Article

Muzak, Lo-Fi, and Acoustic Violence
Genealogies of Functional Music

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Abstract
Violence, including acoustic violence, can be remarkably resistant to critique; the semiotic structures upon which scholarly arguments rely may appear, in their representationalism, to have a distancing effect from the sheer materialism of violence and pain. A tension has thus emerged in the study of acoustic violence: how does one attend to the cultural histories and aesthetics of such practices without, in such theoretical abstraction, losing sight of violence’s embodied experience and effects? This paper argues for the existence of an underacknowledged genealogy of functional music which encompasses programmed music (such as Muzak), lo-fi, and contemporary forms of acoustic violence as social technologies across historical contexts. By attending to this genealogy, it is possible to take tools of cultural critique developed for programmed music and lo-fi and turn them towards acoustic violence. Beginning by outlining the intertwined histories of acoustic violence, programmed music, and lo-fi as well as of the scholarly critique surrounding such practices, this paper then uses these histories to read a specific contemporary form of acoustic violence, the Mosquito anti-loitering device, as part of this genealogy of functional music. I demonstrate how a shared investment in interspecies relationality through vibration connects the Mosquito to programmed music and lo-fi, and in doing so offer an example of the utility of this genealogical approach in interrogating otherwise underacknowledged ideological and sociotechnological aspects of acoustic violence.

Keywords
functional music, acoustic violence, programmed music, Muzak, lo-fi, Mosquito anti-loitering device, species

You are sitting in a room. You are alone. You are meant to be doing something, saying something, accomplishing something. You are failing to do to say to accomplish. A decision is made to aid in the doing the saying the accomplishing. All at once the room fills with sound.
Did you turn on the music, or was it turned on by someone outside the room, watching you?

Is the music soft and subtle, aiding concentration, or is it brutally, physically loud, preventing you from even thinking? What will it take to stop the music? A button on a remote to be pressed? A list of names to be recited?

You are in your home. You are in Bagram Air Force Base. You are in a classroom. You are in Guantanamo Bay.

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Violence is unquestionably material. Practices such as acoustic violence have tangible, physical, embodied effects on the world. Violence does things. As such, it can be remarkably resistant to critique. The semiotic structures upon which written or spoken arguments rely may appear, in their representationalism, to have a distancing effect from the sheer materialism of violence and pain—what Elaine Scarry has called pain’s ‘resistance to language’ (Scarry 1985, 4). A tension has thus emerged in the study of violence, including acoustic violence: how does one attend to the cultural histories and aesthetics of such practices without, in such theoretical abstraction, losing sight of violence’s embodied experience and effects?

In this article, I argue that there exists an underacknowledged genealogy which encompasses programmed music (such as Muzak), lo-fi, and contemporary forms of acoustic violence as social technologies across historical contexts. This genealogy is that of functional music. Even as new technologies have altered the landscape of acoustic violence, its contemporary forms are not without ideological and technological precedent. I do not argue that contemporary acoustic violence or lo-fi are ‘neo-Muzak’ (Anderson 2015) or that programmed music or lo-fi are forms of acoustic violence; rather, I argue that attending to the broad genealogy of functional music of which programmed music, lo-fi, and acoustic violence are a part helpfully places each in relation to the others and allows for new, robust forms of critique. Understanding this genealogy allows us to take tools of cultural critique developed for programmed music and lo-fi and turn them towards acoustic violence. By looking to types of musicking which are less affected by the theoretical roadblocks which characterize acoustic violence, we can open acoustic violence to broader forms of critique.

**Key Terms**

First, some clarification of terms. I use ‘programmed music’ to refer to practices of creating, distributing, and organizing music meant to be played in the background in spaces such as offices and shopping malls in order to encourage
specific behaviors or affective states (such as purchasing more items or working more efficiently). One example of this is Muzak. While my use of ‘programmed music’ mirrors how many other scholars use ‘muzak,’ I use ‘Muzak’ when referring specifically to the Muzak corporation and its products; when referring to such practices more broadly, I use the term ‘programmed music.’

‘Acoustic violence’ in this article refers to the use of music, sound, and infra- or ultra-sonic vibrations in policing, warfare, incarceration, interrogation, and torture; acoustic violence is the use of sound to induce, exacerbate, or make one vulnerable to physiological or psychological harm. This includes, for example, acoustic weaponry such as the Long-Range Acoustic Device (LRAD) and the use of debilitatingly loud and/or presumably culturally offensive recorded music and sounds as tools of ‘no-touch torture.’ When I reference ‘contemporary forms of acoustic violence,’ I am referring specifically to such practices as they have emerged since World War II, particularly during the Cold War and the 21st-century ‘Global War on Terror.’

