fell randomly in the audio of Hurt and Watson that I had created to accompany the Mount Rushmore image. (Imagine the high tones of Alvin and the Chipmunks singing followed suddenly by the basso profundo of Johnny Cash.)

The coincidences that ensued from using the filter reminded me that to alter the pitch of a singer's voice points to intensely affective, sensorial dimensions of masculinity present in musical performance. These are, as Barry Shank and others note, quite linked to assumptions about racial identity.³⁰ The filter raised the pitch of Hurt's singing, taking it somewhat closer in timbre and tone to the more pinched, moaning styles of other Mississippi Delta blues singers such as Robert Johnson.³¹ As a contrast to his actual singing voice, which was far softer and "mellower," the altered pitch highlighted how he evoked a different kind of black masculinity within the folk-revival matrix. Coupled with the image of him in his signature button-up collared shirt and bowler hat, the algorithmically altered sound design clarified how Hurt, a man whom one folk revivalist described as a leprechaun and another as the original hippie, performed this alternative, softer style of masculine appearance.³² It was not an essence but rather an assemblage of what we might call "glitched" details that summon gender, race, class, and region (we could add age here, too) into play with each other.³³

The algorithmic shift raised Hurt's pitch, but since it was operating on a time scale, it lowered the sound of Watson's voice in my audio remix. His altered baritone reminded me of how his singing differed from the more famous "high lonesome" sound of bluegrass, perhaps the most famous of Appalachian-associated genres of music. To hear the algorithmically transformed voice of Watson rendered even lower brought out the ways in which he might be understood as a transitional figure with regard to questions of

gender, race, and region. Within the folk revival, he was a link from the startling, high-pitched singing of someone like Bill Monroe—whose vocal style, as Robert Cantwell argues, arose from very traditional Appalachian modes of masculine identity formation—to a singing style more associated with the crooning male voice that was commonplace on radio and recordings from Watson's childhood. Typically thought of as the ultimate traditional musician who, with the encouragement of folklorist Ralph Rinzler, reached back before bluegrass to earlier mountain music styles, Watson might also be thought of as reworking traditional white southern rural and working-class masculinity into a more modern guise.³⁴ In place of the high lonesome sound, he sang on the lower frequencies of life at the cusp of tradition and modernity.

He did so in part by channeling into his voice an African American blues aesthetic drawn from both Piedmont and Delta traditions.³⁵ He also retained his interest in rockabilly and jazz, which he had been performing in a roadhouse band in North Carolina before meeting Rinzler in the early 1960s.³⁶ In the "Mount Rushmore" photograph, Watson's clothing suddenly takes on a new cast. Viewed to the sound of Watson's computationally lowered voice, the musician's modern-cut, green plaid suit suddenly suggests more than first meets the eye in contrast to the banjo that dangles from Watson's shoulder. This traditional musician smuggled various contemporary styles, strains, and gestures into his "old-time" sound.

In these ways, through formal manipulations accomplished both by human manipulation and algorithmic computation, digital sound design deepens the interpretive possibilities of examining images from the folk revival. Digital sound design does not bring us magically back to the past itself, for we can never make that journey. What we can do is intently make use of digital technology to notice visual and aural details more effectively as they relate to larger social and cultural forces. Constructing history through the new perceptual filters offered by digital technologies, we may develop better interpretations of the past, opening up many lines of thinking rather than narrowing analysis to one, limiting position. Digital sound design fosters an enriched clarity and precision even as it reminds us of the dense multiplicity of historical meaning present in the evidentiary record of the past, particularly when it comes to cultural expression and experience. Bringing a multisensory constellation of imagery and sounds together, digital sound design shows how our designs on the past are always shaped by the ways we—and now our computers—choose to arrange and rearrange history in the present.

DATA FUSION: A Revised *Humbead's Revised Map of the World*

Jorge Luis Borges' story about a map . . . equal in size to the territory it represented has been re-written as a story about indexes and the data they index. Now the map has become larger than the territory.

— LEV MANOVICH, "Database as Symbolic Form"

It is certainly a map, but the closer you look, the stranger it gets: San Francisco, Los Angeles, New York City, Cambridge, and Berkeley are the major countries; North Africa and Southeast Asia are landlocked within them; Boston is a small country with a Cape Cod-like peninsula just off the southern tip of this alternative imagining of the "geospatial" imagination. The "Rest of the World" is merely an island on the northwestern periphery, just barely bigger than Nashville. Look more closely, and the edges that frame the map contain hundreds, even perhaps thousands, of names: a wide-ranging, almost crazed list of participants in the mid-twentieth-century U.S. folk music revival. It includes everyone from Bob Dylan and Joan Baez to lesser-known local folkies to inspirational figures such as Groucho Marx. These names encircle and frame "the Great Naked Sea," out of which a sea serpent, a Poseidon-like sea king, and a large yellow bathtub duck all splash.

This remarkable cartographic fantasy, titled *Humbead's Revised Map of the World* and conceptualized by Bay Area folk scenester Earl Crabb (Humbead) and folk musician, instrument maker, and graphic artist Rick Shubb, offers new possibilities for pivoting back and forth between the visual and the aural (fig. 8.4). To borrow from the theories of cultural geography and spatial history, Shubb and Crabb transform absolute space into the relational representations of a Bay Area folkie's "mattering map."³⁷ Which is to say the map captures an embedded perspective on place. There is a bird's-eye view here, but what the bird sees on *Humbead's Map* reminds us that no two birds see the world below them in quite the same way. Rick Shubb remembers that the idea for the map arose in 1967 in a Berkeley music shop when Earl Crabb commented to a hitchhiker trying to get from Berkeley to Kansas City that he should put "New York" on his sign instead when standing by the side of the road looking for rides. This was because, for Crabb, "New York is closer." The humorous difference between geographical and cultural distance led Crabb and Shubb to the design of a map that reimagined the world from the perspective of a Bay Area folk music participant. Then they added the names

