Twentieth-Century Music 14/1, 3–24 © Cambridge University Press, 2017
doi: 10.1017/S1478572217000032

Tape: Or, Rewinding the Phonographic Regime

ANDREA F. BOHLMAN AND PETER McMURRAY

Abstract

Magnetic tape follows the contours of the twentieth century in striking ways, from the overtly sonic and musical to less obvious political and social transformations. This introductory article sets the tone for this special issue, an effort to connect discrete histories of tape through a focus on its materialities. We posit the existence of a phonographic regime that coheres around a loose set of assumptions that often appear in tandem with broad claims about what 'sound recording' or even 'analogue media' are. This regime dates back to the invention of phonography but persists through many contemporary histories of sound recording. We challenge the regime by thinking with and through tape recording. One of tape's critical media operations, 'rewind', serves as a central focus for our push-back against the regime. As a button-interface, it highlights the physical engagement of humans with materialities, including the corporal labours of using technology, with iconography that digital technologies still employ. As a mechanism of respooling, it points to the industrial histories of various spooling forerunners from textiles to film reels. As we explore its cultural techniques in musical practices, we consider rewind, above all, as a temporal gesture that offers new paths backward into history.

Few media formats follow the contours of the twentieth century and its musical and sonic life like tape. First developed in the tumultuous Weimar Period and Nazi years in Germany, magnetic tape recording's importance for audio recording would spread around the globe rapidly after the Second World War, playing an integral part in the early creation of electronic art music and of popular audiovisual media in the post-war period.[1] Tape offered fidelity, portability, and frugality for amateur and professional recordists alike, as well as a physical medium to be (literally) cut up, reversed, recombined, and otherwise manipulated by its users. The later advent of 4- and 8-track cartridges made tape a viable commercial format for the music industry. This commercialization of tape peaked with the compact cassette – a musical commodity and tangible object that could circulate and sell, record, remix, and even unspool in ways both fragile and artistic. With the end of the Cold War, cassette tapes gave way to CDs in the West, but they continued to function as the dominant materiality of sonic communication in much of the world until the arrival of MP3s and diverse mobile music devices.

Wait! Or, to borrow the language of the tape deck, let's press 'pause' on this journey along tape's musical paths. What happens when we rethink history according to tape's mechanisms

Email: abohlman@email.unc.edu; mcmurray@fas.harvard.edu

We are thankful for comments by and conversations with Brigid Cohen, Michael Heller, Julian Johnson, Clara Latham, John Durham Peters, Alice Shields, Jason Stanyek, Jonathan Sterne, and Benjamin Tausig, as well as the collaboration with the contributors to this special issue.

1 See Peter McMurray's article in this issue for attention to the political and technological stakes of early tape.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

and materialities? How is 'time sounded in media', to borrow Wolfgang Ernst's provocative phrase?[2] We take recourse to that culturally and linguistically pervasive function that emerges from a tape-particular system of buttons and spool-mechanisms: we rewind.

Rewind: at the push of a button with, for example, a portable cassette recorder that sits on our desk. The magnetically coated film passes back over the tape head, tracing, but not sounding, the A and B sides of the tape simultaneously. We have escaped what Steven Connor describes as the locked 'continuum of sounds' that characterize the tape and make 'it hard to get from one part to another, except by going through the sequence once again, like someone trying to remember a line from the middle of a song'.[3] Time spools backwards, and we listen to the tell-tale hiss of the plastic tape under tension as it is respooled by a motor. A number of scenarios might unfold. Perhaps we are familiar with the recorder in our hands and have a sense of the relationship between the quick pace of rewinding and linear playback's real duration, so we can 'drop the needle' on this tape. Perhaps we are less confident and have kept the play button depressed, effecting the unintelligibly frantic, squeaky, and chirpy sound that has come to effect 'backwards time' in popular culture. We locate our target based on this sound's contours and gaps. Perhaps we are rewinding physically damaged tape and it gets caught in the mechanism, snagged and stretched on the pinch roller, leaving us with a tangle of magnetic tape that, if we are lucky, we can reassemble – we rewind by hand, or perhaps with a pencil. Labour, sonic cues, and temporal attention configure our ability to rehear this tape.[4] What music history emerges if we let this tape mode – the function of rewind – shape our historical methods? Pausing and rewinding tape's history is, we posit through the work here, a critical methodology located at the intersection of music studies' close listening and media studies' archaeology.

Tape's significance for music studies – and for rethinking history – surpasses its past work within a parade of media formats. After all, despite all signs that tape is dead, it is still the predominant format in US prisons, where transparent and screwless cassettes are deemed the least weaponizable.[5] Tape is more than the crucial reassessment of its importance for sound recording's technological progress or the critical location of its formats in cultural circulation, though both projects make clear the historiographic potential of a special issue dedicated to tape. In fact, tape's omnipresence throughout many sites of music production and consumption through the second half of the twentieth century is probably – and paradoxically – the reason for its implicit classification as unremarkable. In large part, tape has been left out of the recent scholarly fascination with sound recording as a media process.[6] Formats,

2 Wolfgang Ernst, *Im Medium erklingt die Zeit* (Berlin: Kadmos, 2015).

3 Steven Connor, *Beckett, Modernism and the Material Imagination* (Cambridge: University of Cambridge Press, 2014), 87.

4 This generalized re-imagination evokes one of the most central cultural techniques of making and listening to tape. The technological fluency upon which rewinding depends would be challenged by particular instruments, whether the 8-track player that does not afford rewinding or decks with automated rewind, which remove the human interface – both finger and ear – from the process.

5 Benjamen Walker and Alix Lambert, 'Loud and Clear', *99% Invisible*. Podcast, episode 214, 24 May 2016. http://99percentinvisible.org/episode/loud-and-clear/.

6 Two comprehensive histories by engineers working in tape provide a counterpoint to this disengagement: Friedrich Engel, *Zeitschichten: Magnetbandtechnik als Kulturträger* (Potsdam: Polzer Media Group, 2008); Eric D. Daniel, C.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

such as the 78, the LP, or the MP3, have been the subject of major studies, but the peculiar specificities of tape recording and tape cultures have too often been left aside or subordinated to grand narratives about the history of sound recording or 'the analogue'.[7]

The exceptions to this silence have thus been all the more remarkable. Peter Manuel and David Novak claim wide geographies and inclusive communities for tapes, emphasizing the cultural power of circulation in the feedback loops of cassette makers, copiers, and consumers.[8] J. Martin Daughtry and Thomas Porcello emphasize tape's affordances by positioning it among other music technologies and as the generating force for intimate communities.[9] Charles Hirschkind and Flagg Miller interweave the stories of tape in the anthropology of media, lending music and aurality crucial roles in our understanding of the global order.[10] Certain topics such as the history of the Sony Walkman or the Iranian Revolution (which we briefly discuss below) have also occasionally prompted research about cassette tapes.[11]

Within the domain of Western music history, Richard Taruskin threads tape through histories in the final volume of his *Oxford History of Western Music*. It is at the centre of what he calls 'the third revolution' – the beginning of music history's end through the proliferation of sound reproduction across musics.[12] For Taruskin, tape connects institutions (radio stations and universities), individuals (composers and engineers), and ideologies (Cagean pluralistic dreams and Darmstadt's search for control). He understands tape's emergence out of Nazi hiding as remarkable, calling attention to its many paths through art music cultures in the

Denis Mee, and Mark H. Clark, eds., *Magnetic Recording: The First 100 Years* (Piscataway, NJ: IEEE Press, 1999). Jentery Sayers's dissertation on the history of magnetic recording illustrates the possibilities of bringing together such technical historiography with critical/cultural perspectives. See Jentery Sayers, 'How Text Lost Its Source: Magnetic Recording Cultures' (PhD diss., University of Washington, 2011).

7 See (among others) Michael Denning, *Noise Uprising: The Audiopolitics of a World Musical Revolution* (London: Verso, 2015); Mark Katz, *Capturing Sound: How Technology Has Changed Music* (Berkeley: University of California Press, 2004); Jonathan Sterne, *MP3: The Meaning of a Format* (Durham: Duke University Press, 2012); see also Richard Osborne, *Vinyl: A History of the Analogue Record* (London: Routledge, 2013); Lisa Gitelman, *Always Already New: Media, History, and the Data of Culture* (Cambridge, MA: MIT Press, 2006).

8 Peter Manuel, *Cassette Culture: Popular Music Technology in North India* (Chicago: University of Chicago Press, 1993); David Novak, 'The Future of Cassette Culture', in *Japanoise: Music at the Edge of Circulation* (Durham: Duke University Press, 2013).

9 J. Martin Daughtry, 'Acoustic Palimpsests and the Politics of Listening', *Music and Politics* 7/1 (2013), http://quod.lib.umich.edu/m/mp/9460447.0007.101/–acoustic-palimpsests-and-the-politics-of-listening?rgn=main;view=fulltext; Thomas Porcello, '"Tails out": Social Phenomenology and the Ethnographic Representation of Technology in Music-Making', *Ethnomusicology* 42/3 (1998).