‘Lo-fi’ refers to a mode of musical production, distribution, and consumption which relies upon long-form digital media such as algorithmically-generated playlists and persistent internet livestreams. I use ‘lo-fi’ here to refer not to the broad range of musical practices which have, over many decades, aestheticized ‘low fidelity’ media objects and compositional practices, but rather a specific set of internet-mediated sonic practices that have recently come to be known as ‘lo-fi’ (in its nominal rather than adjectival form). Often, but not always, sonically recognizable through its use of heavy reverb, layered ambient background noises, slow tempos, and prominent use of drum machines and melodic guitars and pianos, lo-fi is primarily a process of musical distribution and consumption. Centrally, lo-fi takes long histories of music’s operationalization for affective self-regulation and makes this its core goal. Lo-fi refers here not to any quantifiable or measurable metric of ‘low fidelity,’ but rather a Foucauldian technology of the self that operates through specific media frameworks.

Finally, I use the term ‘functional music’ to reference types of acoustic vibrations which are meant to accomplish a task – to do something in the world - regardless of whether they are consciously perceived or ‘listened’ to. Put another way: while all music serves a social purpose, functional music refers to a class of music and sound which is understood by its proponents to have direct effects upon the world – material, physiological effects – without mediation through musical taste, cultural meaning, or aesthetic evaluation. Functional music is a term that Muzak executives used to describe their products (Jarvis 1980), and it has often been used as a synonym for programmed music. For example, Simon Jones and Thomas

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1 In doing so, I am following Greene 1986 and Sterne 1997.

2 The nature of the distinction between passive ‘hearing’ and active ‘listening’ – and whether such a distinction exists in the first place – has been the subject of much scholarship (e.g., Rice 2015; Sterne 2015).
Schumacher use programmed and functional music interchangeably to refer to ‘music used primarily to support and encourage some other primary activity’ (Jones and Schumacher 1992, 166n1). While I share Jones and Schumacher’s view that all music has social functions, I base my definition of functional music not on the relationship between it and other ‘activities’ but on its widely perceived ability to directly impact the world at a material, physiological level. In doing so, I broaden functional music to refer to a genealogy which links programmed music, lo-fi, and acoustic violence. The use of an LRAD to disperse a protest, in this formulation, would be a kind of functional music, as would playing a lo-fi stream to a houseplant in order to speed its growth. I retain the term ‘functional music,’ despite my inclusion of arguably non-musical sounds and vibrations within the category, both to be in dialogue with the previous use of the term by other scholars and to call into question distinctions between music and sound.3

This article draws on two of Michel Foucault’s foundational contributions to social theory: genealogy and technology. Genealogy is a mode of social analysis which seeks not to uncover historical ‘truths’ but rather to better understand the murky, knotted histories of contemporary political, social, and technological forces (Foucault 1984). As such, this article does not offer a teleological history of acoustic violence or functional music. Instead, I seek to trace the historical emergence and discursive intertwinement of three interdependent forms (programmed music, lo-fi, and acoustic violence) which must be understood in relation to one another.

Technology, as theorized by Foucault, refers to a set of ‘specific techniques that human beings use to understand themselves’ (Foucault 1997, 224). Among these techniques are technologies of the self, which, Foucault argued, are functions through which individuals exert control over and seek to alter or better themselves. What makes this formulation theoretically incisive is its articulation of how such technologies are interrelated with and not easily distinguishable from technologies of (hegemonic) power. Throughout this article, ‘technology’ is used in this Foucauldian sense to refer to an operation of power – whether of sociopolitical hegemony or of self-transformation. It is worth noting, in the context of this Special Issue, that my choice to forego theories of policing and instead rely upon Foucault’s theories of technology is a purposeful one. While theories of policing are of course quite varied, the term can carry a heavy emphasis of the unidirectional operation of power and foreclosure of individual agency. Foucault’s work allows for a helpful, if rarely clear-cut, disambiguation of self-policing (a core component of his theory of discipline [Foucault 1995], and in many ways a subset of his broader category of technologies of power) and self-improvement (the deployment of technologies of the self). ‘Technology’ includes both of these phenomena, whereas ‘policing’ might only account for the former. As such, for the

3 Such an argument for the porousness of the boundary between music and sound is nothing new - much work in music and sound studies interrogates this boundary (e.g., Sakakeeny 2015; Wong 2014).
purposes of this article Foucauldian technologies offer a more nuanced framework for understanding social control, including when that control is understood to be of oneself rather than imposed from without.

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Concerns over the contemporary weaponization of sound and music have direct precedents in 20th-century anxieties over the use of music as a form of social, behavioral, and affective control through programmed music; similarly, the ideological bases of lo-fi have clear roots in earlier forms of programmed music. Lo-fi, programmed music, and acoustic violence share sociotechnological foundations ranging from transmission media to timbral aesthetics to mid-20th-century military research. I seek to bring these three phenomena together, under the umbrella of functional music, in order to ask how existing modes of critique developed for programmed music and lo-fi might inform new methodologies for the study of acoustic violence.

