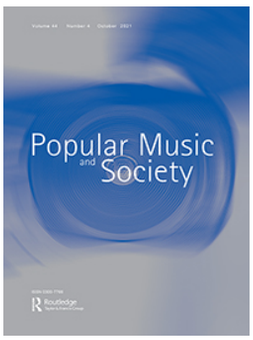

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Paul Harkins: and Nick Prior: (Dis)locating Democratization: Music Technologies in Practice

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ABSTRACT

This article examines the concept of democratization and explains why it has been applied in unhelpful ways to the study of music. We focus on three examples to illustrate the real-world complexities involved in the adoption of new technologies that are often seen as democratic by dint of their widespread use. We argue for a close-reading of the participatory practices of socially-located actors with music-making devices – one that asks detailed questions about who is participating, how, and under what socio-economic conditions. We finish with a call to move beyond the term democratization to an application that is specific to the field of popular music.

KEYWORDS

Acid house; democratization; digitalization; grime; hip-hop ; popular music; technologies

According to the sociologist and literary critic, Raymond Williams, the modern practice of democracy combines two ideational strands: socialist notions of popular power, where the interests of the people are paramount, and liberal notions of representativeness, embodied in the parliamentary election and rights such as free speech. More recently, the term "democracy" has become a rather baggy and idealized aspiration toward a vague leveling of hierarchies and the move toward a more open, accessible, and equal state of affairs – not just in polity, but in the domains of society and culture generally. Hence, from the community arts movement and other grassroots arts activism to the shaping of modern cultural policy and governance, the idea of cultural democratization remains an attractive umbrella term to capture a generalized spreading of culture for all, by all (Jeffers and Moriarty).

The roots of the term "democratization" (as opposed to the more ancient term "democracy") are to be found in the work of US political scientists in the second half of the twentieth century and the idea that a growing economy and increasing levels of wealth within a society leads to greater levels of democracy. In 1959, Seymour Martin Lipset outlined how "the more well-to-do a nation, the greater the chances that it will sustain democracy" (75). The idea of democratization as a linear process, on the other hand, can be traced to the work of Samuel Huntington and his 1991 book, *The Third Wave: Democratization in the Late Twentieth Century*. The date of publication is significant; it is two years after the fall of the Berlin Wall and Francis Fukuyama's essay, "The End of History?" (1989), in which he promoted the idea of liberal democracy's

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eventual victory over communism and other forms of authoritarianism. Huntington describes how since 1974, "the movement towards democracy seemed to take on the character of an almost irresistible global tide moving from one triumph to the next" (21). Despite what he refers to as "resistance and setbacks" such as the events in Tiananmen Square in 1989, recurring waves of democratization will result, Huntington suggests, in the global dominance of free markets and liberal democracy.

In the academic field of popular music studies, scholars interested in diagnosing the changing state (and fate) of popular music have been drawn toward democratization as a way of making sense of wholesale transformations in how music is made and by whom, together with shifts in the music industries (Williamson and Cloonan) such as the growth of the "independent" movement, stylistic diversification, and a widening of the social composition of fans and audiences. Whole genres, such as skiffle, punk/post-punk, and dance music, have been characterized as "democratic" as a result of what some authors argue to be widening participation among nonspecialist producers (Toop), while processes of democratization are often specified as a corollary to, if not driven by, the advent of new technologies. Hence, Goodwin argues that the availability of cheap recording gear in the 1980s – from sequencers and drum machines, to electronic keyboards and samplers – broadened the very concepts of musician and music. While at an organizational level, for Hesmondhalgh, the "explosion of small, independent record companies in Britain since the dance music boom of the late 1980s" (235) certainly failed to directly challenge the corporate dominance of the British music business, it nevertheless heralded a radical decentralization of the recording industry. Indeed, for Hesmondhalgh, dance music represents a "tentative" intervention in the politics of distribution and production partly because of the "DIY appropriation of relatively inexpensive digital technology" (237), albeit one tempered by the close, enduring links between the majors and the independent labels.

Over the last two decades, the widespread availability of virtual-studio technologies, music-making apps, and games consoles has given these arguments additional impetus. Here, cultural democratization is part of a larger set of transformative conditions related to the advent of speedy, late-capitalist, high-tech conditions that have further blurred boundaries between amateur and professional, producer and consumer, fan and critic. Hence, for Durant, the advent of "relatively cheap, digitally-based musical 'instruments'" (182) and processes such as sequencing and multi-tracking not only ushered in new modes of music making but also a re-structuring of musical literacies and a spreading of technical knowledge beyond the domain of the studio-based professional. DIY, it follows, reflects a new mode of production, where cultural hierarchies are re-drawn and a new openness to a flatter, more open, and inclusive field of popular music has emerged. Add to this the advent of widely accessible, "user-friendly" digital audio workstations (DAWs) like GarageBand, peer-to-peer software, and the affordances of the MP3 file and one is left with the impression that something like a technology-led wave of democratization in music production, distribution, and consumption has profoundly leveled the playing field, reaching its apotheosis (perhaps even terminus) with the so-called "digital age" or "digital era" (Blake). Rather than engage in sweeping and extravagant statements about digital transformations that have more in common with "presentist" advertising jargon (where novelty is the *raison d'être* of the whole industry), it is better to describe in detail the practices that accompany the adoption and use of digital technologies.

While not simply dismissing them as lacking analytical or diagnostic power, this article sounds out a cautionary note for popular music scholars looking to employ terms like "democracy," "democratization," and "digitalization." The loose deployment of these terms to identify technology-led shifts in music making – where the "digital" becomes a short-hand for a flattening of hierarchical structures of genre, access, and production – elides socio-musical change as an uneven and gradual process. Indeed, we will argue that such terms lack precision, often fusing together a number of messy and poorly understood processes that need to be disentangled in empirical settings and which raise a number of questions related to cost, education, know-how, and access that are irreducible to mere technological availability. These processes are, in turn, inseparable from broader social structures, hierarchies, and inequalities, not least in terms of who is making music and in what kinds of social conditions. In short, we need to treat these terms with suspicion and subject them to critical scrutiny.

We focus on three cases – the availability and use of the E-mu SP-12 sampling drum machine in hip-hop, the Roland TB-303 Bass Line synthesizer, and the rise of acid house, and the use of music-production software, such as GarageBand and the Sony PlayStation's Music 2000 in grime – to illustrate the need for an examination of the specific, situated, and localized settings in which musical practices take place. As cases, they are chosen not because they stand in for the totality of instances in the general population; nor do they shut down further possibilities for exploring the take up and use of music technologies in specific, local circumstances. Indeed, had the article focused on other examples, such as the electric guitar in punk, the washboard in skiffle, or the Game Boy in chiptune music, different conclusions may well have been drawn. But, this is partly the point, that critical scrutiny of particular cases yields detailed information irreducible to broad-sweeping processes like democratization. Rather, the cases illustrate discursively powerful assumptions about cost, availability and widespread use in a range of literatures – journalistic accounts, in particular – but also in academic texts and commentaries on popular music.

The article, therefore, makes a double move: firstly, it seeks to dislocate democratization by subjecting it to critical scrutiny – twisting it out of joint in order to reveal its discursive power and identifying how and where it gained historical traction; secondly, it calls for re-locating these processes in specific instances, describing in detail how situated actors with classed, raced, and gendered bodies experience and enter into local practices with instruments and devices in often unpredictable and contingent ways.