10 Charles Hirschkind, *The Ethical Soundscape: Cassette Sermons and Islamic Counterpublics* (New York: Columbia University Press, 2006); Flagg Miller, *The Moral Resonance of Arab Media: Audiocassette Poetry and Culture in Yemen* (Cambridge, MA: Harvard University Press, 2007); Flagg Miller, *The Audacious Ascetic: What the Bin Laden Tapes Reveal About al-Qa'ida* (New York: Oxford University Press, 2015). On the Bin Laden tapes, see also Jonathan Sterne, 'Enemy Voice', *Social Text* 25/3 (2008).

11 On tape and the Walkman, see Shuhei Hosokawa, 'The Walkman Effect', *Popular Music* 4 (1984), and Michael Bull, *Sounding Out the City: Personal Stereos and the Management of Everyday Life* (Oxford and New York: Berg, 2000); and on the Iranian Revolution, see Annabelle Sreberny-Mohammadi and Ali Mohammadi, *Small Media, Big Revolution: Communication, Culture and the Iranian Revolution* (Minneapolis: University of Minnesota Press, 1994).

12 Richard Taruskin, 'The Third Revolution', in *Music in the Late Twentieth Century: The Oxford History of Western Music*, Vol. 5 (Oxford: Oxford University Press, 2010).

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

1940s–1960s. A series of anecdotes makes the case for the sneaky presence and power of tape, with magnetic sound recording bringing together a whole ecology of media:

> For the record, so to speak, the earliest continuous tape-recorded opera performance to be commercially released on disc was of *Abu Hassan* (1811), a one-act 'Turkish' singspiel by Carl Maria von Weber. It was originally recorded 'live' for broadcast on Radio Berlin in 1944, with the young soprano Elisabeth Schwarzkopf, later a great international diva, in the role of Fatime.[13]

Tape shapes Taruskin's twentieth century through its ability to be manipulated and to connect. It reshapes *and* reconfirms geographic boundaries, folds time *and* fixes the past.

Another anecdote from the recording studio complements Taruskin's reminder that many of the twentieth-century's classical music recordings began on tape, even if they were consumed on vinyl, or later on CD. Popular musics, too, have flourished because of tape. During the course of his career, Prince used tape to store, circulate, and transform his music. On his first demo cassette, as autodidact engineer, he overdubbed performances and samples from multiple tape recorders;[14] he auditioned at least one singer, Apollonia Kotero, by driving around Minneapolis and having her sing along with a tape in the car;[15] and he manipulated not only tape direction to create 'backwards drums' on songs such as 'Starfish and Coffee' (1987) but also tape speed to transpose his guitar or more dramatically, his voice, to create his female-voiced alter-ego, Camille.[16]

In one particularly memorable session, Prince worked with engineer Susan Rogers all night making what Rogers thought was a particularly powerful song.[17] Prince, on the other hand, decided it was unsuitable – even for storage in his massive vault. Rogers recounts:

> He looked at me and he pointed to the multitrack and he said, 'Now erase it.' And I said, 'What? Excuse me?' He said, 'Put all twenty-four tracks in record and erase it.' He'd never done anything like this [song] before and it was one of the best things I'd ever heard him do. I said, 'You've got to be kidding me.' And he said, 'If you don't, I will.' And I said, 'Please will you just think about it? Can we just put the tape away and just think about it overnight? I'll do it tomorrow if you still want it done.' He

13 Taruskin, 'The Third Revolution', 176. Schwarzkopf's place in the history of tape was already secure thanks to her singing high notes – spliced into the original recording – for Kirsten Flagstad in a 1952 recording of *Tristan und Isolde* for EMI. See Peter Martland, *Since Records Began: EMI – The First 100 Years* (London: Batsford, 1997), 198. Tape's place in electronic music studios has been discussed in limited ways in Georgina Born, *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Avant-Garde* (Berkeley: University of California Press, 1995), and David W. Bernstein, ed., *The San Francisco Tape Music Center: 1960s Counterculture and the Avant-garde* (Berkeley: University of California Press, 2008). See also essays by Brian Kane, Joseph Auner, and Martha Sprigge in this issue.

14 Ronin Ro, *Prince: Inside the Music and the Masks* (New York: St Martin's Press, 2011), 12.

15 Ro, *Prince: Inside the Music*, 93.

16 As in the song, 'If I Was Your Girlfriend'. See Touré , *I Would Die 4 U: Why Prince Became an Icon* (New York: Atria, 2013), 7–8.

17 See also the interview with Susan Rogers by Stefan Helmreich and Peter McMurray in this issue of *Twentieth-Century Music*.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

> steps toward the machine and he put all twenty-four tracks in ready record and he hit record and he wiped the whole thing and he took the cassettes.[18]

This incident illustrates several of the tensions about tape we explore across this special issue and its introduction: tape has emerged as one of the most stable archival media and yet its erasability and reusability have been central to its social life; that 'erase' function is no drag-and-drop, digital flick of the wrist, but the very same operation as 'record' – creation and destruction are different only by sonic context; and finally, tapes are things to keep. After all this, Prince takes the tapes themselves, sonic totems he fears might somehow be reanimated.

This special issue seeks to connect discrete histories of tape through a focus on its materialities. What do we – as sound students and musical thinkers – gain when we think critically about tape, its logics and affordances, and its undeniable percolation through and importance for aural cultures? We reflect on the epistemological and ontological challenges issued by magnetic recording for thinking about musical time and music history, taking as our point of departure that tape has connected musical practices across studio environments as well as listeners on the road or in their homes. Likewise thinking with tape helps question the broader teleology of phonographic history – from the phonograph to the next-great-device, from the groove to the next-great-format – by raising questions of media operations, time, and the capture and playback of sound. Indeed, as discussions in media studies shift towards media as not merely temporal markers but as generative sites of time, tape pushes back against assumptions about the analogue and digital. It sits uncomfortably (and thus productively) between these two categories, since it is far more fragmentary than phonographic time (i.e., like a proto-digital medium); and yet it also figures prominently in early digital data storage (e.g., with DAT tape), and more recently in Sony's new tape-based archival media, both of which use tape not as a format but as a carrier of data – and by extension, a time-generating medium. Collected, the focused articles that make up this issue draw out music histories that emanate from and are bound up in the materiality of tape, tapes, and taping. Or, put more provocatively, tape does not merely record or even bear witness to the sonic history of the twentieth century. In many respects it *is* that history.[19]

This introductory article sets the tone. We posit the existence of a phonographic regime and suggest ways in which that regime can be challenged by thinking with and through magnetic tape. Echoing Martin Jay's critique of the 'scopic regimes of modernity', we interrogate the ways in which much of sound studies has inadvertently built up its own internal regime, in which the phonograph dominates.[20] That domination is not simply the result of focus on

18 Touré, *I Would Die*, 42.

19 We briefly discuss below two overtly political moments in which tape played a major role: the Iranian Revolution of the late 1970s and the Polish resistance of the 1980s. While tape played a particularly important role in those endeavours, its history-making function can be seen in several other articles in this issue, including those by McMurray, Sprigge and Bohlman.

20 Although we adopt Jay's language of regime here, we are hardly the first to point out the emergent narrative tropes accumulating around phonography. Over a decade ago, for example, Jonathan Sterne highlighted 'the cult of Edison', in *The Audible Past: Cultural Origins of Sound Reproduction* (Durham: Duke University Press, 2003), 208. Elsewhere he also dispels the myth of verisimilitude in his *MP3: The Meaning of a Format*, 4–7. Other scholars have taken on

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

the phonograph per se as an object of study, though certainly the phonograph and closely related gramophone have played that role frequently. The regime coheres around a loose set of assumptions that often appear in tandem in broad claims about what 'sound recording' is or even what 'analogue media' are. These include: all sound media are part of the same lineage; that lineage begins with the phonograph; sound recording is an act of inscription – of writing sound; sound media record everything indiscriminately, documenting (or perhaps creating) the Lacanian real; they especially capture the afterlife of the real, embalming the voice of the dead for future generations; and sound recording is an indexical process where time and sound are co-constituted and inextricably linked. These characteristics rarely, if ever, all appear simultaneously in a single text, even in paradigmatic phonographocentric texts such as Friedrich Kittler's *Gramophone, Film, Typewriter* or Lisa Gitelman's *Always Already New* that openly argue for the primacy of phonography.[21] Indeed, many such works offer tantalizing reflections on tape, but always place tape in a subordinate, subsequent role to phonography.