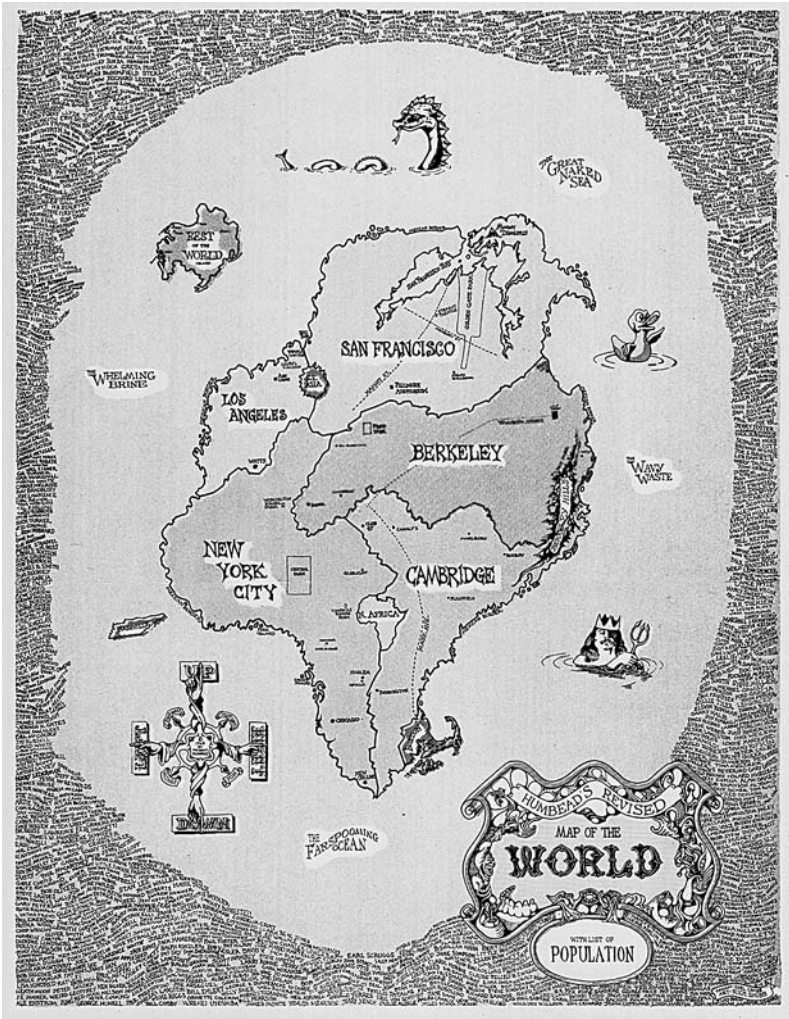


FIGURE 8.4 Humbead's Revised Map of the World, 1968. BY EARL CRABB AND RICK SHUBB.

around the edges, partly as a gag and also on the theory that this would inspire anyone listed to purchase a copy of the map.³⁸

Sound shaped the making of the map and its content, but, of course, as a printed creation it is silent. Once brought into the digital domain, the map provides us the opportunity to address the interplay of cartographic visual representations and their sonic inspirations in one mediated space. In a version of what New Media scholar Lev Manovich calls data fusion, sound data can be layered over the digital version of the map in correspondences that thicken the contextual historicization of the Berkeley folk music scene. Manovich is thinking more of massive combinations of data made possible by computation, but his concept also works at smaller scales. It enables connections between visual and sonic information that intensify a map's implicit commentaries, in this case the tonal shadings of wit that also contain critique. These subtle gestures are at the affective root of this map about roots music. A more textured feel for the past results from remediating its source materials through the additional layer of digital data fusion. Bringing visual and sound elements together provides a more immersive experience of the map's "mapping" of the U.S. folk music revival.

Manovich defines data fusion as "using data from different sources to create new knowledge that is not explicitly contained in any of them."³⁹ This is what bringing sound and image together in a digital version of the map accomplishes. In other words, when fused with audio material through creative compositional choices, *Humbead's Revised Map* gets revised once again. In the process of sonification, a synesthetic interaction of visual and aural data expresses more than either medium could do individually. Whereas the digital sound design of Mississippi John Hurt, Doc Watson, and Sam Hinton did something similar by layering two media—image and sound—on top of one another, data fusion draws on far more sources and puts them into play with each other not only to see a photograph's meanings more robustly but also to produce a new kind of object born from the combination of many sources.

Using the common technology of a clickable "image map," my data fusion of *Humbead's Revised Map of the World* both accentuates and elaborates Crabb and Shubb's conceptual playfulness. It fuses audio clips with various objects, landmasses, topographical notations, names, and "nations." Many of these are straightforwardly discographic or informational—clicking on a name on the frame of the image, for instance, plays a signature song by that performer. But other sounds emphasize the affective experience of the map's cartographic commentary itself. For instance, I once again used

Audacity to create sound files at different volumes so that the size of each of the map's countries and regions correlates to the volume of the connected audio track. Bigger places in their imaginations sound bigger; they are also longer tracks and sometimes contain a greater amount of audio overlaid in my Audacity remixes to register the density of sonic information shaping the cartographic visual representations on *Humbead's Map*. Berkeley, San Francisco, New York City, and Cambridge play louder, longer, and more densely textured audio tracks, while Los Angeles is quieter, shorter, and simpler. Here, through sonification, I figuratively (and literally) turned up the volume on the map, using sound to intensify its cartographic choices and their implicit meanings.

Further sonifications and data fusions included placing transitional tracks at the boundaries between each "nation." At the border of New York City and Cambridge, one can select the introduction to Bob Dylan's version of "Baby Let Me Follow You Down," which mentions the "green pastures of Harvard University" as the place where he claims to have learned the song from fellow folk-scene hipster Eric Von Schmidt.⁴⁰ Recorded in New York City while Dylan was gaining acclaim in the Greenwich Village folk scene, the song's introduction is a snippet of audio that resonates with the geographic imaginings of Crabb and Shubb out on the West Coast in terms of the relationships and connections it reveals within the networks of the folk revival.