The article takes as its leave of departure broad characterizations of the democratization of popular music that rest, in the last instance, on evolutionary, smooth, and linear narratives. At the very least we need to know what exactly is being "democratized," for whom, and with what consequences? Is it because the devices have become "less expensive"? If so, what does expensive mean in relation to relative income and earnings among particular demographic groups? How does this articulate with other resources such as knowledge, technical capital, expertise, and "free time"? The article finishes with a call to move beyond the term democratization in its normative and idealized sense to an application that is specific to the field of popular music. This is to closely examine exactly who buys, owns, and uses instruments and to see musical

technologies less as discrete artifacts with the inherent agency to "open up," but as bundles of relations that are activated in everyday practices which are themselves shaped by "amalgams of social, cultural, and economic factors" (Pinch and Bijsterveld 638).[1]

Availability, Affordability, and Access: The E-mu SP-12 and Its Use in Hip-Hop

One of the places where the concept of democratization enters the discourse around music technology is the writings of the engineer and inventor of the Moog synthesizer, Robert Moog. In an article for *Keyboard* in October 1985 to celebrate the tenth anniversary of the magazine, Moog presents a recent history of developments in synthesizer technology. He uses the term democratization when explaining how the price of microprocessor-controlled synthesizers had decreased over the last ten years, were now available in a larger number of retail outlets, and were owned by many more musicians. Within the field of popular music studies, Paul Théberge has been one of the few scholars to question these kinds of claims. Drawing on C. B. Macpherson's theories of democracy, Théberge distinguishes between theories that privilege the individual as a consumer with freedom to choose available utilities and those that emphasize the inalienable rights of individuals to develop their own abilities. Théberge writes that Moog's idea of democratization is related to "the market concept of democracy. It assumes that the cheaper technology becomes and the more available to the average consumer, the more democracy has succeeded in the equitable distribution of utilitarian satisfactions" (149). This economistic way of characterizing consumption tends to assume an autonomous, freely choosing, "rational" agent in a market of goods based on economic criteria only, such as cost.

We want to continue and build on Théberge's critique of democratization by showing how this discourse about the availability of cheaper technologies leading to a larger number of users has also been applied to the development and use of digital technologies including samplers. The discourse of democratization also merges with the concept of digitalization and assumptions that ways of doing things with analogue technologies are quickly replaced with practices shaped by digital systems and processes. Launched by E-mu Systems in 1981, the Emulator cost $9,995 [US] and is often referred to as "the first affordable digital sampler" (Vail 220). The price of samplers was decreasing throughout the 1980s, leading some scholars and journalists to suggest there was an abrupt shift toward the use of digital technologies. Justin Morey argues that "with the launch of equipment such as the Ensoniq Mirage, Akai S900, and E-mu SP-12 . . . access to digital sampling became a reality for aspiring musicians and producers" (21). Using the SP-12 as a case study, we will show how a technology that was assumed to be more affordable did not become widely used by producers in the socio-musical communities of hip-hop or feature in the production of records with which it is associated. Along with falling costs, for example, the adoption of digital samplers in the production of hip-hop in the mid-to-late 1980s was shaped by other sociological factors. The use of the SP-12 by hip-hop producers and the more widespread use of a later version, the SP-1200, had as much to do with the advances being paid to hip-hop artists signing contracts with record labels at this

time.[2] Other producers saved money from part-time jobs or received gifts and second-hand equipment from family members (Schloss), and, in some cases, took advantage of credit facilities to buy samplers.

E-mu launched the SP-12 twelve-bit sampling percussion system in 1985. In the UK, the recommended retail price was £2995 plus an additional £500 for a Turbo version (Wiffen and Scott). In the US, it was $2,745 for the standard version and $3,550 for a Turbo version (Oppenheimer). A 12-bit device that enabled users to sample their own drum sounds or other sounds that could be used for percussion, the standard version included 1.2 seconds of sample time. The Turbo version included five seconds, though this was distributed across two memory banks with a maximum sample time of 2.5 seconds each. Applying the discourse used to sell synthesizers to the marketing of digital drum computers, E-mu stated, "Virtually anything you can imagine can be sampled into battery backed up memory" (E-mu, "March"). Joseph Schloss reports how those hip-hop artists who could access or acquire one "were soon using the machine to sample not their own drumming, but the sound of their favourite recorded drummers, such as Clyde Stubblefield from James Brown's band or Zigaboo Modeliste of the Meters" (35). However, until the launch of the later version, the SP-1200 in 1987, there is little evidence that the SP-12 was widely used in the making of hip-hop records.

To understand the extent to which the E-mu SP-12 and other sampling drum machines were being used by hip-hop producers in the mid-1980s, we need to know who had access to these technologies and how affordable they were. The introduction of new sampling products by companies such as E-mu as well as Ensoniq, Akai, and Casio resulted in lower prices – Ensoniq introduced the Mirage sampling keyboard in December 1984 for $1,695 [US] – but the extent to which their use had become widespread may have been exaggerated. In his 1985 *Keyboard* article, Moog wrote, "like the democratized polyphonic synthesizers that influenced the musical instrument market because of their attractive prices, the Mirage brings basic sampling capabilities to thousands of eager musicians at a price where no such instrument had existed before. And costs continue to plummet" (46). Affordability is relative, though, and applies differently to "relevant social groups" including African-Americans living in less affluent inner-city areas in the 1980s. Schloss has explained how these technologies were still too expensive for many, particularly hip-hop DJs and producers living in New York housing projects. He writes that the E-mu SP-12 was "well beyond the budget of most inner-city teens" (30) and data supports this. Statistics from the Bureau of Labor Statistics show that in 1985 the annual weekly earnings for African Americans was $277 or $14,404 per year (Bureau of Labor Statistics). In *Black Noise*, Tricia Rose provides a detailed discussion about the urban context of hip-hop production in the 1980s. These include social policies and events in the 1960s-1970s that led to New York and the South Bronx being defined in the US as "national symbols of ruin and isolation" (33). More "affordable" sampling instruments like E-mu's SP-12 and Ensoniq's Mirage meant that digital sampling did become available to more potential users but questions remain about how accessible they were and how much leveling actually took place because of the socio-economic contexts of music-making.

We want to suggest, then, that Moog's argument about "affordability" being a form of democratization because the technologies were now available to everyone is too simplistic and not supported by empirical evidence. For instance, in an interview, KRS-One of

Boogie Down Productions (BDP) suggests ownership of the SP-12 was still uncommon within less affluent socio-cultural communities and highlights this when describing how "South Bronx" from *Criminal Minded* (1987) was produced:

> I performed [the verses] for Scott [La Rock], he played the "Funky Drummer", and started in on the song . . . So, we ran over to Ced-Gee's house and were like: "Yo, Ced, we need that SP-12." Keep in mind that at that time Ced-Gee was the only person in the Bronx with an SP-12, and he was the absolute man. So, he lent us the sounds, the kick, the drum, the snare, the hi-hat. Scott took his records over to Ced and Ced sampled them and made the beat for "South Bronx". Scott did the drums and Ced chopped it up. (qtd. in Coleman 82)[3]