In short, the phonograph's media logics stand in for sound recording broadly understood – and more often than not celebrated. As we explore below, scholars of music, sound, and media have responded to the confident dreams of early phonograph practitioners and promoters by reiterating – even amplifying – their notion that the phonograph is a route to perfection. The phonographic regime shares with the Cartesian hegemony of Jay's 'scopic regime' an emphasis on realism, an implied cultural dominance (often understood as a techno-teleology), and a penchant for objectifying and abstracting sensory perception.[22] In step with Jay's influential insistence that regime formation occurs on contested terrain, we would point out tape's divergent logics: non-linear cultural techniques (splicing, looping, dubbing); its consistent interface with telephony, radio, and – of course – the record; and finally, its subjective import, exemplified in the mixtape.[23] Without suggesting that tape usurp the phonograph, we focus on tape's role as counterpoint to the process of inscription at the foundation of the phonographic regime, rather than as another sound medium subsumed by that regime.

---

other aspects of the regime as well. For instance, James Lastra discusses the vexing presumption of sonic inscription for filmmakers in his 'Reading, Writing, and Representing Sound', in *Sound Theory/Sound Practice*, ed. Rick Altman (New York: Routledge/AFI, 1992). Some scholars like Barbara Engh simultaneously dissect parts of the regime (e.g., fixations on the voices of the dead) while reinscribing its more general monumentality, in 'After "His Majesty's Voice": Post-Phonographic Aurality' (PhD diss., University of Minnesota, 1997). With this rewind of the regime we anchor the critique not only in the history of sound recording, but also within the intellectual history of music and sound studies.

21 A small – but significant – portion of Kittler's analysis is of tape in Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford: Stanford University Press, 1999), 105–14. See also Lisa Gitelman, *Always Already New: Media, History, and the Data of Culture* (Cambridge, MA: MIT Press, 2006).

22 Martin Jay, 'The Scopic Regimes of Modernity', in *Vision and Visuality*, ed. Hal Foster (Seattle: Bay Press, 1988).

23 For an extended treatment of tape's cultural techniques across media and, in part, into the digital, see the articles by Brian Kane and Amy Cimini in this issue.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

Rewind, then, not revise: one of tape's critical media operations, 'rewind' serves as a central focus here on several levels.[24] As a button-interface, it highlights the physical engagement of human and materiality, the corporal labours of using technology. As a mechanism of respooling, it points to the industrial histories of various spooling forerunners from textiles to film reels. And above all, as a temporal gesture, it offers a path backward into history. 'Rewind' challenges the notion of history at remove; pushed to a deterministic limit, one might even consider tape itself as a historian, ordering non-chronological events along a narrative to be unspooled, heard closely, and reformatted.[25] Allowing tape to rewind and unspool the phonographic regime means not only revisiting accepted media history (and historiography), but also to reimagine it through the technical and cultural operations of another media constellation. 'Rewind', too, connects tape's logics to those of film, ultimately leaving room for future tape work to dwell on its broader media ecologies. And while rewind is only one of several buttons we might push to intervene in tape's linearity, its ontological resonances with historical methodologies offer a material reminder of both tape's medium specificities and its central role in twentieth-century cultural history.

Regime 1.0

While the phonographic regime comes to discursive fruition in recent sound studies, it grows out of rhetoric and practices dating back to the phonograph's earliest days, in inventors' statements, manuals, literature, manifestos, and scholarly writing by psychoanalysts and musicologists. This early discourse lays out a utopian vision of eternal preservation, perfected memory, and a technological sense of manifest destiny that the phonograph would not simply continue a march towards progress, but also spread universally. The first great narrator of this genre was Thomas Edison, for whom such statements could be understood as a blend of marketing, inventor's bravado, and technological insight. For example, in an 1878 article Edison indulges in techno-prognostications for his invention, for which 'the possibilities are so illimitable and the probabilities so numerous' that it nearly overwhelms him.[26] Even at this early date, Edison assures his readers that the phonograph is not only capable of reproduction but also of improvement of sound:

> [T]he writer has at various times during the past weeks reproduced these waves with such degree of accuracy in each and every detail … Indeed, the articulation of some individuals has been very perceptibly improved by passage through the phonograph, the original utterance being mutilated by imperfection of lip and mouth formation, and these mutilations eliminated or corrected by the mechanism of the phonograph.[27]

24 For work on 'pause' and the film still, see Laura Mulvey, *Death 24x A Second: Stillness and the Moving Image* (London: Reaktion, 2006), 161–96.

25 For more on tape as a locus – and perhaps agent – of historiography, see particularly the articles by Martha Sprigge on memory work and Andrea Bohlman on tape and/at ethnographic encounter in this issue.

26 Thomas Edison, 'The Phonograph and Its Future', *The North American Review* 126/262 (1878), 527.

27 Edison, 'The Phonograph and Its Future', 528–9.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

Edison also alleges that the phonograph enables the 'indefinite multiplication of a record, and its preservation for all time'.[28] He expects it to 'become universally adopted'.[29] In this early article, he lays out many of the key tropes of the phonographic regime as well: it will preserve 'the sayings, the voices, and the last words of the dying member of the family – as of great men'; it will turn dolls into near-humans 'which may speak, sing, cry, or laugh'; it will regulate the temporalities of work and love as a speaking clock ('tell you the hour of the day; call you to lunch; send your lover home at ten'); and finally, it will 'perfect the telephone, and revolutionize present systems of telegraphy' by being joined together to create a telephone system that automatically records everything said.[30] As Edison described: It 'practically brings [man] face to face with whom he will; and, better still, doing the work of a conscientious and infallible scribe'.[31] The phonograph is the ultimate promise of presence, coupled with a perfect, infinite inscription of that presence.

A decade later, Emile Berliner invented his gramophone, seeking to supplant Edison and the phonograph while employing much of the same language. Berliner sees technologies, especially those related to the voice, as a kind of sonic epiphany. In his first public demonstration of the gramophone he described: 'a still small voice, hardly audible, and coming from a little disk of iron fastened to the centre of a membrane, whispered … the tidings that a new revelation had descended upon mankind, and that the winged and fiery messenger of heaven's clouds had been harnessed to that delicate, tremorous, and yet so potent form of energy, called the Human Voice'.[32]

Berliner celebrates the 'the art of etching the human voice' and closes his talk by 'foreshadowing' the future uses of the gramophone, much as Edison had. He highlights its marketability as well as the potential for sales of phonautograms (i.e., records). The devices will be built into city infrastructure, with 'at least one office having a gramophone recorder with all the necessary outfits' in every city, giving everyone the opportunity to record on-demand.[33] He imagines if the Pope 'should desire to send broadcast [*sic*] a pontifical blessing to his millions of believers, he may speak into the recorder, and the plate then, after the words are etched, is turned over to a plate-printer, who may, within a few hours, print thousands of phonautograms on translucent tracing paper' which can then circulate globally and be photo-engraved, allowing copying 'ad infinitum'.[34] Technicians, too, assert a globalized permanence for these machines:

> Every part of the instrument is built to an established standard, like a good watch. The user in India can send for a screw, a shaft, a center, a rod, a spring, a brush, and it

28 Edison, 'The Phonograph and Its Future', 529.
29 Edison, 'The Phonograph and Its Future', 532.
30 Edison, 'The Phonograph and Its Future', 534–5.
31 Edison, 'The Phonograph and Its Future', 536.
32 Emile Berliner, 'The Gramophone: Etching the Human Voice', *Journal of the Franklin Institute* 75/6 (June 1888), 426.
33 Berliner, 'The Gramophone', 445.
34 Berliner, 'The Gramophone', 445.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

> will fit perfectly in its place when he gets it ... With ordinary care the Phonograph will outlast the life of the man who operates it.[35]

Novelists and poets also embraced the phonograph, casting it as a hero in their writings. For instance, Bram Stoker's *Dracula* (1897) is a kind of medium-specific transcript composed of phonograph recordings, telegrams, handwritten journal entries, and so on. In a key scene the psychiatrist, Dr Seward, and the invaluable stenographer, Mina Harker, have an extended exchange about the merits of phonography. Harker confirms: 'This beats even shorthand!' After listening to Seward's diary, she explains, 'That is a wonderful machine, but it is cruelly true. It told me, in its very tones, the anguish of your heart. It was like a soul crying out to Almighty God. No one must hear them spoken ever again!'[36] The phonograph becomes a mediator between a crying soul and Almighty God, as well as between the living, the dead, and the undead – a critical distinction for vampire slaying and sound recording alike.[37]

Beyond literary and psychoanalytical uses, musicologists, anthropologists, and linguists used the phonograph as a tool for field recordings. The American anthropologist Jesse Fewkes heaped praise on the phonograph's capacity to preserve entire native cultures. In 1890, he writes:

> It is a most valuable auxiliary in linguistic researches and should be used in the study of fast disappearing languages of races, and in making records of those which are rapidly becoming extinct ... The use of the phonograph among the Passamaquoddy has convinced me that the main characteristics of their language can be recorded and permanently preserved, either for study or demonstration, with this instrument.[38]

Likewise, some of the earliest writings of the researchers affiliated with the Berlin Phonogram Archive explicitly celebrate the phonograph for its technical triumph over the difficulties of aural transcription in real time, explaining: 'With the phonograph, one can freeze the music and leisurely study the music in one's lab space, where one's attention is not so directed toward the visual environment, as happens in demonstrations for foreigners ... One can let it run slow or fast as desired.'[39]

The phonograph allows for a reconceptualization of music and musical time and time manipulation. Wolfgang Ernst reads the project not as a kind of cultural imperialism but

35 George E. Tewksbury, *A Complete Manual of the Edison Phonograph* (Kent: G.L. Frow 'Salterns', 1897), 17.

36 Bram Stoker, *Dracula* (London: Penguin Classics, 2010 [1897]), 310, 312.

37 Media theorists, notably Friedrich Kittler and Geoffrey Winthrop-Young, read the phonograph in Dracula slightly differently, focusing on its use in psychiatric listening – an important application and cultural imagining of phonography that we sidestep here but one that equally served to reinforce the regime. See Kittler, *Gramophone, Film, Typewriter*, 83–94; Geoffrey Winthrop-Young, 'Undead Networks: Information Processing and Media Boundary Conflicts in *Dracula*', in *Literature and Science*, ed. Donald Bruce and Anthony Purdy (Atlanta: Rodopi, 1994).