A recurring theme throughout this article is the struggle between cultural and ontological approaches to the study of acoustic violence. In an attempt to resist abstracting away from the lived experience of violence, many scholars have argued that the meaning and power of acoustic violence resides in a precultural ontology of vibration that interfaces with the human body at a physiological level (e.g., Daughtry 2015). This approach stands in generative tension, not only between scholars but also within the bodies of work of individual scholars, with approaches that take cultural meaning and performativity to be central to accounts of acoustic violence (e.g., McDonald 2009). Rather than invest in either of these approaches over the other, I argue that understandings of sonic ontology should be historicized and their cultural bases examined; the genealogy outlined in this article offers one mode for doing just this. Affect offers a useful method of mediating between the cultural and ontological, and as such reappears throughout this article.

I begin with an overview of the intertwined histories of acoustic violence, programmed music, and lo-fi as well as of the scholarly critique surrounding such practices. I then use these histories to read a specific contemporary form of acoustic violence, the Mosquito anti-loitering device, as part of this genealogy of functional music. In examining the Mosquito as an instance of the policing of the

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4 Programmed music, lo-fi, and acoustic violence are by no means the only types of functional music; my goal in this article is to argue for the existence and utility of a broad genealogy of functional music, using these three phenomena as examples, not to offer an exhaustive history of its forms.

5 Other scholars have made similar calls for culturally-specific studies of ontologies of wartime sound (e.g., Sykes 2018).

6 I assume readers of this Special Issue to have an understanding of the fundamentals of affect theory, and as such do not spend significant space discussing it here. For those interested, the work of Brian Massumi and Sara Ahmed (e.g., Massumi 1995; Ahmed 2010) offer introductions to affect and its complex interrelationships with the ontological and the cultural.
social through the overlappings of sound and affect, I demonstrate the utility of this genealogical approach in interrogating otherwise underacknowledged ideological and sociotechnological aspects of acoustic violence.

As you read, return occasionally to the epigraph above. Sit with the discomfort of the juxtapositions it offers. What are the ethics of such a blurring of the boundaries between programmed music, lo-fi, and acoustic violence? What pathways for critique are foreclosed if we ignore their overlappings?

**Acoustic Violence**

The weaponization of sound is a hallmark of 21st-century policing and warfare. Media reports are saturated with tales of the novelty, potentials, and dangers of acoustic weapons such as the Long-Range Acoustic Device, or LRAD – a high-powered loudspeaker capable of generating beams of sound that are simultaneously excruciatingly loud and narrowly directed. Alongside this, a rich scholarly literature has emerged on military and intelligence service practices of sonic torture, in which debilitatingly loud music or other sounds are played as part of broader ‘no-touch torture’ techniques. Other forms of the weaponization of sound range from ‘knock-on-roof’ bombing (Zuazu 2015) to forced music-listening as judicial punishment (Hirsch 2011).

While many of these forms of acoustic violence are enabled by recent technological advancements and contemporary geopolitical formations, they are part of longer histories of the weaponization of sound. Commentaries on acoustic violence often locate its origins in the biblical story of Jericho, in which city walls crumbled under the force of shouting and trumpets (e.g., Hill 2012, 221). It is important to remember that while histories of sound in warfare often begin in the 20th century, epistemic sonic violence was an important tool in legitimizing European colonization centuries earlier (Ochoa Gautier 2014). Sound has played a number of important roles in warfare, from the use of musical instruments to generate confusion in guerrilla warfare to the use of audio recordings to hide troop movements (Peters 2019, 63). The use of music as a disciplinary tool and accompaniment to torture in concentration camps in World War II marks a critical node in this history: following the end of the war, the global dispersal of former Nazi officers triggered a similarly global spread of these practices. This, paired with the training of military and intelligence personnel from around the world in US facilities in the mid- to late-20th century, triggered much more widespread uses of music in torture and as a tool to disperse protests – including in the Greek Junta in 1967-1974 (Papaeti 2013; 2020), the British torture of Irish Republican Army captives in 1971 (Hirsch 2012, 114; Pieslak 2009, 87), the

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7 Two of the many contexts in which LRADs have been deployed are the 2011 Occupy Wall Street protests (Vilanova 2021) and at protests following the police killing of Michael Brown in Ferguson, Missouri in 2014 (Zuazu 2015).