As it should, the duck in the middle of the ocean quacks.

One shortcoming of the sonification of *Humbead's Revised Map* is that it still privileges the visual over the aural: one has to see and click on the map in order to hear its sounds. In the future, I hope to create a version that reverses this orientation: it would consist of audio tracks that one selects to reveal visual information from the map. So too, the image map might become more fully interactive. The ability for users to add and further remix data would take advantage of data fusion to remind us of the social—even, potentially, the contested—nature of how the geographic and social relationships of the folk revival have been characterized. Users might be able, one day, to develop their own "mattering maps" of the folk revival, revising *Humbead's Revised Map of the World* yet again.

Overall, the effort to sonify the map not only fills in the sonic gaps but also amplifies the sensorial and affective dimensions that contributed to and were so crucial to its making and its effects. Data fusion produces a new object, and in doing so, it joins the spirit of revision already present

in the original *Humbead's Revised Map*. Working at the experiential level, the distortions of the map that emerge from digital sonification can be helpful for getting a better feel for the “worldviews” that created the map. After all, the original map is itself already a kind of distortion. (And what map isn't, even as it also conveys accurate information about what it is mapping?) Moving away from a historical document by digitally manipulating it can allow one, ironically, to get closer to it. Here one can access, experience, and then contemplate the particular sounds and the sensations that undergird the ideas of Crabb and Shubb. Data fusion seeks to avoid the mistake of privileging sight and seeing over sound and hearing. Through a synesthetic fusion of the senses, it reminds us that historians often mistakenly privilege the optic, with its rationalistic associations (“seeing is believing”) over the aural, with its emotional connotations (“If music be the food of love, play on”). Data fusion challenges the too-strong distinction that historians make between vision and sound and between thought and feeling, offering instead a digital method for navigating their fluidity rather than asserting one over the other.

Fusion does not render *Humbead's Revised Map* into a unified, static whole, but rather delivers the knowledge that past historical moments and movements were just that: contingent, itinerant, in motion, never complete. The data fusion is a mutating assemblage in which audio and visual components come together into a newly mediated and provisional object. Nonetheless, its dynamic characteristics make it possible to mount many arguments about what the map contains. One can begin to piece together how the small details and silenced references of sound relate to the cartographic representation as a whole—what makes it funny yet serious all at once. Data fusion provides a way to consider the evidentiary movement among scales of knowledge, information, sensation, and emotion that made the folk revival feel like a movement, a more coherent and energized social formation.

Rocketing *Humbead's Revised Map* into the digital medium of fused data, revising it yet again, the sonification also reminds us that as much as older media forms are, as media historian Lisa Gitelman has argued, “always already new,” they are also the opposite: they are always already old.⁴¹ They are embedded in the past and can still relay its meanings. Indeed, they do so precisely through the compositional reconfigurations of data fusion. Like a space-age compass, data fusion charts a way forward for navigating maps of the past.

DATA SONIFICATION: Transferring Mance Lipscomb

The relative openness of the image/sound . . . create[s]
a space for shared or alternative perspectives.

— VIRGINIA KUHN AND VICKI CALLAHAN,

“Nomadic Archives: Remix and the Drift to Praxis”

Both digital sound design and data fusion involve bringing new sounds to bear on existing images, but the possibility also arises for transforming image data itself into sound. The third and final sonification I propose can be called data sonification.⁴² Working with the photograph of Mance Lipscomb taken at the 1963 Berkeley Folk Music Festival, I wondered if new interpretations of it could be rendered from transforming visual data into correlated sound outputs. In other words, could we better hear than see the photograph’s staging of this particular southern, rural, African American musician’s unlikely arrival onstage to play to a large crowd at a neoclassical amphitheater built into the hillside of the flagship public university of California? Would hearing this visual representation allow a historian to analyze it more perceptively? How might a different sensorial reception of the image spark new interpretive perspectives on it? What would it mean to hear an image by listening to its digital data?

The answer to these questions rests largely on the choices made in how to process and output the visual data into sonic form. What computer programmers refer to as the “architecture” of the correlation between incoming, processed, and output data becomes the key issue. In developing a particular architecture for data sonification, I began to consider what within the design and logic of visual code (pixels, color hues, grids, vectors, and even the isomorphic algorithms that make possible tactics such as shape and facial recognition) might be productively fed into certain strategies of sound synthesis (MIDI technology for instance) to generate audio tracks that originated in the visual data but took aural output form.⁴³ As I have previously noted, the resulting creations were not made with the intent of recovering the sounds being made when a photograph was taken. The goal is not to return miraculously and without distortion to a past reality through some legerdemain of data-manipulation magic. Instead, it is to acknowledge that we always construct history through the form and content of our source materials. These require the development of a hermeneutics, a way of interpreting.⁴⁴ What direct data sonification offers to a digital hermeneutics

is a particularly intriguing way of exploring strategies for pivoting between the optic and the aural. Movement between image and sound through their now-shared ontological status as digital data synesthetically brings the eye and ear into new kinds of sensory dialogues, enhancing perceptual access to an artifact such as a photograph. From this interplay, fresh interpretations of the historical information contained within an image can arise.⁴⁵

To begin my data sonification experiment with the image of Mance Lipscomb's silhouette at Berkeley in 1963, I wanted to know more about how data that constitute the pixels might be sonified. I adapted ideas about "glitching" from Trevor Owens's essay "Glitching Files for Understanding: Avoiding Screen Essentialism in Three Easy Steps." As Owens points out, "Digital objects are encoded information. They are bits encoded on some sort of medium. We use various kinds of software to interact with and understand those bits. In the simplest terms software reads those bits and renders them."⁴⁶ Using an MP3 recording of the "West Virginia Rag" from the Henry Reed Collection as one of his examples, Owens purposefully mismatches software applications with different file types so that one begins to visualize how the file types contain information. Most strikingly (and obviously when one thinks about it), just as a WAV audio file possesses more sonic data than an algorithmically compressed MP3 file, so too when it is viewed as a "raw" file in an image editor, the WAV file looks bigger and more spread out than the MP3 file. You can see the audio compression of sound with your eyes.