38 Jesse Fewkes, in Erika Brady, *A Spiral Way: How the Phonograph Changed Ethnography* (Jackson: University Press of Mississippi, 1999), 55.

39 Otto Abraham and Erich von Hornbostel, 'Über die Bedeutung des Phonographen für die vergleichende Musikwissenschaft', *Zeitschrift für Ethnologie* 36/2 (1904), 229. See also Julia Kursell, 'A Gray Box: The Phonograph in Laboratory Experiments and Fieldwork, 1900–1920', in *The Oxford Handbook of Sound Studies*, ed. Trevor Pinch and Karin Bijsterveld (Oxford: Oxford University Press, 2011).

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

as part of a nascent tradition (at the time) of 'an overriding multi-media practice of global classification, data processing and information storage, leading to early twentieth century efforts to create a universal science of cultural documentation'.[40] Less favourable critics might call this globalizing impulse cultural imperialism. Either way, the phonograph is bound up with a totalizing drive – a yearning to capture *all* the sonic real.

Regime 2.0

If the original phonographic regime, from inventors to recordists, embraced and romanticized the phonograph, a later generation – we will call it the phonographic regime 2.0 – of scholars enshrined this narrative. Getting from the beta-version regime to its update is as simple as dropping the needle on a Pink Floyd LP alongside Friedrich Kittler circa 1968, who famously preferred listening to the Beatles and Pink Floyd to marching in the streets in student protests or reading Marx and Adorno. In an interview, Kittler extols Pink Floyd's 'gramophonic music': 'Distinctly not love songs on *Ummagumma* and such early works, but instead the music itself as that which sings itself, namely the gramophonic music, if you will, the relationship of the ear and memory, and of gramophony and return. The last line from "Grantchester Meadows": "Bringing sounds of yesterday into this city room."'[41] The rhetoric of immortality and of the gramophony or phonography of the real – of actual fields with birds and rivers – which Kittler employs here is strikingly similar to the media theorist's descriptions of Edison himself. He writes:

> 'Speech has become, as it were, immortal.' These were Edison's precise words when he presented, in 1877, his latest invention, the phonograph. From that year on, however, not only words have become immortal, but all kinds of music, sound and noise. [. . .] On the banks of the Swanee River, for instance, Edison's phonograph immortalized not only the blues going under the name and the black people performing it, but also the steamboat's roaring machine, and the Swanee River's song. The Thames, as Kate Bush tell us, is 'a poet that never, ever ends.'[42]

In those same formative years for Kittler, Theodor Adorno was listening to records as well (the Second Viennese School and opera), and curating his own radio show with special emphasis on Webern's music. In 1969 Adorno wrote an essay, 'Opera and the Long-Playing Record', in which he describes the LP as a 'deus ex machina' to save opera from what he calls the 'phony hoopla' of contemporary staging: 'It allows for the optimal presentation of music, enabling it to recapture some of the force and intensity that had been worn threadbare in the

40 Wolfgang Ernst, 'Dis/Continuities: Does the Archive Become Metaphorical in Multi-Media Space?', in *Digital Memory and the Archive* (Minneapolis: University of Minnesota Press, 2013), 113.

41 Friedrich Kittler, interview, 'Friedrich Kittler – Warum Pink Floyd?', Vimeo video, posted by Markus Heidingsfelder, 25 November 2012, https://vimeo.com/54235974 .

42 Friedrich Kittler, 'Preparing the Arrival of the Gods', in *Kittler Now: Current Perspectives in Kittler Studies*, ed. Stephen Sale and Laura Salisbury (Cambridge: Polity, 2015), 99.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

opera houses.'[43] For Adorno, the LP can be repeated, possessed, and experienced temporally, and it is no coincidence that in the same essay he extols time in opera, with a special mention of late Wagner and Strauss, describing their operas as 'sea voyages'.[44] These two biographical accounts of Kittler and Adorno as not just writers but also listeners remind us that the regime includes not only inventors and scholars, but also consumers, listeners, and scholars.

As a cue then for our own return to tape, we highlight the convergence of tape and vinyl present in the records to which Kittler and Adorno listened. None other than Wendy Carlos heard the phonographic regime as violent in the context of her first realizations of J.S. Bach at the synthesizer. Reflecting on her 1968 *Switched-on Bach* album, she sounded off:

> I shudder to think of the shock of hearing what the vinyl version of my carefully engineered master tape sounded like. At best the groove noises covered up some of the tape hiss. Even though I had been a stereo master cutter and recording engineer, I was taken aback by the pinch distortion, pre- and post-echo, popping and ticking, and inner groove losses that passed as state-of-the-art. It was a losing battle to try and get the levels up with minimum limiting while squeezing in about twenty-two minutes a side. Of all media some audiophiles worship (how about Dolby A tape?), this one I can least understand. Yuck![45]

Carlos's comments here aim squarely at the fetishization of the long-playing record – which 'audiophiles worship', she tells us. In listening to vinyl, she hears not an ideal sonic reproduction but rather a whole range of artefacts that show vinyl's shortcomings: groove noise, distortion, echo, popping, and ticking all detract from perfect sonic reproduction. As a result, she is baffled by the audiophilic worship of vinyl. Implicitly, either vinyl advocates fail to hear these sounds, suggesting that their aural discernment is unrefined to begin with, or else they hear them and suggest that these artefacts are part of vinyl's unique pleasures. (This latter argument appears frequently in the context of vinyl's resurgence in recent decades, as its characteristic crackle and 'warmth' are pointed to as markers of authenticity and preference.) In pursuing this line of argument, Carlos might be accused of falling prey to the 'quest for verisimilitude', as Jonathan Sterne has called it, but she seems more concerned with the logic (or lack thereof) of audiophilia.[46] However flawed the worship of format may be, the ostensible criteria of audiophiles should have led them to embrace tape over vinyl.

Of greater interest here, Carlos also points to a more complex issue: *Switched-on Bach* was both a vinyl album and a tape recording. It was a 'vinyl version of [a] carefully engineered master tape', with the original tape recording being audibly different from and obscured by the commercial vinyl release, both in terms of its media processes as well as the labour and material that preceded the vinyl. Although the first LPs introduced by Columbia in 1948 did not involve tape, the two quickly became entangled, with sound recording and editing happening on tape before a master tape was transferred to vinyl. One of the

43 Theodor W. Adorno, 'Opera and the Long-Playing Record', trans. Thomas Y. Levin, *October* 55 (Winter, 1990), 64.

44 Adorno, 'Opera and the Long-Playing Record', 65.

45 Wendy Carlos, liner notes to *Switched-On Bach 2000* (CD, Telarc, CD-80323, 1992), 3.

46 Sterne, *MP3: The Meaning of a Format*, 4–5.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

ongoing struggles facing producers/advocates of tape was finding a format that was readily playable by listeners/consumers while maintaining the desired recording characteristics. This struggle is apparent in the numerous formats for tape playback (reel-to-reel, 4-track, 8-track, compact cassette). Furthermore, the central role of radio in the development of tape becomes immediately understandable in this light, since it provided playback opportunities even longer playing than the LP.