8 Foundational publications include Cusick 2006; 2008; Grant 2014; Hill 2012.
1974-1990 Pinochet regime in Chile (Chornik 2013; 2018; Papaeti 2020), and Cold War-era protests in Czechoslovakia, Guatemala, and Paraguay (Peters 2019, 77). The US itself has used weaponized music both domestically, as at the 1993 Waco Siege (Torture By Music 2012), and internationally, as in attempts to remove Manuel Noriega from power in Panama in 1989 (Cusick 2006; Goodman 2009, 15–26; Pieslak 2009, 78–99) and the use of loudspeakers on military helicopters in both Grenada and Vietnam (Goodman 2009, 15–26; Peters 2019, 64). Such practices often revolved around picking music thought to be most disliked by the targeted party and then playing that music nonstop at high volumes to induce distress.9

Commentary in both the scholarly and popular press on acoustic violence frequently centers on whether such practices are better considered as ‘sound’ or as ‘music.’ The result is often a cognitive dissonance emblematized by Pitchfork, a music industry publication, running an article on how to protect yourself from LRADs (Carr 2020), or by the documentary Songs of War, which follows the composer for children’s television show Sesame Street as he learns that his music was played to torture prisoners at Guantanamo Bay (Chrytroschek 2010). Scholars too have struggled with the distinction between music and sound in these practices. Scholarship in this area is marked by a push and pull between ontological approaches (which consider acoustic violence’s use of sound as a physical tool, as a mechanism of vibration which interfaces directly with the bodies of its subjects prior to the cohering of any cultural meaning [e.g., Hill 2012]) and cultural approaches (which focus less on sound’s material qualities and more on its uses and histories, for example the assumed culturally offensive nature of certain lyrics or musical genres [e.g., Hirsch 2012]). These two categories are of course not mutually exclusive, often representing less ideological camps into which specific scholars fall and more an unresolved point of tension in nearly all writing on acoustic violence. One possible key to resolving this tension lies in the historicization of acoustic violence along new paths, such as that of functional music. Practices and understandings of acoustic violence exist not in a vacuum but in relation with other phenomena; by examining these relations, new avenues for critique will be opened.

**Programmed Music**

In 1922 – exactly 100 years prior to the penning of this article – the company Wired Radio, Inc. was founded in Ohio (Toop 2001). Wired Radio’s goal: to use the recently invented technique of carrier multiplexing to pipe music into customers’ homes as part of their electrical service. By 1934 the company realized that its fortunes would lie in commercial rather than residential clients. A change of focus, a change of name, and Muzak was born (Isacoff 2013). Muzak would grow into the dominant force of the programmed music industry in the United

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9 Listening and musical practices have, of course, often been used as methods of survival during war, not only as weapons (Chornik 2018; Daughtry 2015; Papaeti 2020; Sykes 2018).
States over the following decades before being acquired by Mood Media in 2011 and rolled into that company’s broader ‘sensory branding’ initiatives (MOOD MEDIA TO... 2011).

The preceding paragraph tells a common tale of a business lifecycle: invention, incorporation, acquisition. Yet untold here is a deeper story of nationalism and militarism without which Muzak cannot be fully understood — indeed, without which its connections to US state-sponsored acoustic violence might remain imperceptible. Crucial to our purposes is the fact that the rise of contemporary military programs of acoustic violence during and following World War II took place at the same time as militaries were investing in programmed music as a tool of human engineering. The functional similarities between programmed music and acoustic violence — both essentially boiling down to attempts to manipulate behavior through sound and music — exist alongside their side-by-side historical expansion in the postwar US.

Muzak was at its core a military technology. The technique of carrier multiplexing was invented by US Army Major General George Owen Squier as a potential solution to the military intelligence problem of securely transmitting audio data (Lanza 1994, 22–30). Muzak came into being in conversation with empirical research into music and workplace productivity conducted in the US during World War II (North and Hargreaves 2006, 108–9), aligning itself with ideals of military efficiency and nationalist sentiment. From this technological and ideological inception onward, Muzak would be characterized by deep interconnections with US politics and militarism. Muzak developed ‘a brand-program of air-raid music’ as a potential early-warning system in the 1940s (Lanza 1994, 45), which led to experiments with the US Army Human Engineering Laboratories in keeping soldiers attentive while watching for Russian aircraft; it even came to be included on military lists of ‘optional equipment’ in the 1960s (Lanza 1994, 149–51). The Muzak corporation and its franchises were owned by some of the most powerful political figures in the United States, from senators (Lanza 1994, 53) to future president Lyndon B. Johnson (Lanza 1994, 149). In fact, it was Johnson’s sales pitch that led to Muzak first being heard in the White House during the Eisenhower administration (Collard 2009). In 1970, Richard Nixon had Muzak installed in the newly redesigned White House press quarters (Semple Jr. 1970), only one year after having had it played at his inauguration (Lanza 1994, 149). Muzak sought to develop an ‘all-American’ image even beyond politics, exemplified by its recording of an arrangement of the US national anthem for its 50th anniversary (on the 1984 album Muzak Celebrating a Sound Future). Some cultural critics have considered programmed music to be a quintessentially American genre, akin to and improving upon jazz (e.g., Lanza 1994, 36). Indeed, American travel writers have been shocked to find Muzak-style tunes playing in other parts of the world, ruining the ‘authentic’ exotic atmosphere.
soundscapes they had expected (e.g., Lanza 1994, 229). To put it plainly: programmed music and contemporary forms of acoustic violence arose in the same historical and cultural circumstances, were created for similar purposes, and were developed by and for the same group of political figures and military organizations.  