It is impossible to know *how many* SP-12s existed in the Bronx at this time, but the above quotation suggests they were scarce as hip-hop users borrowed them from owners who were well connected and therefore rich in social capital (Bourdieu and Wacquant). What was also in limited supply was specific knowledge about how to sample sounds from preexisting recordings, which is why a producer like Ced Gee was also relied upon to program the instrument. With only 1.2 seconds available to users of the standard version of the SP-12, *Criminal Minded* contained samples of only a short length. On "Poetry," the scratching of vinyl on turntables is accompanied by snatches and shrieks from a James Brown recording. "Dope Beat" features guitar riffs from AC/DC's "Back in Black." The limited sample time meant users were reproducing drum sounds such as those from Clyde Stubblefield's solo on "Funky Drummer," but complete breakbeats could not yet be sampled and looped. Along with price, the technical constraints or, to use James J. Gibson's term, the "affordances" of the SP-12 was another one of the reasons for its nonuse by hip-hop producers.[4]

Instead of a sudden shift toward digitalization taking place in the mid-1980s due to lower prices, analogue technologies like magnetic tape, turntables, and vinyl continued to be used in the production of hip-hop. Released in 1986, the Beastie Boys' *Licensed to Ill* contained complete drum breaks from recordings such as Led Zeppelin's "When the Levee Breaks." Some journalists assumed that the preexisting sounds on the album were reproduced using an SP-12. Angus Batey writes,

> Like much of the hip-hop of the time, [*Licensed to Ill*] relies on a selection of beats concocted on machines like the legendary SP-12, a drum machine that allows the programmer to construct original percussive patterns using sampled drum sounds. . . . Still a relatively new tool in the mid-1980s, the SP-12 was behind most of the major stylistic advances in hip-hop music prior to the advent of cheap samplers with long sample times. (40)

In fact, the drum sounds from "When the Levee Breaks" were repeated by recording and looping them using magnetic tape.[5] Those involved in the engineering of the album, were relying on established skills that had been part of the process of record production since the 1960s. The use of magnetic tape to loop and repeat excerpts from preexisting recordings was still an important practice in hip-hop in the mid-1980s along with other technologies like turntables. All of which is to say, that rather than accepting arguments that the wider availability and lower costs of digital samplers automatically resulted in greater affordability and more accessibility, we need to introduce a more nuanced historical account about the extent to which sampling technologies like the SP-12 were used (and not used) in the development of hip-hop. This requires acknowledgment of the more complex, situated, and contingent ways that technologies are used in practice than arguments about democratization and music technologies often suggest.

If the SP-12 failed, in the sense that it did not become widely used by hip-hop producers, it was because of the lack of sample time as well as its cost. The designers and marketers at E-mu realized that users were disregarding its built-in drum sounds and wanted more RAM to sample their own sounds. In 1987, E-mu released an updated version, the SP-1200. Available in the UK for £2199 (Mellor), E-mu's adverts promised "a full 10 seconds of sampling time." However, as sample time was distributed across four banks that each stored eight sounds, the maximum length of samples was still only 2.5 seconds. Its use by hip-hop producers was the result of contingency rather than E-mu's marketing strategy. Director of Marketing, Marco Alpert, explains,

> I designed the user interface for the SP-1200, and while I would like people to think I was prescient as to think it would be a cool tool for rap and hip-hop people, it was totally by accident. None of us had any idea that what we were doing would be used in that particular way. But people loved that interface. The SP-1200 was very approachable and intuitive and immediate. And then we couldn't even kill it. (qtd. in Milner 332)

Adopters of the SP-1200 in hip-hop valued its 12-bit fidelity levels at a time when 16-bit instruments were available. They also discovered ways of overcoming the "affordances" or technological constraints. Fixes were developed so that, where possible, users could sample an excerpt from a preexisting recording even though the length of a particular break was longer than the available sample time. Hank Shocklee, of Public Enemy's Bomb Squad, often sampled the sounds of preexisting recordings at the wrong speed. LPs designed to be played at 33 1/3 rpm were played at 45 rpm so that a longer excerpt could be sampled. The pitch of the sampled recording was then shifted downwards afterward. Shocklee described how "the way we stretched time, you lose a little fidelity that way. But back then, who cared about fidelity?" (qtd. in Milner 334). The designers of the SP-1200 were concerned about what they perceived to be the poor-quality sounds of the device. Scott Wedge of E-mu admitted, "It was okay for a drum machine, but it had cheesy pitch shifting. It got away from the fidelity and quality we aimed for" (qtd. in Milner 332). Hip-hop producers were more concerned with the amount of available sample time and inadvertently developed a "lo-fi" or "ghetto" sound that contrasted with the focus on fidelity and ideologies of improvement and progress that accompany the marketing of digital technologies.[6]

For Shocklee and other hip-hop producers like Pete Rock and The RZA of Wu-Tang Clan, the technological limitations of the SP-1200 contributed to its unique "feel" and it became their chosen instrument for sampling prerecorded sounds. The RZA explains how "[t]hat machine basically changed my life. Once again, I got it from, you know, malfunctioning – I got it maliciously. I put some money down on it and never continued to pay" (196). Highlighting how the SP-1200, like the SP-12, was still financially out of reach for some hip-hop producers, its success within this community was a surprise to its designers who could not understand why users embraced an instrument with fidelity levels they considered unsatisfactory. As well as experiencing manufacturing problems – it was difficult to find parts and expensive to produce – the designers at E-mu were also unhappy that the SP-1200 was used in hip-hop because of controversies around the genre and they eventually discontinued it in 1990. Scott Wedge explains, "We tried to stuff it back in the closet. Rap had a bad [reputation]. Politically, it was really ugly stuff. We kind

of pulled [the SP-1200] out of retirement, but then we learned that what it was being used for was this rap music, we went, 'Well, let's discontinue it, maybe that'll stop it'" (qtd. in Milner 332).

The instrument was being used by a social group in ways that were perceived to conflict with the countercultural image and hippie values that E-mu had tried to cultivate as a company since the 1970s. The "democratization" of digital sampling and the more widespread use of the SP-1200 among hip-hop producers rubbed up against the anti-democratic and elitist instincts of its designers at E-mu.[7] In a similar way to the technology we want to focus on next, the popularity of the SP-1200 among hip-hop producers was partly the result of users in musical communities ignoring the original design "flaws" of the instrument as perceived by its designers (poor fidelity) and coming up with fixes that overcame its "affordances" to enjoy more sample time and loop breakbeats in ways that became integral to the hip-hop esthetic of the late 1980s.

Democratization, Contingency, and the "Accident": Acid House and the Roland TB-303

In the case of the Roland TB-303 we are faced with a similar constellation of contingencies, mediated by user practices *in vivo* and *in situ*. Designed to emulate the sounds of a bass player, the TB-303 (TB stands for "Transistor Bass") was an analogue synthesizer released in 1982 by the Japanese electronics company, Roland. A slim, silver box with a single-octave keyboard and series of rotary knobs that modulated the sound, it was marketed primarily at guitarists who, the company hoped, would be interested in combining the bassline generating properties of the 303 with Roland's TR-606 drum machine to form a bass and rhythm accompaniment. Put another way, "scripted" into the unit was a set of assumptions about the user and certain expectations regarding its use.[8] In particular, the 303 was designed to be programmed using a step sequencer in order to generate bassline phrases, while the sound was to be shaped at the beginning of a session by adjusting the various tone knobs to generate the desired effect. It was encoded, in other words, as a device that would support musicians – especially guitarists – in performance and rehearsal mode as a more adaptable and flexible bass player. This is evident from the 90-page manual which describes it as a "an automatic Bass machine which can memorize the Bass line of a musical piece and replay it automatically" (, 1981 4).