Given this invisible doubling of tape and the LP, Kittler calling Pink Floyd 'gramophonic' is misleading: by foregrounding the gramophonic, he obscures tape's role in producing such music. Strikingly, Kittler clearly knows this. Like many other theorists and scholars whose writings bolster the phonographic regime, he has already written on multiple occasions about the role tape plays in music albums such as Jimi Hendrix's *Electric Ladyland* or the Beatles' *Magical Mystery Tour*.[47] Indeed, in his conclusion of 'Gramophone', Kittler not only closes with a discussion of tape, but he even highlights its place in the production of records: 'Storing, erasing, sampling, fast-forwarding, rewinding, editing – inserting tapes into the signal path leading from the microphone to the master disc made manipulation itself possible.'[48] Even Kittler's beloved Pink Floyd understood their musical practice as a form of 'tape for its own ends'.[49]

This kind of wilful oblivion with regards to tape lies at the heart of Regime 2.0. As we have already noted, Kittler has not only thought about tape, but also thought about precisely the ways in which it makes his beloved 'gramophony' possible at the hands of Pink Floyd. Metaphorically speaking, Kittler rewinds his own history of gramophony to make way for tape at the end. In the discussion that follows, we consider how the physical act of rewind and the more critical gesture of re-thinking the past might dovetail to offer insight into the history and historiography of sound recording.

Rewind

In a 1962 article 'Sound of Hell', tape-music composer Vladimir Ussachevsky defended himself against assertions that his music was automated, or 'push-button music'.[50] We will return to Ussachevsky's craft and aesthetics, but by drawing attention to buttons, his critics had identified one of the most important features of tape. The push-button interface – even called a 'piano-key style' in the context of certain cassette decks – also powerfully positions tape as contingent (erasable) and music as re-routable (rewindable), two centrepieces of tape's media logics devalued in the presence of the regime. Buttons connect the range of tape communities: mixtape makers, composers, and listeners in cars, homes, and on the streets.

The time manipulation that buttons afford positions tape decks among what Roger Moseley has theorized as 'digital analogies' – a term that draws attention to instruments that 'register and resist binary oppositions' in order to draw attention to the contested and ambiguous

47 Kittler, *Gramophone, Film, Typewriter*, 109ff.

48 Kittler, *Gramophone, Film, Typewriter*, 108.

49 Kittler, *Gramophone, Film, Typewriter*, 109.

50 Vladimir Ussachevsky, 'Sound of Hell: Score for Film Version of No Exit', *Newsweek* 60 (10 Dec. 1962), 86.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

interaction of the digital and analogue modes in musical technologies.[51] With buttons – and occasionally switches or knobs – consumers and producers have their hands involved in making music. Like the radio dial, buttons facilitate human interaction with the machine and accordingly provoke an imagination of its medium and mechanisms.[52]

The 2000 dance track 'Re-Rewind', a collaboration between the band Artful Dodger and singer Craig David, highlights the rewind function as a node between the practical/material and the creative/expressive. Having dubbed their digital recording onto a TDK D90 tape for review, the artists decided on a couple of tweaks while listening in the car, only to return to the studio to find their original files corrupt. As Craig David recalled, 'That plastic TDK tape became gold dust. We had the whole song on there, and we had to use the recording as our reference, playing it very carefully so it didn't get chewed up, and trying to remember all the things we did.'[53] He reminds us that tape playback is never so simple as just pushing a button: the mechanism strains the medium. The song bears an acoustic trace of this precarity. Each line of the chorus conjures a DJ's successful record scratching with a stutter on the first syllable of the word 'rewind'. Only, instead of sampling the sound, the gimmick is effected with digital processing that indexes a CD skipping, a variant on a playback 'malfunction' that is generative while also implying the reliability (or at least stream-like nature) of analogue.

Across most tape formats – the 8-track tape is one exception – buttons start straightforward playback, spool the tape at high-speeds backward/forward to rewind or fast-forward, and initiate the recording process – a move that requires the hard depression of two buttons in order to avoid accidental manipulation of the recorded sound. It is the 'ordinariness' of push buttons, to quote the tech designer Bill DeRouchey, that lends them their power to initiate a technological process their users cannot understand.[54] We would also argue that buttons connect technologies and enable the quick translation of specific fluencies among media: you can still 'press play' in order to initiate a video on your smart device's touchscreen, the bumpy plastic and resistance of a Walkman's start button exchanged for other tactile knowledge of texture and pressure. The sonic feedback of the tape recorder's click, too, reinforces the sensory work that buttons do.

Buttons, like all material components of a medium, have a genealogy that situates those objects in deeper histories of working, consuming, and playing, along with the tools we use to do so. Examining early tape recorders on the American market makes clear that the precise history of buttons was not a historical given but rather a development that brought together manufacturing, design, language, and iconography in early tape recorders. The Ampex Model 200A (released in 1948), the first American commercial tape recorder, used buttons but with

51 Roger Moseley, 'Digital Analogies: The Keyboard as Field of Musical Play', *Journal of the American Musicological Society* 68/1 (Spring 2015), 154.

52 Andreas Fickers, 'Visibly Audible: The Radio Dial as Mediating Interface', in *The Oxford Handbook of Sound Studies*, ed. Pinch and Bijsterveld.

53 In Mark Savage, 'Born to Redo It: Craig David on His "Crazy" Career Revival', *BBC News*, 4 Feb. 2016, www.bbc.com/news/entertainment-arts-35483863.

54 Bill DeRouchey, '1887: Pushbuttons in the Times archives', *Push Click Touch* (blog), 16 June 2008, www.pushclicktouch.com/blog/?p=219.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

slightly different functions than would eventually become standard. The term 'Start' is used instead of 'Play', a function that both plays the tape and enables all other functions: 'None of the controls can be operated unless the Start button is first operated. When it is desired to start the machine in any of the other conditions, the Start button must be operated simultaneously with the desired button. Once the Rewind or Fast Forward button has been operated, it is necessary to depress the Stop button to select another mode of operation.'[55]

The 200A Instruction Book offers considerable detail about the machine's technical operations. It goes well beyond what we might think of today as a 'user manual'. One result is that the mechanical and electrical work that takes place when a button is depressed – or more to the point, that are obscured by the apparently simple act of pushing a button – are made more apparent. The Start button, for example, is broken down into the movement and restriction of interconnected component parts.[56] Rewind is provided with a similar technical clarity: 'Operating the Rewind button picks up relay K202, which locks itself in, energizes the Rewind light, applies 90 volts to the rewind motor through resistor R205 [. . . and so on]. The record relay K204 is also dropped out, and the Fast Forward relay is locked out.'[57] Within the machine, rewind is less a temporal operation than a complex set of electromechanical ones, acting in tandem with and precluding other operations like fast-forward. The 200A also had instructions for editing tape using special knobs for manual control; for cueing, noting that 'the machine comes up to full speed in approximately two seconds'; and for synchronizing two recorders together, which relied mostly on the user's hand–ear coordination to stop/restart one tape rapidly until both line up.[58]

Within a few years, push buttons had become not merely interfaces but a key part of tape recorder design and marketing.[59] In 1953, the Radio Corporation of America (RCA) ran a full-page advertisement in the inaugural issue of the specialist magazine *Tape Recording*, with the tagline: 'Now Record it . . . the Easy way with RCA's New Push-Button Tape Recorder.'[60] The ad depicts a hand reaching out and pushing Record on a tape recorder, with a microphone attached to the recorder. In the background, a series of hand-drawn vignettes depicts a family party, a meeting, and playing piano (among others), presumably all activities that would be enriched by the presence of a tape recorder. The text of the ad repeatedly highlights buttons: 'Easy to Record – Just push a button and the RCA Tape Recorder is in action, making a

55 Ampex Electric Corporation, *Instruction Book: Model 200A Magnetic Tape Recorder* (San Carlos, CA: Ampex Electric Corporation, no date [*c.* 1948]), 11.

56 'Depressing the Start button provides normal playback operation. The brake solenoids pick up, extending the brake springs and releasing the brakes, the capstan solenoid picks up, clamping the tape against the capstan, relay K201 picks up through the normally closed Stop switch contacts . . . which leaves the safety switch S7 contacts closed.' Ampex, *Instruction Book: Model 200A*, 11.

57 Ampex, *Instruction Book: Model 200A*, 12.

58 Ampex, *Instruction Book: Model 200A*, 14.

59 The question of material interfaces of tape extends to other familiar media as well. See, for example, Roger Moseley, *Keys to Play: Music as a Ludic Medium from Apollo to Nintendo* (Berkeley: University of California Press, 2016), in which Moseley traces out a rich archaeology of keys and to a lesser degree buttons, with emphasis on the creative interface with hands, from ancient Greek music to classical piano repertoire and ultimately to video games.

60 In *Tape Recording* (Nov.–Dec. 1953), 5.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

faithful record of the sounds and voices you cherish'; or, 'Easy to Play – Just push a button, and you hear what you've recorded – instantly. Fast forward and reverse speeds are push-button operated too, so you can locate any portion of your tape recording easily.'[61] In a review of the RCA recorder in the same issue of *Tape Recording*, the author notes that the 'simple' interface between machine and user is one of the 'excellent points in the recorder's favor'.[62] The lengthy review gives a sense of the user's intuitive experience of this novelty, belabouring the instructions for an audience learning to use the recorder: 'Another point mentioned with frequency in the manual is the admonition to "press the buttons FIRMLY." They are not kidding. The springs are rather strong and unless the buttons are pressed firmly and meaningfully, you might have a tape foul-up.'[63] This description offers a rare glimpse at the physical and ergonomic aspects of a recorder from that period, suggesting both that buttons still required some refinement and that the button was a key site of design and interface – even a location of 'meaning'.