Critiques of programmed music are both an important part of its history and a recuperative archive in the face of acoustic violence’s resistance to critique; by recognizing acoustic violence and programmed music as both part of a broader genealogy of functional music, modes of critique developed for programmed music – such as the following – can be effectively turned towards acoustic violence as well. Scholars have analyzed programmed music along aesthetic, economic, and political registers, often drawing upon Marxist and Frankfurt School formulations (such as those of Theodor Adorno); in doing so, the focus is most often on programmed music as a technology of power rather than a musical genre. Muzak, as metonymic for all programmed music, has prompted polemic moralizations ranging from the utopic to the apocalyptic. Here is a representative dichotomy:

Muzak and mood music are, in many respects, aesthetically superior to all other musical forms: they emit music the way the twentieth century is equipped to receive it. (Lanza 1994, 5)

I must say that I’ve had the thrilling and rare experience this morning of being certain about something: I am certain that Muzak is the single most reprehensible and destructive phenomenon in the history of music…. (Roger Reynolds during a Muzak executive’s Q&A, quoted in Jarvis 1980, 16)

Marxist critiques of Muzak have framed it as uniquely alienating, traceable not only to labor alienation but also the social alienation of US individualism (e.g., Radano 1989; Greene 1986). Programmed music’s functioning has depended upon assumptions of its cultural universality (Jarvis 1980, 16), despite its nation-, class-, and race-specific framings (Sterne 1997; Hirsch 2007). These intersecting corporate rhetoric of individualism and universalism of course fit squarely within the framework of ‘pseudoindividuality’ advanced by Horkheimer and Adorno, in which they argue that, in the eyes of the culture industry, ‘individuals are none but mere intersections of universal tendencies’ (Horkheimer and Adorno 2002, 125). Silence is often the point of contestation here, as it is with many practices of acoustic violence. Programmed music has been critiqued as removing a background of silence which allows the liberal subject to speak and be heard; simultaneously, however, it is often taken as a hegemonic structure whose power is silencing (e.g., Attali 1985, 120–24). What is valued, then, is a pre-existing, ‘natural’

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11 This brief history runs parallel, of course, to Friedrich Kittler’s famous argument that most technologies have militaristic roots (Kittler 1986).
silence which allows individuals to speak; what is feared is an artificial ‘silencing’
which prevents individuals from speaking, often through the removal of the
‘natural’ silence which would have enabled such speech in the first place.\textsuperscript{12}

\textbf{Lo-Fi}

Lo-fi – often referred to using terms such as ‘lo-fi jazz,’ ‘lo-fi hip hop,’ ‘chillhop,’ or
some variation on ‘beats to [study / relax / etc.] to’ – is an umbrella category
which encompasses not only musical practices but also visual art styles, discursive
norms, and practices of self-making through aesthetic curation. Lo-fi is, in this
broad conception, a technology – in the Foucauldian sense of an operation of
power, whether hegemonic or applied to the governance of the self – rather than
a genre.\textsuperscript{13} As a technology, lo-fi is as defined by its uses for affective regulation and
self-making as its sonic characteristics.

While lo-fi is etymologically derived from ‘low fidelity,’ it has grown far beyond the
 technological and hardware limitations indexed by the latter term. As Adam Scott
Neal has noted: ‘Although imbued with signifiers of low fidelity, such as the noise
of dust on vinyl records, the music is constructed with care. It begins clean and
‘hi-fi,’ and is then made lo-fi’ (Neal 2022, 32; emphasis original). Lo-fi is aurally
identifiable through its use of slow tempos, general avoidance of sung or spoken
voices, and a foregrounding of gentle piano or guitar melodic lines (often heavy
with reverb or vibrato effects) alongside synthesized percussion ‘which has stylistic
roots in 1990s instrumental or experimental hip hop’ (Winston and Saywood
2019, 40–41). More important than the sonic components of its production,
however, are lo-fi’s distinctive methods of access and social uses. While it is
possible to listen to lo-fi music in album or playlist form via streaming services, or
even as background music at physical or virtual businesses (Galloway 2023), its
archetypal form is live, multi-hour (or, in some cases, even multi-month) streams
on YouTube designed for affective regulation, relaxation, and productivity. The
most popular persistent lo-fi streams are hosted on the YouTube channel ‘Lofi
Girl,’ formerly ‘ChilledCow.’ As is the case with many other streams as well,
listeners access this music through an intermediary host (Lofi Girl) in addition to
the mediations of the software platform (YouTube); music is selected through the
‘vibe’ of the channel rather than for a specific musician. Central to lo-fi streams as
social spaces are perceived norms of creative anonymity, artistic honesty,
nonchalance, communality, and kindness (Neal 2022; Alemoru 2018).