What if we move in the opposite direction to try to hear visual data? The raw file proved to be the key starting point for reversing this process and considering how instead of visualizing sound, one might sonify an image. The raw file of a photograph is sometimes known as a "digital negative" because it contains minimally processed data of a digitally created image. This file type, in other words, consists of what a digital lens translated from light and color in the world into the pixelated patterns of digital code. Outputting the photograph of Mance Lipscomb at Berkeley in 1963 as a raw data file via a text editor, I began simply by importing the file into Audacity sound-editing software (fig. 8.5). The result was not particularly useful to the human ear for listening: a solid roar of static sounded something like Lou Reed's famous album *Metal Machine Music*.⁴⁷ The experiment did not produce particularly useful results for interpretation, but it did serve as a good reminder that what we might idealize as the most direct, unmediated, and pure translation of historical data is not, when it comes to computational remediation, necessarily the most productive for generating valuable perspectives on the past. Linking visual data to sonic form requires more elaborate sound syn-

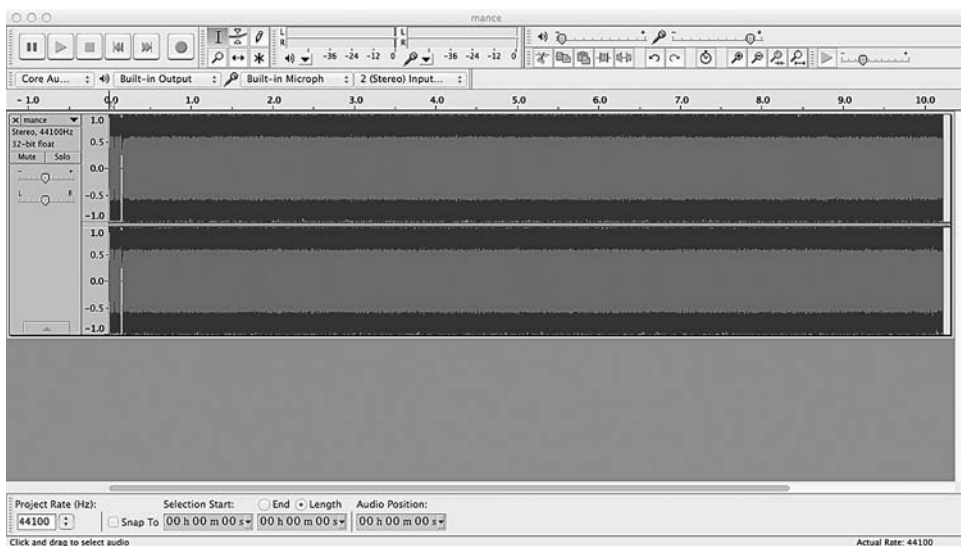


FIGURE 8.5 Mance Lipscomb at Berkeley, 1963, imported into Audacity from raw JPEG data.

thesis strategies. Sometimes you have to mess with your source materials more adventurously to grasp their significance more accurately.

My next experiment involved importing the digital image of Lipscomb into the Photosounder program designed by Michel Rouzic (fig. 8.6). Photosounder maps a JPEG file across a spectrogram whose x-axis is time and y-axis is pitch and moves by default (it is adjustable) from a low frequency of 27.5 hertz to a high frequency of 20 kilohertz. As the pixels of the image are placed within this two-dimensional Cartesian coordinate system, the intensity/brightness of each pixel is sonified through a filtered cross between white noise and pink noise: the more intense or brighter the pixel, the louder the noise.⁴⁸ What emerged from the shift to Photosounder showed that the program's sound synthesis strategy more evocatively represented the relations of color density found in the visual data than Audacity did with a raw file type.

Most fascinatingly, by offering a sonification that combined “pink noise” and “white noise” rather than generating pure sine waves, Photosounder amplified the centrality of Lipscomb's silhouetted figure. The sonification strategy produced sounds that the human ear could decipher as varying timbres, allowing one to hear densities of visual information more evocatively than one might see them. As I played the Mance Lipscomb photograph from

left to right, the resulting sonification suddenly went silent when it reached Lipscomb's body at the center of the image. Then the noise, which sounded like radio static, grew louder as the sonification reached the other side of his figure and once again registered the audience pictured in the photograph.

The sonification led me to think far more carefully about the kinds of projections that folk-revival audiences at the Greek Theater enacted upon Lipscomb as he performed before them in the early 1960s. At first glance, the photograph emphasizes Lipscomb's very real arrival at center stage. He is there, present, basking in the attention of a new audience. This is a celebration. However, the Photosounder sonification suggested almost the opposite interpretation of the image: instead of placing him at center stage, it rendered him spectral and ghostly. As with Mississippi John Hurt and Doc Watson, did Lipscomb also become less a real person than a kind of symbolic keyhole through which folk revivalists thought they could unlock a whole different configuration of social relationships when it came to race, region, class, community, and the very self in modern America?