As simple as the 'play', 'rewind', and 'record' functions may seem in description, their execution depends on aural and tactile fluencies analogous to the sensory knowledge that drives the performance of many musical instruments.[64] Theodor Adorno, with some dismay, draws attention to the importance of listening and the musical potential for spinning the radio dial: 'The very act of selection, however limited, sometimes makes the listener feel as if he were playing an instrument. Certain effects of turning the dial, as long as all the programs are musical ones, resemble musical colors.'[65] Adorno's suggestion that there is musical value to the radio effects positions them as potentially beautiful, in the same way later artists and listeners alike have framed record pops, tape hiss, vinyl scratches, and a range of distortion effects as aesthetically desirable. Or, media specificities can make listening real. But the whir of stations flying by on the dial shares a crucial communicative potential with the smear of tape fast-forward and reversal: it provides the listener with feedback and roots the engagement with the machine not just in materiality but also in media logics.

Rewind and fast-forward are rooted in mechanical speed: they take place faster than playback. If play is engaged simultaneously the switch in velocity is audible as they give rise to a higher-pitched, compressed version of the recorded sound. At mid-twentieth-century mixing and cutting boards musicians drew out such tape effects in compositions, thematizing the medium's affordances – as in, for example, Ussachevsky's tape demonstration, 'Transposition', which speeds up and slows down a recording of the piano's lowest A 'from high hiss to … bell-like'. He argued, 'The tape medium is particularly felicitous for giving the composer a chance to hear and to shape his sound material as he proceeds.'[66]

61 *Tape Recording* (Nov.–Dec. 1953), 5.

62 [Unsigned.] Review of RCA Push-Button Tape Recorder Model SRT-301, *Tape Recording* (Nov.–Dec. 1953), 28–9.

63 *Tape Recording* (Nov.–Dec. 1953), 28.

64 See, for example, Timothy Rice, *May It Fill Your Soul: Experiencing Bulgarian Music* (Chicago: University of Chicago Press, 1994), 49.

65 Theodor W. Adorno, *Current of Music: Elements of a Radio Theory* (Cambridge: Polity, 2009), 96–7.

66 Vladimir Ussachevsky, 'Notes on a Piece for Tape Recorder', *The Musical Quarterly* 46/2 (Apr. 1960), 208.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

He linked the possibility of manipulating tape as it played with the non-linear access to recorded sound, a complex intervention in linearity that lent the medium a 'dimensional impression'.[67]

The time it takes to rewind (or fast-forward) also draws attention to the fact that spooling is itself a form of compression, one that links the logics of tape with the MP3.[68] In fact, rewind initially gained currency to describe winding paper in the context of the industrial revolution: printing presses, wires, and piano rolls were wound and rewound, facilitating storage. As a tape function, rewinding navigates through recorded time. That is, to rewind is not just to repeat or flip back in time: rewinding is a process of waiting and returning.

But the time of rewinding is not just work, it also asserts suspense and underscores absence. In one of his more recent tape pieces, Alvin Lucier – who is of course known for drawing out the particularities of tape in now-canonic works such as *I Am Sitting in a Room* – stages rewinding as part of the fabric of making music. *Nothing Is Real* (2002) is an arrangement of the Beatles' 'Strawberry Fields' that drives the non-representational nature of tape recording home. For piano, amplified teapot, tape recorder, and miniature sound system, the work begins with a rather hazy collection of unmeasured melodic fragments from the tune's melody tinkered at the keyboard. The performer holds the sustaining pedal throughout the piece, all the while recording the acoustic performance through a single microphone on tape. Next the tape recorder is rewound, so that the recording can then be played back from the 2¼" sound system that has been glued – fixed – to the inside of the ceramic teapot. The performer shapes the playback by opening and shutting the lid as the audience hears another version of the tune disengaged with questions of fidelity and presence. The covering of the teapot lid does nothing to trap or preserve the recording. Instead it muffles and amplifies the resonances, smoothing in a way not dissimilar to the transformation of the recorded spoken text that is at the core of *I Am Sitting in a Room*. The many deformations of the song, too, remind the audience of the Beatles' own experimental interventions with tape: the reversed loops, distortion and echo, splicing, and speed manipulation of 'Lucy in the Sky with Diamonds', 'Tomorrow Never Knows', and 'Revolution No. 9'.

Revolution and regime change

Tape is not only entangled with theoretical regimes; it has itself played an important role in challenging – and sometimes upholding – the political and economic hegemonies of the twentieth century. A minor example might be the 'home recording movement' of the early 1980s, which prompted bands to issue tape-specific releases with blank B-sides to invite users to transfer radio broadcasts to tape.[69] Tape has also explicitly figured in literal regime change.

67 Eugene Bruck, Liner notes to *Sounds of New Music*, LP, Folkways Records, FX6160, 1957, 1.

68 See Sterne, *MP3: The Meaning of a Format*, 6.

69 The English new-wave band Bow Wow Wow, for example, released the first cassette single in 1980, entitled 'C·30 C·60 C·90 Go!', a reference to the number of minutes on different cassette models (e.g., a TDK D-C60 cassette, with 60 minutes of playing time). Its chorus was essentially a user manual for circumventing the recording industry: 'C30 C60 C90 Go / Off the radio, I get a constant flow / Hit it, pause it, record it and play / Turn it, rewind and rub it away'.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

Take, for instance, the Islamic Revolution in Iran in the late 1970s. In the run-up to the overthrow of the Shah, the 'heavy artillery' of revolution, as some have put it, were tapes and mimeograms, especially those containing speeches by Ayatollah Khomeini from exile abroad.[70] The Ayatollah's signal flow travelled as follows: 'In Khomeini's rented house, two tape machines were kept permanently running, recording his speeches and announcements and duplicating them for transmission or transportation to Iran. Khomeini refused to talk on the telephone directly so international lines were used for tape-to-tape recording.'[71] An aide would then call from Paris to various cities in Iran and playback tape recordings of Khomeini over the phone: 'Every individual seated at his telephone in each of those cities would have a tape recorder ready. The message would be recorded, transcribed, and given into the hands of the local ulama for distribution within that city.'[72] Just a few years after the White House tapes brought down the Nixon administration, it was a period when tape not only bore witness to history, but history was also made and relayed through tape.

Meanwhile, secret police units across Warsaw-Pact countries treated the medium as a witness (when they surreptitiously recorded domestic spaces) and as a truth serum (when they kept it running through hours-long interrogations). But it was tape's contingency that was crucial for the successes of the opposition to state socialism as they coupled unofficial magnetic recording – *magnitizdat* – with the ubiquitous *samizdat*, or self-publishing.[73] In Poland, for example, activists recorded not only banned or suspect music, but also meetings, political rants, and memorials for the unrecognized dead. Faced with a governmental embargo on paper, magnetic tape's rewritability turned it into a bountiful resource. While typed protocols and essays were made vulnerable by their relative stability, which provided evidence of authors' evasion of censorship bureaus, home-recording archives could be wiped of content by a magnet during the realtime of secret police raids.

Other less overtly political revolutions might be thought through tape as well. Whether the emergence of digital culture is a revolution or some other kind of cultural shift, it has a lengthy prehistory in magnetic tape. For example, when Alan Turing was working with Don Bayley to conceive of a storage mechanism for a new electronic computer, they considered using a captured Magnetophon. They rejected the idea because tape was too tape-like: 'magnetic tape was too much like the tape of the theoretical Universal Turing Machine – it would require so much physical moving to and fro'.[74] In 1951, tape became an integral part of computer storage and drives, first with the development of the Uniservo I, 'the first digital magnetic tape recorder designed ... to be part of a computer system', and then with IBM's

70 Sreberny-Mohammadi and Mohammadi, *Small Media, Big Revolution*.

71 Sreberny-Mohammadi and Mohammadi, *Small Media, Big Revolution*, 120–1.

72 Hamid Algar, *Roots of the Islamic Revolution in Iran* (Oneonta, NY: Islamic Publications International, 2001), 34.

73 For a study of *samizdat* that focuses on its movement and politics, see Friederike Kind-Kovacs and Jessie Labov, eds., *Samizdat, Tamizdat, and Beyond: Transnational Media during and after Socialism* (Oxford and New York: Berghahn Press, 2013).