\textsuperscript{12} Silence is also important in its use as a control against which programmed music is quantitatively
studied (e.g., North and Hargreaves 2006); this despite the importance of silence within the
construction of programmed music itself, most notably the (in)famous Muzak stimulus progression
(Jarvis 1980; Lanza 1994, 49).

\textsuperscript{13} Other scholars have argued that forms of music similar to lo-fi are technologies in the more
vernacular sense, such as Paul Allen Anderson’s claim that the ‘neo-Muzak’ of algorithmically-
generated playlists ‘is not a musical form or genre. It is, strictly speaking, a technology for the delivery
and consumption of musical content from any genre’ (Anderson 2015, 833).
Lo-fi is only one example, if a remarkable one, of the common practice of self-regulation through music. Personal musical practices as Foucauldian technologies of the self are arguably more common now than ever before thanks to lo-fi streams along with the popularization of algorithmically developed playlists of all genres (Anderson 2015; Seaver 2022) as well as noise cancellation technologies (Hagood 2019). Such practices can be traced back to the ‘Walkman Effect’ of being able to curate one’s own mobile, individualized sonic environment through personal music playback hardware (Hosokawa 2012) and even, as Judith Peraino has argued, to the monastic musical traditions of medieval Europe (Peraino 2006). While the use of music for self-regulation is not genre-specific (DeNora 2000), lo-fi is unique given that it is a technology created and distributed primarily for the purpose of such self-regulation.

As with programmed music, a very brief overview of critique around lo-fi provides a glimpse into a broader suite of methods that might be applied elsewhere along the genealogy of functional music. To begin with, lo-fi exists in clear relation to earlier practices of programmed music such as Muzak.\footnote{Lo-fi is part of a matrix with other internet-mediated music such as PC music and vaporwave, each of which has its own connections to Muzak. PC music and vaporwave have been called ‘shopping mall rave muzak’ (quoted in Harper 2016, 92) and ‘music optimized for abandoned malls’ (Glitsos 2018), respectively.} Programmed music and lo-fi are both built upon the idea of music for affective regulation and behavioral optimization; their main point of divergence lies in the
question of who has agency in these practices. Indeed, some critics have argued
that lo-fi is the new Muzak in all its dispersed, individualized, online, postmodern
glory (Mikhaylova 2019). While it may be tempting to draw equivalences between
programmed music and deindividuation (the individual as, say, just one more
potential consumer in the shopping mall) and between lo-fi and individuation
(where the individual takes control of crafting their own sonic domestic
environment), we have already seen the complexity of Muzak’s dynamics of
(pseudo)individuation. The complexity of these genealogies refuses the too-easy
categorization of lo-fi (as ‘personal enhancement background music’ or
‘PEBM’ [Brown and Theorell 2006]) as ethical, and Muzak (as ‘acoustic
wallpaper’ [ibid.]) as unethical. Indeed, some scholars have even argued that
Muzak itself can function as a kind of ‘PEBM’ (Radano 1989, 457).

There are notable sonic throughlines between programmed music and lo-fi as
well. The fetishization of low fidelity in lo-fi — even, perhaps especially, ‘fake’ low
fidelity (Neal 2022; Winston and Saywood 2019) — stems at least in part from the
hardware affordances of shopping mall Muzak, what Ronald Radano refers to as
‘an aesthetic of loudspeaker sound.’ Radano argues that this aesthetic
purposefully links the timbres of programmed music in public spaces to the
timbres of ‘the low-fidelity radios and phonographs of the home’ (Radano 1989,
453–54), a move which in turn constructs the home as a ‘lo-fi’ space. Other
compositional consistencies abound, from a general exclusion of the human voice
in both programmed music and lo-fi and an emphasis on rhythmic and metric
continuity and homogeneity, to a de-emphasizing of the producer/musician and a
responding emphasizing of the soundscape over the individual song or album.
Some commentators go so far as to argue that lo-fi is a perfect distillation of 21st-
century society (Mikhaylova 2019); haunting this claim is the specter of parallel
equivalences which have been drawn between Muzak and the 20th-century US.