Much to Roland's disappointment, however, the unit failed to sell in significant numbers and production was pulled after 18 months, despite retailing at the price of $215. This was undoubtedly cheaper than a lot of comparable gear: in 1983, a Tascam 244 Portastudio, for instance, cost around £650 ($430). But it was still undoubtedly beyond the financial capabilities of many musicians, including black urban musicians. Indeed, according to the U.S. Bureau of Labor statistics, median income among African-Americans in full-time work in the U.S. was around $245 per week in 1982, while it was much lower for the unemployed and those on welfare. It's not difficult to imagine the financial juggling that would have to have been carried out even by those on a decent wage to commit to buying a device of this nature, echoing the cost-based inequalities associated with the E-mu Emulator, SP-12, and other samplers mentioned

above. It is also worth saying, however, that cost and affordability are always complex calculations dependent on a mix of conditions, including employment, household size, debt, and housing. What is considered "affordable," in other words, is a matter of some complexity.

By the end of 1983, Roland had produced around 20,000 units but not many featured in songs of those early years. Those that did included some electro tracks by bands such as Mantronix, Heaven 17, Ice T, Newcleus and Section 25. Noteworthy, also, as Reynolds notes was Italo-disco producer Alexander Robotnik's "Les Problemes D'Amour," released in 1983, while Scottish band, Orange Juice's use of the device on the hit, "Rip It Up," also from 1983, hinted at its later use as a generator of the "squelchy" sounds characteristic of acid house. In general, though, by the mid-1980s, the 303 had yet to make much of an impact on popular music culture.

Why the failure? In addition to financial prohibitions (economic capital), the instruction manual gives some additional clues. For a device aimed at rock guitarists, the operation of the 303 was complex. To set out to program the instrument properly one had to have at least some knowledge of notation, music theory, and the architecture of tone. Even the manual admitted that "operating the TB303 may seem a little complicated . . . because it is so different from a bass guitar or a keyboard instrument" (, 1981 6) and offered three tutorials at basic, intermediate, and advanced levels. This was despite the fact that the 303 was a single oscillator synthesizer, with only two waveform options and a standard filter section. Commentators still talk about the "sprawling interface and cryptic programming language" that "prevented musicians from smoothly integrating it into their existing setups" (Hsieh). On the other hand, the sound produced by the 303 was not a particularly accurate emulation of a "real" bass guitar. Indeed, its mimicry lacked, according to early adopters, the "warmth" of its electric or acoustic referent.

It wasn't long, then, before customers began selling their units, and very quickly pawn shops and thrift stores throughout the world were receiving secondhand 303s. An advert from the British music magazine, *Sounds*, shows that by 1986, brand new 303s were being sold for under £100, while some musicians claim that shops were practically giving away the 303 as part of bundled deals or selling them for as little as £25. Testimony from one disgruntled musician reads: "I still hurt from the day in 1991 when I went around the second-hand shops of Dublin looking for a distortion pedal for my new guitar and I was offered a 303 for £25 . . . but I opted for a Boss Supradistortion instead" (qtd. in Whitwell).Notwithstanding the readiness with which musicians inhabit and perform narratives of "the one that got away," it's clear that by early 1985, demand for the 303 was patchy at best.

Soon after Roland had abandoned production of the 303, resourceful African-American musicians and DJs in Chicago and Detroit started acquiring the device as a means of making electronic music. This was despite the fact that, as Farley "Jackmaster" Funk put it, the 303 was already "an obsolete, old-fashioned piece of technology" (cited in Reynolds 25). Three such musicians were Herbert J, DJ Pierre, and DJ Spanky, a group of friends who made music under the name of Phuture, the latter having acquired a secondhand 303 for $40 – a modest cost compared to much music hardware, but which DJ Spanky reports cleaned him out financially (see Lawrence; interview with DJ Pierre, "20 Years").

In 1985 DJ Spanky had been messing around with a 303 in his bedroom when he started playing around with the tone-shaping knobs while it played bassline sequences. This was against Roland's recommendations and configuration of the 303 as a "set and play" device. Rather than setting the tone controls and leaving them in place, DJ Spanky had created a rich, intense, and searing sound by tweaking the cutoff, resonance, and other filter settings as the device was playing. As DJ Pierre recalls the moment, "I went over to [Spanky's] house, and he had a track playing with this crazy sound on it. . . . He didn't exactly know how to work it, but he liked the sound it was putting out. I agreed and proceeded to mess around with the knobs and stuff. We made a tape of it that day and got it right away to [the record producer] Ron Hardy" (qtd. in Hsieh). The track, *Acid Trax*, is commonly recognized as the beginnings of what was to become a whole new genre in electronic dance music, acid house, though the search for genre origins is always a perilous and somewhat reductive exercise. This is particularly so as histories are always contested, provisional, and being rewritten to recognize alternative and previously hidden (often post-colonial) accounts. In the case of acid house, there has been some discussion about the claims that Bollywood session musician, Charanjit Singh's album, *Synthesizing: Ten Ragas to a Disco Beat* was acid house *avant la lettre* (Pattison). A similar claim was recently made by Scottish musician Bill Drummond in a recent BBC documentary about the band Orange Juice's "Rip It Up." Certainly, it is important for popular music historians to avoid narratives from becoming overly neat and linear, eliding the mess and muddle of social and technological practices as well as their subsequent narrativization and mythologization.

As the story goes, however, bootleg versions of the track did the rounds in Chicago with the result that more and more people began seeking out the signature sound in record shops and, by the late '80s, acid house had become one of the first dancefloor movements to enjoy mass success in both Europe and America (Poschardt). In London, clubs like Heaven and Shoom were playing acid house tracks on the back of Ibiza reunion parties and the style (yellow smiley faces, bandannas, white t-shirts, and trainers) was quickly established in the UK. Suddenly, music was punctuated with squealing 303s and while bands like S'Express, 808 State, and A Guy Called Gerald enjoyed commercial success with the 303, its unique sound percolated into a range of dance-based genres, including acid techno, electro and, later, big beat. Fat Boy Slim's 1996 album *Better Living Through Chemistry* even featured a track called "Everybody Needs a 303" that played homage to the instrument.

But back to DJ Spanky's bedroom, because what might be considered the democratic repurposing of the device was the result of the extemporizing body, the resourceful body that makes do and, while "making do," makes (De Certeau). The acid squelch was a contingent action that edged away from the intentions of the developer. Minor fluctuations in the tweaking of the device amongst young, amateur black musicians based in the suburbs of Chicago was one of a number of processes and conditions (including, as we will argue below racialized systems and structures of ownership) that helped to instigate developments to the genre, which in turn fed into and off a broader set of social, industrial, and political effects in unexpected ways. It was, after all, the sound of the 303, along with the distinctive sounds of classic drum machines, that by the late 1980s inspired an active party scene, recruiting dancing bodies into the ludic sonic spaces of raves and nightclubs. In the UK, this sparked a widespread moral panic, eventually giving

rise to the Entertainment (Increased Penalties) Act, designed in a moment of Thatcherite authoritarian-populism, "to increase the punishment for party organizers, a move that was critical in reducing the number and scale of these events" (Hill 89). Indeed, the sound of the 303 was particularly conducive to a step-level intensification of sound characteristic of the drug-enhanced experiences of ravers and their imaginary dreamscapes. Its expressiveness helped to keep the crowd "up" more than a kick drum alone. This expressiveness, however, was bound up with a series of contingencies – not just the small variations in the finger actions of music-making bodies, but on black amateur musicians "getting by" as best as possible within broader constraints. It is said that musicians found the unit so hard to program that the sequenced patterns would sound nothing like how the musicians intended them and workarounds were found to make programming easier. A common "hack" was taking the batteries out for a certain period and reinserting them so that the patterns in the memory began to vary in random ways, giving rise to the quasi-random sounds associated with acid house (Brewster and Broughton).