Here in the direct data sonification, the power of the photograph as a visual documentation of an aural event announces itself more clearly. The sonification reveals how Lipscomb was both extremely real to his new audience and also an enigma. He moved to the center of the folk revival, but as a silhouette, re-representing his past as an African American sharecropper and musician in rural Navisota while leaving that past behind. He achieved a whole new status as a musician and a person by carrying the shadow of that other history into broad daylight out west in Berkeley. In the click of a camera's shutter, the shadow becomes the substance, the man is his image. His silhouette, then, is not only an outline of the man but also a kind of opening, an aperture, an entry point into his larger cultural moment and the place that he, his audience, and all their history occupy within it. All the explicit and implicit negotiations, appropriations, adjustments, disorientations, alienations, connections, affiliations, and social interactions across boundaries of identity and power roar forth in the mix of photographic image and its silent silhouette of data.

Reheard through a sonic amplification of its formal qualities, the image more vividly suggests the power of the performance we glimpse in the still shot. Captured through a lens at the Greek Theater, Lipscomb captivates. The songster from Jim Crow Texas, born in 1895 as the son of former slaves, becomes a kind of king, a nobleman. He sits on a folksy wooden throne. Yet he is also small compared to the massive audience watching him. So who is ruling whom here, exactly? Perhaps what we glimpse in the image when we

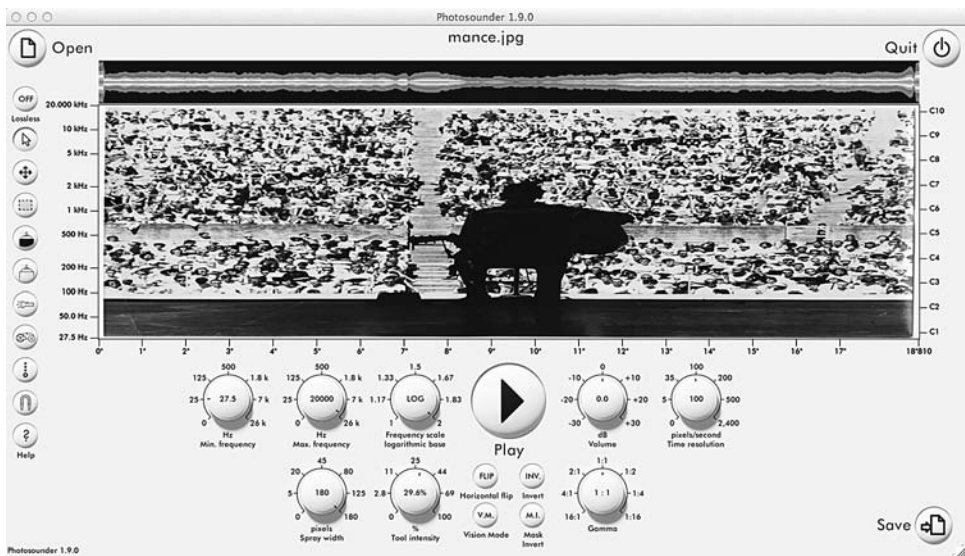


FIGURE 8.6 Mance Lipscomb at Berkeley, 1963, imported into Photosounder application.

listen to it sonified is, most of all, a transition, what folk-revival scholar Robert Cantwell calls the process of “ethnomimesis.”⁴⁹ As Lipscomb traverses not only the physical but also the social distances between black working-class life in Navasota and a sunny, leisurely day on the Berkeley campus in the early 1960s, he crosses the threshold into the folk revival. He plays his past, as authentic as could be, but his performance also becomes a mimetic act of ethnic re-representation. He is performing himself in a new way. He has to. It is the only way as a performer he can reach across the divides of social location to connect with this new audience. As this cultural process occurs, we witness Lipscomb entering a different world, settling into a different position, and attaining a previously unavailable status. He does so as a charismatic performer “playing the folk,” a man in the process of discovering a newfound currency gained by his virtuosic access to a fading, southern, African American vernacular musical tradition.⁵⁰ He is utterly real, but he is also, in the very same instant, a silhouette, a blank slate for the projection of fantasies, dreams, and desires by those now watching and listening to him across a chasm of social difference.

By turning this shadowy, silent photograph of Lipscomb making music at Berkeley in 1963 back into sound—a very different sound than the ones

Lipscomb made on stage that afternoon to be sure, but sound nonetheless—Photosounder helped me access a sharper, more accurate interpretive analysis of the historical moment. Even my rather technologically simple sonification was capable of doing so, and Photosounder provides ample additional opportunities for playing with the visual image data to create further sonifications of the image, including the ability to adjust frequency ranges, pixels per second, and even to manipulate pixels themselves using a set of “spray tools.” The opportunities are many to experiment at the level of pixels in order to seek out their historical meaning. One can turn up the volume on certain characteristics or tone down others. In the transit between visual inputs and sonic outputs, iterative play can lead to interpretive discovery. These synesthetic collisions of image and sound are not reductive but rather generative of multiple ways of experiencing and better understanding even one historical artifact.

Other software applications and design approaches might foster additional sound synthesis strategies. For instance, one might extract semantic information rather than formal qualities from image data. Much as facial recognition software works now, isomorphic feature extraction could be employed to capture, for example, what instruments appear in the photographs of the Berkeley Folk Music Festival. How many banjos are in photographs compared to guitars? Do the ratios change over the festival’s duration from 1958 to 1970? What are the various expressions that appear on Joan Baez’s face as she performs onstage as compared to the many offstage portraits of her in the festival archive? Where are the eyes of audience members looking in the thousands of performance photographs? Analyzed statistically over this large data set, does gaze indicate something about what makes a particular performer charismatic or a specific concert setting enthralling for folk-revival participants? Sonification, in turn, might prove effective for perceiving undetected patterns in these kinds of semantic data extractions, for it produces a different kind of sensory experience of the data than visualization does.⁵¹

Overall, visual image sonification functions well on multiple scales: one can delve deeply into the meaning of the pixels in one image, or even a detail of one image, or one can go big, exploring patterns in hundreds or thousands of images. Whether it be of Mance Lipscomb’s singular silhouette one summer day in 1963 or a sense of the ten thousand-plus images in the Berkeley Folk Music Festival archive, sonification enhances the perceptual and sensorial dimensions of historical inquiry by turning digital humanities

analysis toward the core humanities practice of expanding the pathways by which we assess and interpret evidence. Data sonification allows us to better appreciate the multifaceted and multidimensional historical truths contained within the codification of the world into ones and zeroes.