The Mosquito
We emerge from this very brief overview of programmed music and lo-fi’s
intertwined histories with the beginnings of an outline of common modes of
critique, modes which I argue can be productively turned towards acoustic
violence as a third node in the genealogy of functional music. As a demonstration,
I turn now to the example of the Mosquito anti-loitering device. The Mosquito,
often discussed as an example of acoustic weaponry and sonic policing, is
regularly critiqued along ontological lines which take vibration, auditory
physiology, and notions of youthfulness as precultural truths. These ‘truths,’
however, are built in this case upon histories of culturally specific notions of
interspecies sonic communication. The example of the Mosquito demonstrates
how contemporary practices of acoustic violence can be better understood by
taking them as part of a longer genealogy of functional music. I use this brief
discussion as a model of how a broader historicization of acoustic violence that
includes programmed music and lo-fi better elucidates acoustic violence’s
ideological foundations.
Created by security consultant Howard Stapleton in Wales in 2005, the Mosquito is a device designed to emit high-pitched frequencies in order to drive away young people from areas in which they are not wanted. Fundamental to the device is the notion that humans lose the ability to hear high-pitched sounds as they age, and thus that certain sounds are only audible to certain age groups. By playing loud, annoying sounds at high frequencies often perceptible only to children and teenagers, Stapleton reasoned, the Mosquito could ‘provide a solution to the eternal problem of obstreperous teenagers who hang around outside stores and cause trouble’ (Lyall 2005).

The racist and ableist politics of the Mosquito are easy to critique, from referencing all groups of teenagers as ‘gangs’ (Lyall 2005) to the investment in ideas of normative embodiment which fail to account for variations between individuals. It constructs notions of ‘youth’ even as it claims to simply be operating based on biological facts; as many scholars have argued, ‘[y]outh is a cultural rather than a biological category’ (Grossberg 1992, 176, quoted in Akiyama 2010, 464). Centrally important to the Mosquito’s functioning are its investments in biological claims which derive their truth-status from their statistical accuracy (most individuals lose the ability to hear these sounds by the time they are 25) and in social claims perceived to hold similar statistical accuracy (most people hanging around outside stores are under 25; most of these people are not being productive members of society while doing so; etc.). The Mosquito is thus in many ways a clear example of what Robin James calls ‘the sonic episteme,’ the link between sonic practices and the neoliberal politics of exception through statistical control (James 2019). By investing in and reproducing ideas of what the ‘normal’ person can hear and how the ‘normal’ person should behave, the Mosquito traffics in the same Gaussian probabilistic (the mathematics of the ‘bell curve’) which, James argues, are the exemplary quantification model of neoliberal governance. For example, the construction and subsequent disavowal of non-normativity appears in both physiological and social forms in Stapleton’s conception of the Mosquito: Stapleton has argued that ‘it does not matter if [some] people in their 20s and 30s can hear the Mosquito, since they are unlikely to be hanging out in front of stores, anyway’ (Lyall 2005).

While some scholars have analyzed the Mosquito as a weaponization of sound and even examined it alongside Muzak, clear demarcations between the two have been drawn: Muzak operates via aesthetics while the Mosquito operates via affective, physiological control, and it would be a ‘mistake’ to read too much into their surface-level similarities (Akiyama 2010, 459). Clearly, the device is premised upon notions of the precultural functioning of sound: that one is compelled to act, to leave the premises, by the annoying or overwhelming nature of the sound and cannot simply choose to ignore it or aestheticize it into a pleasurable experience. And yet, this operationalization of sound, similar to that of other practices of acoustic violence such as the LRAD, demonstrates an investment in sonic ontology that is fundamentally cultural, based upon culturally constructed notions of boundaries of unintelligibility between species.
A profile on Stapleton and the Mosquito in *The New York Times* soon after its invention includes a quantity of references to nonhuman life which, on its surface, appears quite odd. Beyond the name of the device itself (which derives from how the high-pitched sounds it produces are similar to those of a buzzing mosquito), the article compares the ‘surly teenagers’ who gather outside stores to ‘birds perched on telephone wires’; describes the device’s effect ‘as if someone had used anti-teenage spray around the entrance, the way you might spray your sofas to keep pets off’; discusses how Stapleton ‘avoided possible aggressive confrontations’ by ‘tell[ing customers] it was to keep birds away because of the bird flu epidemic’; referring to the sound as ‘a pulsating chirp’ and ‘a bat-like squeak’; and, playing on the name of the device, stating that it ‘makes unruly teenagers buzz off’ (Lyall 2005).