In a way we struggle to find the right language and concepts to account for this: certainly, the flood of cheap gear into the secondhand market gave the 303 a new lease of life. Cost was, however, a necessary but not sufficient condition for its take up. We have to recognize the intersection of situated, urban actors engaging – often in an improvisational mode – with specific devices which have their own properties, but which are extended in everyday practices. In other words, the machine-body encounter is singular and contingent. It emerges through specific conditions that are irreducible to either industry-level, financial, or technological conditions, but do certainly include them.

It is clearly the case that the subsequent marketing of acid house was tied up with field-specific properties of different parts of the music industries, the gatekeeping role of Ron Hardy, as well as racialized structures of ownership and profit maximization. Indeed, as with other genres like hip-hop (Negus), very few of the black musicians associated with acid house were particularly well compensated for their pioneering work. In 2020, some musicians even launched legal efforts to indemnify funds from the record label, Trax, whose white executive, Larry Sherman, was accused of exploitative and discriminatory business practices (Dowling). In this sense, institutionalized and systemic forms of racism, including the exclusion of black personnel from positions of power, temper any benefits afforded by "cheap" and "democratic" technology. On the other hand, without the phenomena of the tweak, without a programming "accident" acid house would not have taken off – there would have been nothing to commercialize.[9]

It is the co-production of action through technology and the socially-located body that is at stake here, then, and rather than short-circuit the account as a process of democratization *tout court*, it would be preferable to invite detailed description of the musician's body as it encounters technology in society and to recognize how and why "users matter" in any account of the democratization of music technology (Oudshoorn and Pinch). They matter because they constantly find unexpected uses for new and old instruments without any developed idea of what they may sound like. Indeed, over 35 years after its initial introduction, the 303 is still being twisted, extended, and kept alive by remaining users and fans totally unconnected to the corporation that originally designed it. Its release, in 1996, as one of the first VST (virtual studio technology) plug-ins, in the form of Propellerhead's Rebirth, gives a new twist to the story, not least because it meant that

a new generation of musicians had begun working with a digital simulation without ever having known the hardware version, and at a fraction of the price. Eventually, the software was made available for free as a download, before recently being discontinued, joining the informational flow of post-material goods within networks of digital culture and raising complex questions about the nature and extent of democratization in the "digital age." It is to these questions that we now turn.

Democratization and the Digital Era: Grime and "The PlayStation Generation"

At the beginning of his 2001 book, *Strange Sounds*, Timothy Taylor suggests that "the advent of digital technology in the early 1980s marks the beginning of what may be the most fundamental change in the history of Western music since the invention of music notation in the ninth century" (3). Digitization, for Taylor, as for many commentators over the last two decades, represents nothing short of a watershed moment in how music is produced, stored, and consumed. Just as the era of the fluid, non-degradable perfect digital copy has undermined the ability of a centralized recording industry to control music content (a shift in power to the networked consumer that was to reach its zenith with Napster), so what gets made, and by whom, has been opened up with the advent of software studios, virtual studio technologies, and Internet protocols (Leyshon). The "digital age," from this perspective, has intensified and accelerated processes of democratization, leading not just to a further flattening of hierarchies in culture at large (for instance between high and low culture), but to a rapid dissolution of prohibitive barriers to making music and participating in music cultures (Covach).

Capturing the essence of this latest phase of democratic cultural production is, for Ritzer and Jurgenson, one that requires a change in terminology. The advent of user-generated content (or what was once termed "Web 2.0") has undermined hard distinctions between production and consumption, giving rise to what the authors call "prosumer capitalism" (13). The whole economic system, in other words, has been transformed to cater for the generation of increasingly abundant, free content among increasingly active publics. Seemingly mundane digital practices, such as liking, tagging, composing playlists, generating mashups, tweeting live sets, uploading lyrics, writing live reviews, contributing to internet forums, and so on, are part of a hugely kinetic system of demotic creativity, according to this view. Indeed, for Jenkins et al., the shift to digital circulation "signals a movement toward a more participatory model of culture" (2) in which the public does not simply consume prepackaged messages but actively shapes, shares, remixes, and reframes media content; and while there is certainly debate over whether this constitutes anything more than the generation of endless free labor and content for the new platform capitalists – Google, Facebook, Apple, Amazon (Terranova) – many argue that digital media, nevertheless, bring about a generalized opening up of creative practices and a "reimagining of cultural and political participation" (Jenkins, Ford, and Green 3).

As far as music making is concerned, a key component of this shift concerns access to and ownership of the tools of cultural production. Here, it is argued, the era of the professional, high-value, physical studio and its expensive instruments has been usurped by the rise of software studios and associated digital devices like laptops and, more

recently, gaming consoles and smartphones. Critics and scholars have written in optimistic, even utopian, terms about the availability of cheap digital audio workstations, games, and apps that have reconfigured the kinds of expertise needed to compose, mix and master songs, thereby reducing barriers to music-making among wider communities (Durant; Goodwin). While such optimism was more prevalent in scholarly work in the late 1980s and '90s, more recently, authors like Leyshon have identified the rise of the software studio as de-privileging the recording studio, lowering economic barriers to production and making possible "a regime of more distributed musical creativity, which represents a democratization of technology" (1326). Here, it is no longer necessary for musicians to hire out expensive recording studios, rely on orthodox channels of music distribution, or require the backing of a major label. Instead, the "new amateurs," accompanied by their powerful tools of digital composition and connection, are empowered to compose in their bedrooms or on the move, to collaborate with diverse others, and to bypass the increasingly outmoded music industries in order to disseminate their music (Prior; Théberge).[10] Or as Ryan and Hughes put it,

"It is clear that what has occurred is a phenomenal democratization of recorded music production, as the mainstream commercial industry is not so much replaced as circumvented by thousands of musicians" (243).

While it is certainly true that, as Savage notes, the advent of software studios like GarageBand – which is shipped free as part of Apple's operating system and comprises a relatively simple and stripped down interface, with a library of loops – potentially puts tools of enormous compositional power in the hands of producers, it does not necessarily follow either that it is technology that "drives creativity" (163), nor that participatory social and musical practices point to the advent of a democratic era that heralds "more optimistic views on the interconnectivity of larger populations with musical content creation," as Savage puts it (159). Technologies are always embedded and do nothing in isolation from social processes and patterns. Still, it would be short-sighted not to recognize how emergent music-making communities, particularly those located in poor and disadvantaged urban neighborhoods, have successfully appropriated these tools and twisted them in practice.