CONCLUSION: Listening Up

Subjectivity is not merely the impure other of objectivity.

— VEIT ERLMANN, *Reason and Resonance: A History of Modern Aurality*

Moving between looking and listening by employing the tactics of digital image sonification advances conceptualizations of the digital humanities first outlined by visual theorist Johanna Drucker. She calls for the development of a “digital aesthetics” revolving around the concept of “speculative computing.” Drucker’s experiments at the University of Virginia’s SpecLab revealed a dynamic interplay between computational experimentation and humanistic interpretation, one that seeks to expand rather than reduce meaning by attending to the pliability and ductility of digital form. Because representational objects, texts, and modes of expression are not static but rather are malleable based on positionality and perception, digital humanists, she contends, should avoid the “mathesis” of formal logic that is so prevalent in computer science. This approach, which seeks to totalize, universalize, and instrumentalize knowledge and perception, “can be challenged only by an equally authoritative tradition of aesthetic works and their basis in subjective forms of knowledge production.” Drucker proposes a far more critical, qualitative, and subjective method, one that seeks to harness computation for imaginative interpretation rather than submit the critical facility of the imagination to a regime of narrow-minded quantification. As she puts it, “Neither ‘works’ nor ‘forms’ are self-evident entities. They are emergent phenomena constituted by shifting forces and fields through productive acts of interpretation.”⁵²

Drucker’s theoretical interventions remind us that historical evidence is never transparent. We must “read” it to interpret it. We must make sense of the data for it to be meaningful. Especially with cultural material, this reading can come to include not only looking but also listening more intensively and more experimentally. To transit between the visual and the aural

through their modularity as data becomes a futuristic way of journeying back into the past on speculative pathways. It is particularly powerful as a foray into the ephemeral past of events such as the Berkeley Folk Music Festival, where sonic and visual experiences intermingled to create an intangible cultural heritage worthy of scrutiny, yet easily rendered both invisible and silent. Digital image sonification becomes not so much an act of *recovering* as one of *uncovering* and *discovering*, which is to say identifying the multifaceted dimensions of historical experience.

In the end, after all, sight and sound are both grounded in the more unified experiences of sensory perception. As Jonathan Sterne points out, the separation of the senses into discrete modes is a historical phenomenon, grounded in Enlightenment thinking. The very assumption that humans have five distinct senses only emerged over time.⁵³ Rather than using the digital to extend and reify the separation of the senses further, we can use the flexible modularity of data to become more aware of the very history in which our senses are embedded.⁵⁴ But image sonification does not return us to some McLuhanesque unification of the senses; rather, it transits synesthetically between the optic and the aural in pursuit of meaningful explanations that arise out of the movement between the two through the mediating form of binary data.⁵⁵ As the auricular and the optic crisscross and enrich each other, a hybrid phenomenology—a way of perceiving—arises from careful attention to the ontology of digital materiality and points to what digital artifacts actually are on the material level. This approach brings us back to the rich sensorial immediacy of the past precisely by making use of its remediation—its alienation—into digital form. From there, we can produce new historical epistemologies, new ways of knowing not only what was happening but also why it mattered.

In the digital humanities, we are only just beginning to explore the possibilities of history writ in code. Like data visualization, image sonification offers one mode through which the field can push interpretation of the past forward.⁵⁶ Image sonification echoes visualization's focus on remediating and *re-presenting* data using the peculiarly modular qualities of binary code, but it also enters more uncertain territory by recalibrating the privileging of the optic over the aural in historical investigation. Digital technologies become a means for deepening comprehension not only of the visual past but also of what Sterne calls “the audible past.”⁵⁷ Historians tend to be less confident about what they hear than what they see in the evidentiary record. As we enter the digital era, however, we must develop methods of accessing history through computationally mediated sources that let the noise of the

future into the previously muted chambers of archival research. Through digital image sonification, we can open our ears as well as our eyes to sound in order to picture the past more completely, more accurately, more profoundly.

NOTES

The chapter title and epigraph are taken from Bob Dylan's "It's Alright Ma (I'm Only Bleeding)," on *Bringing It All Back Home*.

- 1 For more on Chris Strachwitz, see Rohter, "Still the Address"; Benicewicz, "Chris Strachwitz"; and Gosling and Simon's documentary film *This Ain't No Mouse Music*. For more on Mac McCormick, see Lomax, "The Collector." Strachwitz encountered Lipscomb while traveling through East Texas with fellow folklorist Mac McCormick in search of the bluesman Sam John "Lightnin'" Hopkins, whom he had similarly helped to travel to California to perform at the Berkeley festival in 1960. Strachwitz also took a photograph of Lipscomb at the 1963 festival from almost the same vantage point as the image in the Berkeley archive. It can be viewed at the Arhoolie Foundation website, <http://arhoolie.org>. Additionally, there is a wonderful and quite similar image in the Berkeley Folk Music Festival Collection of Lipscomb during his first appearance at the Greek Theater as part of the 1961 festival program.
- 2 On the history of the Greek Amphitheater, see Hyman, "UC Berkeley's Greek Theatre."
- 3 For more on Lipscomb, see Alyn, *I Say Me for a Parable*.
- 4 Berkeley Folk Music Festival Collection, Northwestern University.
- 5 Gibbs and Owens, "Hermeneutics of Data."
- 6 Bolter and Grusin, *Remediation*. See also Trettien, "Circuit-Bending Digital Humanities."
- 7 Indeed, what at first might seem like computational distortions—what digital literary scholars sometimes call deformances—can potentially lead to greater accuracy in our comprehension of the past. Mark Sample describes the term "deformance" as "a portmanteau that combines the words performance and deform into an interpretative concept premised upon deliberately misreading a text, for example, reading a poem backwards line-by-line." See Sample, "Notes towards a Deformed Humanities." Another digital literary scholar, Stephen Ramsay, puts it this way: "Computationally enacted textual transformations reveal themselves most clearly as self-consciously extreme forms of those *hermeneutical procedures found in all interpretive acts* [my italics]." See Ramsay, *Reading Machines*, xi. Deformance intersects with older operations that turn to stochastic methods to examine texts from new angles: everything