74 Andrew Hodges, *Alan Turing: The Enigma* (New York: Simon and Schuster, 1983), 314. Kittler, who makes this same point about Turing, also notes that Konrad Zuse's collaborators were interested in using tape for computer storage, see *Gramophone, Film, Typewriter*, 282.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

726 Tape Drive, a removable storage medium using half-inch tape instead of punch cards.[75] And finally, even digital audio storage, theoretically an antagonistic format to analogue tape, has key moments of coexisting and even thriving on tape, such as the Digital Audio Tape (DAT), announced in 1983, and its precursor technologies. With DAT, tape is both analogue (spooling continuously) and digital (discrete, sample-based), thus resisting facile binaries between analogue and digital like so many other sound technologies.[76] Furthermore, tape's ready application as a recording and storage medium to other forms of data – including audio and computers, but also video and instrumentation (such as black boxes) – further underscores the critical rupture between the phonograph and tape.

In a less direct way, even the many types of capital mobilized by the tape revival of the 2000s package neoliberal technologies of the ironic in order to allow users to rationalize their disengagement with their contemporary sociopolitical issues. In other words, tape becomes not a technology of remembering or preserving, but one of active forgetting and wilful erasure of cultural pasts in the plural.[77] One media critic has speculated that these self-described 'hipsters' function as 'a kind of permanent cultural middleman in hypermediated late capitalism, selling out alternative sources of social power developed by outsider groups'.[78] If so, is the cassette revival a kind of 'white hipness 2.0', following Ingrid Monson's discussion of white US-American hipsters in the 1940s and 1950s, but with the popular music of the Global South standing in for bebop and cool jazz?[79]

The rhetorical sting of naming and blaming regimes aside, each of these entanglements of tape in networks of exclusion and erasure serves as a reminder that tape was forged in the techno-political crucible of fascism. However interesting tape's musical or sonic applications may be, political stakes remain central to its existence, even as it recedes from centre stage in an era of WikiLeaks and massive NSA data collection, Twitter-fuelled popular uprisings, and smartphone recordings of police brutality. After all, the iconic play button – and arguably the very notion of 'play' as a technical operation – remains a vestige of tape culture. It is no coincidence that the globally dominant video-sharing website YouTube bestows a tape-esque award, the 'YouTube Play Button', on the creators of its most *popular* videos, connecting its own work at monetization back with the long history of patent battles among tape innovators. In other words, tape is never politically neutral. Nor is it easily assigned to any particular political stance or party. Sometimes it fights the regime, sometimes it is the regime.

75 William B. Phillips, 'Data Storage on Tape', in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (Piscataway, NJ: IEEE Press, 1999). See also Charles J. Bashe, Lyle R. Johnson, John H. Palmer and Emerson W. Pugh, *IBM's Early Computers: A Technical History* (Cambridge, MA: MIT Press, 1986), 187–230.

76 For more on DAT, see John R. Watkinson, 'The History of Digital Audio', in *Magnetic Recording*, ed. Daniel, Mee, and Clark.

77 See the article by Joanna Demers in this issue.

78 Rob Horning, 'The Death of the Hipster', *Pop Matters*, 13 April 2009, www.popmatters.com/tools/print/72950/.

79 Ingrid Monson, 'The Problem with White Hipness: Race, Gender, and Cultural Conceptions in Jazz Historical Discourse', *Journal of the American Musicological Society* 48/3 (1995).

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

Tape: the issue

This special issue grew out of an alternative-format panel at the 2015 Annual Meeting of the American Musicological Society, as well as subsequent conversations among the authors featured here, and other presentations, in particular at a conference at Stony Brook University in April 2016 (Periods and Waves: A Conference on Sound and History). The contents are organized in roughly chronological order to give some sense of a broader history of tape, tapes, and taping (i.e., tape recording) as a cultural practice. We begin with Peter McMurray's exploration of magnetic tape's invention by Fritz Pfleumer, and especially its quality of recording-on-the-surface in Germany during the Second World War and its subsequent 'transfer' by looting to other Allied nations. The question of the war's legacy also plays a central role in Martha Sprigge's article on electroacoustic composers in the GDR and their responses to recordings of Joseph Goebbels's infamous 'total war' speech of 1943. In a broadly theoretical vein, Brian Kane draws on early tape practices at the Groupe des Recherches Musicales studios in France and elsewhere to argue for tape's ongoing relationship to earlier recording technologies as a kind of 'relay' of shared cultural techniques. In contrast, Joseph Auner focuses in-depth on Steve Reich's 1967 composition *Violin Phase* to argue that the unique materialities of tape are critical to understanding the piece's performance and to Reich's larger musical output. Amy Cimini's article on Maryanne Amacher's *City-Links* project then considers how tape might be understood as part of a broader network of media (especially telephony), places, and bodies, whose difference is too often elided by simple descriptions of tape-as-medium.

Tape was never simply a practice of art music and formal studio-based composition, and the articles that follow query some tape practices that diverge from the better-known paths of historical musicology. The final two articles discuss the alleged pastness or death of tape. Reflecting on tape's revival in the past two decades, Joanna Demers considers recent tape revivals in North American popular music scenes, drawing out how the medium's resurfacing is not rooted in a historical turn, but is instead a central example of what she terms 'creative anachronism', a broader practice through which to understand the musical pulse of the 2010s. Thinking more ethnographically, Andrea Bohlman offers a critical essay in the form of a written mixtape that delves into homemade tapes in Poland and their intimate histories. Her article suggests several affordances of the cassette tape as methodologies for the history of sound and listening. The essay by Steve Weiss and the interview with Susan Rogers take this conversation firmly into the realm of practice, as they consider tape as the medium for two artists' careers: Tia Blake and Prince, respectively. Their evocations of the studio and the archive foreground tape fluencies on the part of the archivist and recordist.

Such a chronological organization allows a number of strong thematic connections to emerge, including electroacoustic music practices, the legacy of the Second World War in tape's history, and experimentalisms beyond the studio. At the same time, chronology suppresses other less obvious connections that we might have pursued: the use of buttons and the language of tape's commands; the performativity of tape, whether in recording, playback,

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

or other circulation; tape's connections to other media besides the phonograph/gramophone, including telephony, video, and computing; tape and cultural difference, including its often gendered history and historiography; and the usefulness of materiality as a theoretical paradigm.

In lieu of such organizational *jouissance*, we offer four key thematic questions that also point to future directions of research, questions we ask again through the tape-oriented reviews section. First, what are the merits and shortcomings of a materialism-first approach to studying a particular medium? Several of the articles included here might be thought of as emphatically privileging materiality, by hewing to an approach like media archaeology or object-oriented ontology (in spirit if not necessarily bibliographically), while others (notably Brian Kane's) push back against this approach. Second, how might different methodologies be brought to bear on the question of tape's past and present lives? As a group of authors, we explicitly draw on history, ethnography, media theorizing (again, including 'archaeology' as a kind of methodology), but with special emphasis on the history of tape's mediality or media logics – that is, how and why tape was used in the ways it has been at different historical moments. One resulting lacuna here is perhaps the lack of focused ethnography on tape's circulations, especially in non-Western contexts. Third, what kinds of actors are central to this assembled history of tape? Individuals and institutions, nation-states and global politics, and sonic communities of artists, dissidents, and engineers all figure into our narratives in different ways, but considerable theorizing remains in thinking what the implications are in choosing such scales-of-study. And fourth, what are the temporalities of tape and how are those temporalities contingent on the kinds of data tape stores? Temporality figures more prominently here than other more common tropes of tape – again, such as circulation – but that temporality already seems medium-specific: the temporality of a Beethoven symphony on tape is different from a surreptitiously recorded underground concert, both of which in turn differ considerably from hours-long recordings of telephone lines. Pause. Stop? Fast forward.

Bibliography

Abraham, Otto and Erich von Hornbostel. 'Über die Bedeutung des Phonographen für die vergleichende Musikwissenschaft'. *Zeitschrift für Ethnologie* 36/2 (1904), 222–36.

Adorno, Theodor W. 'Opera and the Long-Playing Record', trans. Thomas Y. Levin. *October* 55 (Winter 1990), 62–6.

——. *Current of Music: Elements of a Radio Theory*, ed. Robert Hullot-Kentner. Cambridge: Polity, 2009.

Algar, Hamid. *Roots of the Islamic Revolution in Iran*. Oneonta, NY: Islamic Publications International, 2001.

Ampex Electric Corporation. *Instruction Book: Model 200A Magnetic Tape Recorder*. San Carlos, CA: Ampex Electric Corporation, no date (*c.* 1948).

Bashe, Charles J., Lyle R. Johnson, John H. Palmer, and Emerson W. Pugh. *IBM's Early Computers: A Technical History*. Cambridge, MA: MIT Press, 1986.

Berliner, Emile. 'The Gramophone: Etching the Human Voice'. *Journal of the Franklin Institute* 75/6 (June 1888), 425–46.

Bernstein, David W., ed., *The San Francisco Tape Music Center: 1960s Counterculture and the Avant-garde*. Berkeley: University of California Press, 2008.