When Dylan Mills, aka Dizzee Rascal, won the Mercury Prize with his debut album, *Boy in Da Corner* (2003), he said in his acceptance speech, "I come from the PlayStation generation, making music and beats on anything we can" (qtd. in "Dizzee"). Mills was a member of Roll Deep Crew, one of many collectives that had been forming across London, particularly in areas of the East End like Bow, Poplar, and Limehouse. One of the ways in which its young producers were making what became known as grime was with the software Music 2000 that came with the Sony PlayStation. The following year journalists were proclaiming a major shift in cultural production using the discourse of revolutionary change and technological democratization. In *The Independent*, Kevin Braddock wrote,

> A fundamental shift is occurring in British music culture. And it's not just the way music is being made that's changing; so too are the people making it. It's a sound coming from the imaginations of the first generation to have grown up surrounded by digital technology – from gaming consoles and computers to mobile phones, CD burners and MP3 players. Today, any teenager with a few pounds and a good idea can become a star from their own bedroom. Technology has made it possible to compose and record a song on a standard PC,

> or a Sony PlayStation gaming console, burn the track on to a rewritable CD, pass it to a DJ, and hear it played on a pirate radio station within hours. A process that would until recently have taken months, can now be achieved in a day.

It wasn't just Sony PlayStation's Music 2000 that grime producers were using to make beats. They were also using Fruity Loops, Cubase, Mario Paint, and secondhand PCs donated by Morgan Stanley in nearby Canary Wharf. As Dan Hancox points out, it was more than the availability of music software on gaming consoles that laid the social foundations for the development of grime. He shows how the role of the state in the form of his participation in (and exclusion from) secondary school education was integral to Mills's learning of how to program music using Cubase and PCs. Youth clubs were essential spaces where aspiring grime DJs and MCs met to play music and rave together. Moreover, many grime MCs and DJs, like Richard Cowie, aka Wiley, and Darren Joseph, aka DJ Target, were children with family members from West Indian backgrounds who had experience of making reggae music and performing with sound systems (DJ Target; Wiley). In other words, tacit knowledges related to a "feel" for certain kinds of music were an important factor in how grime musicians had been socialized in family networks and taken up and developed in neighborhood collectives and groupings. What we want to emphasize, then, are the continuities in the social structures that made the making of grime music possible. The sharing of knowledge about how to use programs like Cubase occurs through the mentoring of more experienced adults like Mills's music teacher, Tim Smith, and the influence of his engineer/manager, Nick Cage, who owned a recording studio in Bermondsey, South East London. Cage introduced him to using Pro Tools in what Mills calls "a proper studio" (qtd. in Flint). In this case, the DIY "democracy" of making music in bedrooms, home studios, or classrooms with Cubase, Music 2000, or GarageBand is the initial stage in a process that involves learning how to use more professional recording technologies and working in studios funded by the budgets of independent and major record labels.

On the one hand, then, grime might be celebrated as a democratized form of music-making that makes it possible for any teenager to become a professional musician. In this sense, it represents the idealized convergence of digital technology and participatory culture. On the other hand, the accessibility, ownership, and use of sound recording technologies like Fruity Loops, Cubase, and GarageBand, which have contributed to the development of a genre like grime, are embedded in a series of social and familial relationships where music- making is part of the cultural life of participants. This includes relationships related to trenchant disparities between and within social groups within the geographical areas of London associated with grime. Indeed, we should not lose sight of the social inequalities that continue to shape and disrupt urban life in UK cities like London – the riots that took place in August 2011 being an example of civil unrest and protest where issues of racism, poverty, and police violence were understood to be reasons for the resulting crime and disorder. Clearly, there also continue to be systematic social, cultural, and economic barriers to cultural production and consumption as well – including those related to gender. While key figures in the early history of grime were women – journalists Chantelle Fiddy and Hattie Collins, for example – female grime artists such as Lady Leshurr and Nadia Rose are less well known than their male counterparts, reflecting wider trends in the music industries

(Adegoke). In other words, grime is a genre that has been and continues to be dominated by men in spaces – such as pirate radio and music videos – where hyper-masculinity is performed and reproduced. Recent academic research by Born and Devine has highlighted the class and gender inequalities that exists in music technology courses that are now part of higher education in the UK, alerting us to the importance of recognizing the continuing alignment of technology with masculinity. This is another reason why it is important for researchers to develop a more critical attitude toward the idea of digital democratization.

Conclusion

In concluding we want to draw upon the work of an academic who shares our skepticism about the idea of digital technologies being part of a linear process toward greater democratization. Nielsen, 2016 in his entry on democracy in *Digital Keywords*, an updated version of Raymond Williams's conceptual dictionary, states, "it is not clear that the widespread use of digital technologies means that they have played the kind of revolutionary role in actually existing democratic and democratizing political practices that has sometimes been forecast" (85). The reasons for this, he argues, is that "many other forces have shaped democracy more than has the spread of relatively affordable and accessible digital technologies" (88).

Our argument has been that the term democratization is too readily leveraged as a catch-all term connoting a generalized "opening up" and flattening of cultural hierarchies, often as a result of technological developments or decreasing cost. What these narratives gloss are the often contingent processes to do with the way musicians engage with and appropriate music technologies in often uneven and sociologically fissured contexts. In all of the cases mentioned – the SP-12, the TB-303, and the music software packages used in the making of grime – (dis)locating democratization implies moving beyond the term as an all-inclusive process that strips out the complexity of music-making in social settings. At best, we might recognize pseudo-democratic tendencies at work in the take-up of music technologies, and, in this article, we have hinted at how this might be done – by detailed descriptions of music-making in practice. But even here we need to fill in the relatively empty and often linear and romantic idea of what these terms mean and ensure we ask more probing questions about their use in popular music studies. For while the superimposition of overtly political and economic conceptualizations of democratization onto histories of popular music is tempting, it should be avoided. The former often carry assumptions around participation (voting), rational action (costing), and economistic behaviors (buying) that only superficially get at the uneven, non-linear, and "thick" modes of practice that characterize cultural production, including music-making. If the term is to be used at all, we suggest divesting it of its liberal Western democratic connotations, where the tendency is to convey intractable – perhaps even "natural" – processes of opening up, smoothing out, and leveling. Instead, it is incumbent on popular music scholars to draw out the complexities, contingencies, and irregularities of musical engagements as they unfold in everyday settings, and to build up a vivid picture of the entangled nature of bodies and music-making devices within constraining and enabling social contexts.

Methodologically, this would be to combine elements of "thick" or "close" description of music-making practices and device relations, where, as Richardson puts it, focus is on the "fine grain of experience" (113–114), with critical attention to the material conditions of cultural production and how these practices intersect with socio-economic structures. The latter would include structures of inequality along class, race, and gender lines which discipline and temper possibilities of access, affordability and take-up. Here, music technologies are far from inert objects waiting to be purchased, deployed, and disseminated in a mode of common instrumentality or open, universal deployment. Their development, take-up, and appropriation are, to return to Raymond Williams, shaped by the complex social relations of the worlds into which they enter.