from Emily Dickinson's tantalizing concept of backward reading to Randall McLeod's "transformissive reading" to the systematic word-substitution tactics of the Oulipo group. Moving beyond text alone, one might also include the Zen-inflected compositional ideas of John Cage or the choreographic approaches of Merce Cunningham. To be sure, the influence of Dada, surrealism, and situationism lurks in deformance as well. See also McGann and Samuels, "Deformance and Interpretation"; Samuels, "If Meaning, Shaped Reading"; and Kramer's "Navigating the 'Screwmenetic' Circle" and "Distorting History."

- 8 On the history of photography, see Barthes, *Camera Lucida*; Sontag, *On Photography*; Olin, *Touching Photographs*; and Wells, *Photography Reader*. On the representational dimensions of archival sources, see Farge, *Allure of the Archives*, and Steedman, *Dust*. For an article on the historical archive in relation to digital history, see Darnton, "Good Way to Do History."
- 9 On the folk revival as a milieu of cultural mediation, see Filene, *Romancing the Folk*.
- 10 See the essays in Gitelman, "Raw Data," as well as Sterne's work on formats in *MP3*.
- 11 Jenkins, *Convergence Culture*. See also Galloway, *Protocol*, on the technical dimensions of code that make the internet a mechanism of consolidation and control.
- 12 On visualization, see, for instance, Moretti, *Graphs, Maps, Trees*; Stanford University's Spatial History Project; and Staley, *Computers, Visualization, and History*.
- 13 The folk revival contains figures long interested in using technology to pivot between sound and sight, music and image. No less a figure than one of the founders of American ethnomusicology, Charles Seeger, father of folk-revival mainstays Pete and Mike Seeger and himself a frequent speaker at the Berkeley Folk Music Festival, supported the building of the first electronic music writer in the United States in 1956. The melograph, Seeger believed, might more accurately capture visually the sounds of world musics that did not translate well to classical Western notation. See Seeger, "Prescriptive and Descriptive," 148–95. On the melograph, see Pescatello, *Charles Seeger*, 212. The effort to notate sound is deeply connected to interest in "folk" and vernacular music; see Nettl, "I Can't Say a Thing." Thanks to Mary Caton Lingold for reminding me of this point and of Charles Seeger's important role in expanding musical visualizations beyond standard Western notation long before digital humanities scholars became obsessed with visualization. For more on technology and mediation in the folk revival, see Svec, "Folk Media," "Pete Seeger's Mediatized Folk," and "If I Had a Hammer."
- 14 For more on the folk revival's history and the role of festivals within that history, see Cohen, *Rainbow Quest and History of Folk Music Festivals*. See also Cantwell, *When We Were Good*; Filene, *Romancing the Folk*; Donaldson, "I Hear America Singing"; Lornell, *Exploring American Folk Music*; and the essays in Rosenberg,

Transforming Tradition. DeWitt, *Cajun and Zydeco Dance Music*, offers a fascinating look at the legacy of the folk revival in Northern California during more recent decades.

- 15 See Gibbs and Owens, “Hermeneutics of Data.”
- 16 Documentarian Ken Burns garnered fame in part for his innovative technique of panning a movie camera across still images and photographs in his films. He often did so to a musical soundtrack. See *The Civil War*.
- 17 The “constructionist” philosophy of the “maker movement,” with its producer ethic of actively doing things with objects instead of passively observing them or merely critiquing them, has been influential in digital humanities. See Hatch, *Maker Movement Manifesto*; Donaldson, “Maker Movement”; and the website of the University of Victoria’s Maker Lab in the Humanities (accessed January 14, 2018, <http://maker.uvic.ca>). For critiques of the maker movement, see Chachra, “Why I Am Not a Maker”; and Morozov, “Making It.”
- 18 The concept of “versioning” has begun to emerge as a key tactic in digital literary studies, but less so in digital history. See Kirschenbaum, “The .txtual Condition” and “Save As.” See also Manovich’s notion of “variability,” in *Language of New Media*, 36–45, and the UVic Maker Lab in the Humanities website article, “Versioning Modernism.”
- 19 We are closer here to Bruno Latour’s “actor-network” theory, in which objects possess agency because of their positioning within an ever-evolving matrix of social relationships. See Latour, *Reassembling the Social*.
- 20 Hart described his camera in an email correspondence with the author, May 30, 2017. On Freedom Summer, see McAdam, *Freedom Summer*, and Watson, *Freedom Summer*. On the Free Speech Movement at the University of California, see Cohen and Zelnik, *Free Speech Movement*, and Rorabaugh, *Berkeley at War*. Cantwell describes an image of Bob Dylan, Joan Baez, the Freedom Singers, and other folk luminaries holding hands and singing together at the closing 1963 Newport Folk Festival in these terms; see *When We Were Good*, 19, 351–52.
- 21 Hurt, “Mary, Don’t You Weep”; Watson, “Country Blues.”
- 22 Audacity: Multi-Track Audio Editor and Recorder software (accessed November 21, 2017, <http://audacity.sourceforge.net>).
- 23 Hurt’s original track seems to have been recorded in stereo; Watson’s was recorded in mono and then remastered as stereo for later re-releases. Both tracks reflect the folk-revival aesthetic of doing little technologically to manipulate the recorded sound.
- 24 For more on Hurt’s life, see Ratcliffe, *Mississippi John Hurt*.
- 25 In using this term, I am linking Hurt to the scholarly literature on the African American trickster figure, particularly as a cultural innovation forged under duress due to racism, slavery, Jim Crow, and other oppressive conditions in the United States. See Baker, *Blues, Ideology*; Gates, *Signifying Monkey*; and Floyd, “African American Modernism.”
- 26 For more on Watson’s life, see Gustavson, *Blind but Now I See*.