Born, Georgina. *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Avant-Garde*. Berkeley: University of California Press, 1995.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

Brady, Erika. *A Spiral Way: How the Phonograph Changed Ethnography*. Jackson: University Press of Mississippi, 1999.
Bruck, Eugene. Liner notes to *Sounds of New Music*, LP, Folkways Records, FX6160, 1957.
Bull, Michael. *Sounding Out the City: Personal Stereos and the Management of Everyday Life*. Oxford and New York: Berg, 2000.
Carlos, Wendy. Liner notes to *Switched-On Bach 2000*. CD, Telarc, CD-80323, 1992.
Connor, Steven. *Beckett, Modernism and the Material Imagination*. Cambridge: Cambridge University Press, 2014.
Daniel, Eric D., C. Denis Mee, and Mark H. Clark, eds. *Magnetic Recording: The First 100 Years*. Piscataway, NJ: IEEE Press, 1999.
Daughtry, J. Martin. 'Acoustic Palimpsests and the Politics of Listening'. *Music and Politics* 7/1 (2013). http://quod.lib.umich.edu/m/mp/9460447.0007.101/–acoustic-palimpsests-and-the-politics-of-listening?rgn=main;view=fulltext (accessed 30 June 2016).
Denning, Michael. *Noise Uprising: The Audiopolitics of a World Music Revolution*. London: Verso, 2015.
DeRouchey, Bill. '1887: Pushbuttons in the Times archives', *Push Click Touch*. Blog, 16 June 2008. www.pushclicktouch.com/blog/?p=219 (accessed 30 June 2016).
Edison, Thomas. 'The Phonograph and Its Future'. *The North American Review* 126/262 (May–June, 1878), 527–36.
Engel, Friedrich. *Zeitschichten: Magnetbandtechnik als Kulturträger*. Potsdam: Polzer Media Group, 2008.
Engh, Barbara. 'After "His Master's Voice": Post-Phonographic Aurality'. PhD diss., University of Minnesota, 1997.
Ernst, Wolfgang. 'Dis/Continuities: Does the Archive Become Metaphorical in Multi-Media Space?', in *Digital Memory and the Archive*. Minneapolis: University of Minnesota Press, 2013. 113–40.
——. *Im Medium erklingt die Zeit: Technologische Tempor(e)alitäten und das Sonische als ihre priviligierte Erkenntnisform*. Berlin: Kadmos, 2015.
Fickers, Andreas. 'Visibly Audible: The Radio Dial as Mediating Interface', in *The Oxford Handbook of Sound Studies*, ed. Trevor Pinch and Karin Bijsterveld. Oxford: Oxford University Press, 2011. 411–39.
Gitelman, Lisa. *Always Already New: Media, History, and the Data of Culture*. Cambridge, MA: MIT Press, 2006.
Hirschkind, Charles. *The Ethical Soundscape: Cassette Sermons and Islamic Counterpublics*. New York: Columbia University Press, 2006.
Hodges, Andrew. *Alan Turing: The Enigma*. New York: Simon and Schuster, 1983.
Horning, Rob. 'The Death of the Hipster', *Pop Matters*, 13 April 2009, www.popmatters.com/tools/print/72950/ (accessed 15 June 2016).
Hosokawa, Shuhei. 'The Walkman Effect'. *Popular Music* 4 (1984), 165–80.
Jay, Martin. 'The Scopic Regimes of Modernity', in *Vision and Visuality*, ed. Hal Foster. Seattle: Bay Press, 1988. 3–23.
Katz, Mark. *Capturing Sound: How Technology Has Changed Music*. Berkeley: University of California Press, 2004.
Kind-Kovacs, Friederike and Jessie Labov, eds. *Samizdat, Tamizdat, and Beyond: Transnational Media During and after Socialism*. Oxford and New York: Berghahn Press, 2013.
Kittler, Friedrich. *Gramophone, Film, Typewriter*. Trans. Geoffrey Winthrop-Young. Stanford: Stanford University Press, 1999.
——. Interview. 'Friedrich Kittler – Warum Pink Floyd?'. Vimeo video, posted by Markus Heidingsfelder, 25 November 2012. https://vimeo.com/54235974 (accessed 15 June 2016).
——. 'Preparing the Arrival of the Gods', in *Kittler Now: Current Perspectives in Kittler Studies*, ed. Stephen Sale and Laura Salisbury. Cambridge: Polity, 2015. 95–112.
Kursell, Julia. 'A Gray Box: The Phonograph in Laboratory Experiments and Fieldwork, 1900–1920', in *The Oxford Handbook of Sound Studies*, ed. Trevor Pinch and Karin Bijsterveld. Oxford: Oxford University Press, 2011. 176–97.
Lastra, James. 'Reading, Writing, and Representing Sound', in *Sound Theory/Sound Practice*, ed. Rick Altman. New York: Routledge/AFI, 1992. 65–86.
Manuel, Peter. *Cassette Culture: Popular Music Technology in North India*. Chicago: University of Chicago Press, 1993.
Martland, Peter. *Since Records Began: EMI – The First 100 Years*. London: Batsford, 1997.
Miller, Flagg. *The Moral Resonance of Arab Media: Audiocassette Poetry and Culture in Yemen*. Cambridge, MA: Harvard University Press, 2007.
——. *The Audacious Ascetic: What the Bin Laden Tapes Reveal About al-Qa'ida*. New York: Oxford University Press, 2015.
Monson, Ingrid. 'The Problem with White Hipness: Race, Gender, and Cultural Conceptions in Jazz Historical Discourse'. *Journal of the American Musicological Society* 48/3 (1995), 396–422.
Moseley, Roger. 'Digital Analogies: The Keyboard as Field of Musical Play'. *Journal of the American Musicological Society* 68/1 (Spring 2015), 151–228.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press

——. *Keys to Play: Music as a Ludic Medium from Apollo to Nintendo*. Oakland: University of California Press, 2016.
Mulvey, Laura. *Death 24x a Second: Stillness and the Moving Image*. London: Reaktion Books, 2006.
Novak, David. *Japanoise: Music at the Edge of Circulation*. Durham: Duke University Press, 2013.
Osborne, Richard. 2013. *Vinyl: A History of the Analogue Record*. London: Routledge, 2013.
Phillips, William B. 'Data Storage on Tape', in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark. Piscataway, NJ: IEEE Press, 1999. 254–60.
Porcello, Thomas. '"Tails out": Social Phenomenology and the Ethnographic Representation of Technology in Music-Making'. *Ethnomusicology* 42/3 (1998), 485–510.
Rice, Timothy. *May It Fill Your Soul: Experiencing Bulgarian Music*. Chicago: University of Chicago Press, 1994.
Ro, Ronin. *Prince: Inside the Music and the Masks*. New York: St Martin's Press, 2011.
Savage, Mark. 'Born to Redo It: Craig David on His "Crazy" Career Revival'. *BBC News*, 4 Feb. 2016. www.bbc.com/news/entertainment-arts-35483863 (accessed 15 June 2016).
Sayers, Jentery. 'How Text Lost Its Source: Magnetic Recording Cultures'. PhD diss., University of Washington, 2011.
Sreberny-Mohammadi, Annabelle and Ali Mohammadi. *Small Media, Big Revolution: Communication, Culture and the Iranian Revolution*. Minneapolis: University of Minnesota Press, 1994.
Sterne, Jonathan. *The Audible Past: Cultural Origins of Sound Reproduction*. Durham: Duke University Press, 2003.
——. 'Enemy Voice'. *Social Text* 25/3 (2008), 79–100.
——. *MP3: The Meaning of a Format*. Durham: Duke University Press, 2012.
Stoker, Bram. *Dracula*. London: Penguin Classics, 2010 (1897).
Taruskin, Richard. *Music in the Late Twentieth Century: The Oxford History of Western Music*, Vol. 5. Oxford: Oxford University Press, 2010.
Touré. *I Would Die 4 U: Why Prince Became an Icon*. New York: Atria, 2013.
Tewksbury, George E. *A Complete Manual of the Edison Phonograph*. Kent: G.L. Frow 'Salterns', 1897.
Ussachevsky, Vladimir. 'Notes on a Piece for Tape Recorder'. *Musical Quarterly* 46/2 (Apr. 1960), 202–9.
——. 'Sound of Hell: Score for Film Version of No Exit'. *Newsweek* 60 (10 Dec. 1962), 86.
Walker, Benjamen and Alix Lambert. 'Loud and Clear'. *99% Invisible*. Podcast, episode 214, May 24, 2016. http://99percentinvisible.org/episode/loud-and-clear/ (accessed 15 June 2016).
Watkinson, John R. 'The History of Digital Audio', in *Magnetic Recording: The First 100 Years*, ed. Eric D. Daniel, C. Denis Mee, and Mark H. Clark (Piscataway: IEEE Press, 1999). 110–23.
Winthrop-Young, Geoffrey. 'Undead Networks: Information Processing and Media Boundary Conflicts in *Dracula*', in *Literature and Science*, ed. Donald Bruce and Anthony Purdy (Atlanta: Rodopi, 1994). 107–29.

https://doi.org/10.1017/S1478572217000032 Published online by Cambridge University Press