Notes

1. Exemplary, here, is Pinch and Trocco's study of the development of the Moog synthesizer, which emerged through particular "sets of practices, discourses, and material artefacts" (10) associated with a range of actors or "relevant social groups." Such practices included the often unpredictable uses imprinted on the Moog by users as well as its development within the everyday lives of designers, marketers, inventors, and salespeople. In each case, technology and cultural practices are deeply intertwined in that the actions of core and "support personnel" (to borrow Howard Becker's terminology) are heavily embedded in the material properties and spaces of the synthesizer: from the erratic tuning of the instrument to studios, basements, and car boots. The outcome, for Pinch and Trocco, is the production and distribution of a device that helped spark major transformations in the way music is produced and consumed. Far from being a predictable and linear development, however, the Moog's increasingly widespread use was dependent upon a series of contingent and local mediations – as much accident as design.
2. Ice T (Tracy Marrow) has explained how the SP-12 used on *Rhyme Pays* (1987), one of the first hip-hop albums to be released on a major label, was bought using the advance from Sire Records/Warner Bros: "We got the $40,000, bought an SP-12, and fucked off some of the money. The record probably cost about $25,000 to make, total. We made that whole album with one drum machine, the SP-12, using the sounds that were in the machine" (qtd. in Coleman 238).
3. Ced Gee or Cedric Miller was also the producer of hip-hop group, Ultramagnetic MCs.
4. Ian Hutchby writes, "the affordances of an artefact are not things which impose themselves upon humans' actions with, around, or via that artefact. But they do set limits on what it is *possible* to do with, around, or via the artefact" (453).
5. MCA of the Beastie Boys explains, "On *Licensed to Ill*, we didn't even have any samplers. So, the stuff that's looped, we actually made tape loops. We'd record 'When the Levee Breaks' beat onto a quarter-inch tape, and then we'd make the loop and that tape would be spinning around the room, dangling on mic stands, going around in a big loop. And then, in order to layer that with something else, we'd have to actually synch it up, physically" (qtd. in Brown 45).
6. For a more detailed discussion of fidelity and ideas of authenticity in relation to the design, marketing, and use of digital synthesizers and samplers, see Harkins.
7. In 1994, E-mu relaunched the SP-1200 with a marketing campaign targeted specifically at hip-hop consumers and producers: "Notice how the major rap and hip-hop producers always seem to come up with those 'signature' grooves that rattle your bones? Check out the SP-1200 sampling drum machine from E-mu – those grooves start right here. That's right, the machine that you thought was gone is back by popular demand and as BAD as ever" (E-mu, "It's Baaaack").

8. We are appropriating the term "script" from Akrich's examination of how technological objects define a framework for action in their design configurations. According to Akrich, while the projected user is an imagined user, designers will nonetheless inscribe their vision of how the device is to be used, the technical parameters of its operation, and the competences needed to use it in the way intended.
9. Though perhaps unsatisfactory, with its connotations of a naïve mishandling, a mistake, or utter randomness, the term "accident" is, nevertheless, used by DJ Pierre in his own accounting of the incident in DJ Spanky's bedroom: "But when we made 'Acid Tracks', that was an accident. It was just ignorance, basically. Not knowing how to work the damn 303" (qtd. in Brewster and Broughton 335). For music critic Mark Fell, however, even the terms "accident" and "misuse" are insufficient to describe what happens with the 303, when this might reasonably just be called "discovery."
10. By the middle of the 2000s, critics like Kusek and Leonhard were arguing that the "digital revolution" had "made it easier for artists to leverage their creativity [because] more music can be created in a shorter time, perhaps for a lower budget, with much less of the outside help that record labels traditionally provided" (22).

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Works Cited

"20 Years of Acid House." *Mixmag* [special issue], Oct. 2007.

"Dizzee Rascal: Underground star." *BBC News*, 10 Sept. 2003, http://news.bbc.co.uk/1/hi/entertainment/3095430.stm. Accessed 1 Sept. 2019.

Adegoke, Yomi. "Where are All the Black Women in Grime? The Same Place They are in the Rest of the Music Industry – Sidelined." *The Guardian*, 1 Apr. 2019, https://www.theguardian.com/lifeandstyle/2019/apr/01/where-are-all-the-black-women-in-grime-the-same-place-they-are-in-the-rest-of-the-music-industry-sidelined. Accessed 1 Sept. 2019.

Akrich, Madeleine. "The De-Scription of Technical Objects." *Shaping Technology, Building Society: Studies in Sociotechnical Change*, edited by Wiebe E. Bijker and John Law, MIT P, 1992, pp. 205–24.
Batey, Angus. *Rhyming & Stealing: A History of the Beastie Boys*. Independent Music P, 1998.
Blake, Andrew. *Popular Music: The Age of Multimedia*. Middlesex UP, 2007.
Born, Georgina, and Kyle Devine. "Music Technology, Gender, and Class: Digitization, Educational, and Social Change in Britain." *Twentieth Century Music*, vol. 12, no. 2, 2015, pp. 135–72. doi:10.1017/S1478572215000018.
Bourdieu, Pierre, and Loic Wacquant. *An Invitation to Reflexive Sociology*. U of Chicago P, 1992.
Braddock, Kevin. "Partners in Grime." *The Independent*, 22 Feb. 2004, https://www.independent.co.uk/arts-entertainment/music/features/partners-in-grime-5355390.html. Accessed 1 Sept. 2019.
Brewster, Bill, and Frank Broughton. *Last Night a DJ Saved My Life*. Headline, 2006.
Brown, Jake. *Rick Rubin: In the Studio*. ECW P, 2009.
Coleman, Brian. *Check the Technique: Liner Notes for Hip-Hop Junkies*. Villard Books, 2007.
Covach, John. "The Way We Were: Rethinking the Popular in a Flat World." *Analitica/Rivista Di Analisi E Teoria Musicale*, vol. 1–2, 2015, pp. 59–72.
De Certeau, Michel. *The Practice of Everyday Life*. U of California P, 1984.
DJ Target. *Grime Kids: The inside Story of the Global Grime Takeover*. Trapeze, 2018.
Dowling, Marcus K. "Inside Trax Records: Why Chicago's House Originators are Fighting for Reparations." *Mixmag*, 19 Oct. 2020, https://mixmag.net/feature/trax-records-chicago-house-originators-payment-larry-sherman. Accessed 1 Sept. 2019.
Durant, Alan. "A New Day for Music? Digital Technologies in Contemporary Music Making." *Culture, Technology and Creativity in the Late Twentieth Century*, edited by Philip Hayward, Arts Council and Libbey P, 1990, pp. 175–96.
E-mu. "March to a Different Drummer." *Keyboard*, Mar. 1986, p. 71.
E-mu. *It's Baaaack . . . and It's Baaaad*. E-mu Systems, 1994.
Fell, Mark. "Collateral Damage." *The Wire*, Jan. 2013, https://www.thewire.co.uk/in-writing/essays/collateral-damage-mark-fell. Accessed 1 Sept. 2019.
Flint, Tom. "Dizzee Rascal & Cage: Recording *Boy in Da Corner*." *Sound on Sound*, Jan. 2004, https://www.soundonsound.com/people/dizzee-rascal-cage. Accessed 1 Sept. 2019.
Fukuyama, Francis. "The End of History?" *The National Interest*, Summer 1989.
Gibson, James J. *The Ecological Approach to Visual Perception*. Houghton Mifflin, 1979.
Goodwin, Andrew. "Rationalization and Democratization in the New Technologies of Popular Music." *Popular Music and Communication*, edited by James Lull, Sage, 1992, pp. 147–68.
Hancox, Dan. *Inner City Pressure: The Story of Grime*. William Collins, 2018.
Harkins, Paul. *Digital Sampling: The Design and Use of Music Technologies*. Routledge, 2019.
Hesmondhalgh, David. "The British Dance Music Industry: A Case Study of Independent Cultural Production." *British Journal of Sociology*, vol. 42, no. 2, 1998, pp. 234–51. doi:10.2307/591311.
Hill, Andrew. "Acid House and Thatcherism: Noise, the Mob, and the English Countryside." *British Journal of Sociology*, vol. 53, no. 1, 2002, pp. 89–105. doi:10.1080/00071310120109348.
Hsieh, Christine. "Tadao Kikumoto." *E-Musician*, 2007, https://www.emusician.com/gear/tadao-kikumoto. Accessed 26 Aug. 2019.
Huntington, Samuel P. *The Third Wave: Democratization in the Late Twentieth Century*. U of Oklahoma P, 1991.
Hutchby, Ian. "Technologies, Texts, and Affordances." *Sociology*, vol. 35, no. 2, 2001, pp. 441–56. doi:10.1177/S0038038501000219.
Jeffers, Allison, and Gerri Moriarty. *Culture, Democracy and the Right to Make Art*. Bloomsbury Methuen Drama, 2017.
Jenkins, Henry, Sam Ford, and Joshua Green. *Spreadable Media: Creating Value and Meaning in a Networked Culture*. New York UP, 2013.
Lawrence, Tim Liner notes. *Acid: Can You Jack? (Chicago Acid & Experimental House 1985–1995)*. Stuart Baker, Compiler. Soul Jazz Records, 2005. CD.