- 27 See, for instance, Beckert, *Empire of Cotton*, for a history of these cross-regional structural commonalities. On southern music and class, see Malone, *Singing Cowboys and Don't Get Above Your Raisin'*.
- 28 On the circulation of southern musical styles, see Miller, *Segregating Sound*.
- 29 For Cage's reflections on the use of chance operations in his compositional strategies, see Kostelanetz, *Conversing with Cage*.
- 30 Shank, "That Wild Mercury Sound"; see also Radano, *Lying Up a Nation*.
- 31 Debates have raged among scholars about song style in the Mississippi Delta. Early blues scholars romanticized a more "primitive" and supposedly authentic, anticommercial style in the region; more recently, scholars such as Elijah Wald have pointed out that singers such as Robert Johnson performed in a wide range of styles that suited the desires of their audiences and reflected access to the range of twentieth-century American popular music; see Wald, *Escaping the Delta*.
- 32 Barry Olivier, director of the Berkeley Folk Music Festival, described Hurt in a conversation as a leprechaun-like figure. Hurt's manager, Boston-based photographer and folk music producer Dick Waterman, thought of him as the archetypal hippie; see Waterman, "John Hurt."
- 33 On glitching, see Krapp, *Noise Channels*.
- 34 Cantwell, *Bluegrass Breakdown*.
- 35 Thanks to Mary Caton Lingold for making this observation about the African American blues presence in Watson's performance style.
- 36 See chapter 9 of Gustavson, *Blind but Now I See*.
- 37 White, "What Is Spatial History?" On mattering maps, see Grossberg, *Dancing in Spite of Myself*, 13.
- 38 Quoted in Shubb, "Saturday Morning."
- 39 Manovich, *Software Takes Command*, 339, italics in original.
- 40 Dylan, "Baby Let Me Follow You Down."
- 41 Gitelman, *Always Already New*.
- 42 Tools of data sonification include the Photosounder application by Michel Rouzic (accessed November 21, 2017, <http://photosounder.com>) and TAPoR's Voyant Bubbles software (accessed November 21, 2017, www.tapor.ca/?id=11). See also "Say It with Pictures"; and Davies, Cunningham, and Grout, "Visual Stimulus."
- 43 Computer programmer Bill Parod of the Northwestern University Information Technology division has been immensely helpful in conceptualizing and beginning to implement this idea.
- 44 Gibbs and Owens, "Hermeneutics of Data."
- 45 Data sonification also raises fascinating questions about what counts as legitimate evidence. At one level, it distorts a photograph into a sonic form that is so removed from the original and so odd-sounding to the human ear that it might perhaps seem useless for inquiries into the past. Then again, sonified data is still linked to the original artifact; it merely remediates the data of the digital

- image itself, which was already a remediation of a photograph, which in turn was a remediation of a past moment.
- 46 Owens, “Glitching Files.”
 - 47 Reed, *Metal Machine Music*. The album’s four tracks, each precisely sixteen minutes and one second long, consist of guitar feedback manipulated at various speeds by Reed.
 - 48 See “Photosounder Version 1.9 User Guide” (accessed January 14, 2018, <http://photosounder.com/documentation.php>). Michel Rouzic provided further explanation in two emails to the author, January 21, 2015.
 - 49 Cantwell, *Ethnomimesis*.
 - 50 For analysis of “playing the folk,” see Hale, “Black as Folk”; see also Hamilton, *In Search of the Blues*.
 - 51 The use of sound to index large datasets has been the most common approach to sonification (and visualization, for that matter) in the digital humanities. See, for instance, fascinating projects such as Joque’s *Listening to the Dow*; *Listen to Bitcoin* by Laumeister; and *Listen to Wikipedia* by LaPorte and Hashemi. A more adventurous version can be found in Foo’s ongoing Data-Driven DJ experiments. Of course, the sound of something like ten thousand banjo samples ringing out in unison seems like a wonderfully twisted thing to get to hear in its own right.
 - 52 Drucker, *SpecLab*, xiii, 17, 23. See also Drucker, “Humanities Approaches”; and Sayers, “New Poster.”
 - 53 Sterne, *Audible Past*; Erlmann, *Reason and Resonance*; Levin, *Modernity and Hegemony*.
 - 54 A variety of fields—visual culture studies, sound studies, and new media studies—have already begun to traverse the senses as historical forms. On visual culture studies, see Mitchell, *Picture Theory* and *What Do Pictures Want?* See also Sturken and Cartwright, *Practices of Looking*. For sound studies, see endnote 57 below. On new media studies, see Wardrip-Fruin and Montfort, *New Media Studies Reader*, and Giddings and Lister, *New Media and Technocultures Reader*.
 - 55 See McLuhan, *Understanding Media* and *Medium Is the Massage*.
 - 56 In this way, the practice of digital image sonification for historical interpretation offers a response to the call by archivists such as Bertram Lyons for computational scholarship to shift into a “post-digitization” phase. Rather than merely preserving artifacts digitally, we must start to figure out what we can do with them once they exist within a digital environment. See Lyons, “Editorial.”
 - 57 Sterne, *Audible Past*. The field of sound studies to which Sterne’s book belongs has already begun this project of recalibration. See books such as Corbin, *Village Bells*, and Smith, *Listening to Nineteenth-Century America*. For overviews, see Sterne, *Sound Studies Reader*, and Bull and Black, *Auditory Cultures Reader*.

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