Leyshon, Andrew. "The Software Slump? Digital Music, the Democratization of Technology, and the Decline of the Recording Studio Sector within the Musical Economy." *Environment and Planning A*, vol. 41, no. 6, 2009, pp. 1309–31. doi:10.1068/a40352.
Lipset, Seymore Martin. "Some Social Requisites of Democracy: Economic Development and Political Legitimacy." *The American Political Science Review*, vol. 53, no. 1, 1959, pp. 69–105. doi:10.2307/1951731.
Macpherson, Crawford Brough. *Democratic Theory: Essays in Retrieval*. Oxford UP, 1973.
Mellor, David. "E-mu Systems SP-1200 Sampling Percussion System." *Sound on Sound*, Oct. 1987, pp. 22–28.
Milner, Greg. *Perfecting Sound Forever: The Story of Recorded Music*. Granta, 2009.
Moog, Bob. "The Keyboard Explosion: Ten Amazing Years in Music Technology." *Keyboard*, Oct. 1985, pp. 36–48.
Morey, Justin. "The Bridgeport Dimension: Copyright Enforcement and Its Implications for Sampling Practice." *Music, Business and Law: Essays on Contemporary Trends in the Music Industry*, edited by Antti-Ville Kärjä, Lee Marshall, and Johannes Brusila, International Institute for Popular Culture, 2012, pp. 21–45.
Negus, Keith. *Music Genres and Corporate Cultures*. Routledge, 1999.
Nielsen, Rasmus Kleis. "Democracy." *Digital Keywords: A Vocabulary of Information Society & Culture*, edited by Benjamin Peters, Princeton UP 81–92 , 2016.
Oppenheimer, Larry. "The E-mu SP-12." *Electronic Musician*, July 1986, pp. 84–90.
Oudshoorn, Nelly, and Trevor Pinch, editors. *How Users Matter: The Co-Construction of Users and Technologies*. MIT P, 2003.
Pattison, Louis. "Charanjit Singh, Acid House Pioneer." *The Guardian*, 10 Apr. 2010, https://www.theguardian.com/music/2010/apr/10/charanjit-singh-acid-house. Accessed 1 Sept. 2019.
Pinch, Trevor, and Frank Trocco. *Analog Days: The Invention and Impact of the Moog Synthesizer*. Harvard UP, 2002.
Pinch, Trevor, and Karin Bijsterveld. "Sound Studies: New Technologies and Music." *Social Studies of Science*, vol. 34, no. 5, 2004, pp. 635–48. doi:10.1177/0306312704047615.
Poschardt, Ulf. *DJ Culture*. Quartet Books, 1995.
Prior, Nick. "New Amateurs Revisited: Popular Music, Digital Technology and the Fate of Cultural Production," *Routledge Handbook of Cultural Sociology*, edited by John R. Hall, Laura Grindstaff, and Ming-cheng Lo, 2nd ed., Routledge, 2019, pp. 398–407.
Reynolds, Simon. *Energy Flash: A Journey through Rave Music and Dance Culture*. Macmillan, 1998.
Richardson, John. "Ecological Close Reading of Music in Digital Culture." *Embracing Restlessness: Cultural Musicology*, edited by Birgit Abels, Georg Olms Verlag, 2016, pp. 111–42.
Ritzer, George, and Nathan Jurgenson. "Production, Consumption, Prosumption: The Nature of Capitalism in the Age of the Digial 'Prosumer.'" *Journal of Consumer Culture*, vol. 10, no. 1, 2010, pp. 13–36. doi:10.1177/1469540509354673.
Roland. *Computer Controlled Bass Line TB-303 Owner's Manual* (Roland Corporation), 1981.
Rose, Tricia. *Black Noise: Rap Music and Black Culture in Contemporary America*. Wesleyan UP, 1994.
Ryan, John, and Michael Hughes. "Breaking the Decision Chain: The Fate of Creativity in the Age of Self-Production." *Cybersounds: Essays on Virtual Music Culture*, edited by Michael D. Ayers, Peter Lang, 2006, pp. 239–54.
RZA, The. *The Wu-Tang Manual*. Plexus Publishing, 2005.
Savage, Steve. *Bytes and Backbeats: Repurposing Music in the Digital Age*. U of Michigan P, 2013.
Schloss, Joseph G. *Making Beats: The Art of Sample-Based Hip-Hop*. 2004. Wesleyan UP, 2014.
Taylor, Timothy D. *Strange Sounds: Music, Technology and Culture*. Routledge, 2001.
Terranova, Tiziana. *Network Culture: Politics for the Information Age*. Pluto P, 2004.
Théberge, Paul. *Any Sound You Can Imagine: Making Music/Consuming Technology*. Wesleyan UP, 1997.
Théberge, Paul. "Historical and Technological Paths to a New Ideal in Music Making." *Social Studies of Science*, vol. 34, no. 5, 2004, pp. 759–81. doi:10.1177/0306312704047173.

Toop, David. *Ocean of Sound*. Serpent's Tail, 1995.
Vail, Mark. "E-mu Emulator: First Affordable Digital Sampler." *Vintage Synthesizers*, edited by Mark Vail, Miller Freeman, 2000, pp. 220–25.
Whitwell, Tom. "New Roland TB-303. Just £89, Inc. Postage." *MusicThing*, 20 Apr. 2005, https://musicthing.blogspot.com/2005/04/new-roland-tb303-just-89-inc-postage.html. Accessed 1 Sept. 2019.
Wiffen, Paul, and Annabel Scott. "Me and My E-Mu." *Electronics and Music Maker*, Sept. 1985, pp. 44–46.
Wiley. *Eskiboy*. William Heinemann, 2017.
Williams, Raymond. *Television: Technology and Cultural Form*. Fontana, 1974.
Williams, Raymond. *Keywords*. Fontana/Croom Helm, 1976.
Williamson, John, and Martin Cloonan. "Rethinking the Music Industry." *Popular Music*, vol. 26, no. 2, 2007, pp. 305–22. doi:10.1017/S0261143007001262.