This profile goes beyond insect puns in its demonstration of an already-existing investment in the communicative potential of sound across species boundaries. It is by metaphorizing the unwanted teenage populations as nonhuman animals that the practice is explained to the public, and through references to the sonic manipulation of birds that ethical questions about the device’s use are sidestepped. There are also direct technological histories at play: the Mosquito is ‘an adaptation of technologies initially deployed as a means of rodent control’ (Goodman 2009, 184). The political functioning of the Mosquito is made possible through its investments in sonic ontology, in the possibility of using sound to interface with and control the behavior of subjects according to the assumedly precultural truths of youthfulness and auditory physiology. This understanding of sonic ontology has historical precedents and other contemporary manifestations; it was workshopped through attempts to control the behavior and emotions of nonhuman animals in the 20th century through programmed music, and it continues to appear in lo-fi and programmed music practices in the 21st century. The Mosquito’s conceptualization, utilization, and meaningfulness are dependent upon these interspecies histories.

Functional music has never been limited to the human; it overflows species boundaries because it was never invested in such boundaries to begin with. There have been significant research dollars spent on the use of programmed music to boost livestock production, for example (Godoy 2014). Muzak, more specifically, has long licensed its music for uses wherein the intended audiences are nonhuman animals, from horse stables (Jarvis 1980) to pet stores (Business Wire 2016). In 1973, a Muzak representative in St. Louis would state: ‘There was a situation when the National Stockyards in Illinois had too many ‘dark cutters,’ which happens when the release of adrenalin makes the blood congeal and the meat turn. They put the Muzak in and it calmed the cattle as they went to the hereafter’ (quoted in Lanza 1994, 152). The lack of public records of such an arrangement

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15 The passing mention of smell (anti-pet sprays for furniture) indexes what is often perceived to be an alignment between scent and sound as modes of precultural communication, observable in the alignment of both with affect in critical theory (for smell and affect, see Brennan 2004; for sound and affect, see James 2012).
is surely not accidental; given the various criticisms of programmed music as lifeless, deindividuating, and dehumanizing, the Muzak corporation would surely not have wanted to acknowledge any circumstance that could lead to its human listeners being compared to cattle led to the slaughter – even as the corporation was clearly invested in the existence of a shared plane of affective intelligibility between slaughterhouse cattle and shopping mall humans. Programmed music, such practices suggest, is understood to function preculturally, to achieve its goals on an ontological, affective register that preexists species differentiation.

Numerous examples of lo-fi meant for nonhuman listeners can also be identified – examples which are not marginal or niche, but rather hugely popular and historically important. Most obviously, we can look to YouTube streams such as ‘15 HOURS of Deep Separation Anxiety Music for Dog Relaxation! Helped 4 Million Dogs Worldwide! NEW!’ (with 46 million views) to highlight the general popularity of these practices. Such phenomena are not limited to nonhuman animals, with a range of massively popular media for and about aiding plant growth through music (echoing, with a different meaning, Muzak’s early moniker of ‘potted palm music’), from Mort Garson’s famous 1976 album Plantasia, to Spotify playlists with titles such as ‘Music for Plants: Mellow vibrations for green leaves, green thumbs, and green ears,’ to YouTube videos such as ‘Music for Plants – Music Stimulation for PLANT HEALTH – Brainwave Entrainment.’ Jacob Smith has argued that such musical activities are not marginal phenomena, interesting solely for their deviations from musical forms otherwise meant for human consumption – rather, background and ambient music have their roots in the Euroamerican history of keeping caged songbirds in domestic spaces. As Smith’s ‘green media archaeology’ shows, interspecies relationalities are fundamental, rather than marginal, to the genealogies of background music (Smith 2015, 42–79). All of these phenomena fall squarely under the umbrella of lo-fi-as-technology. YouTube streams of music for houseplants and pets, for example, clearly share the same frameworks of mediation as lo-fi streams; they also traffic in the same notions of aurally delineated domestic space in which background music stimulates specific behavioral outcomes. At play here is the same understanding that is demonstrated throughout the history of programmed music, that affective manipulation through sound functions across species boundaries. Affective manipulation refers here not only to emotion as the goal of what is to be manipulated. It also references the way such manipulation is understood to occur, through the biological functioning of vibrations passed between resonant bodies; the emphasis on terms such as ‘vibrations’ and ‘entrainment’ in the examples above helps make this clear.

Given these themes of vibrational ontology, prelinguistic communication, and emotion, a potentially useful framework here is the treatment of species difference in affect theory. Some scholars working in affect theory have suggested that affect, while not limited to humans, is exceptionally prominent in human experiences of the world (e.g., Brown and Tucker 2010, 233). Others, however, have argued that affect is ontologically rooted in a space beyond the human. Deleuze and Guattari,
along with other scholars such as Brian Massumi, have argued that affect can act as a bridge between species: ‘This something can be specified only as sensation. It is a zone of indetermination, of indiscernibility, as if things, beasts, and persons… endlessly reach that point that immediately precedes their natural differentiation. This is what is called an affect’ (Deleuze and Guattari 1994, 173; emphasis original). Operating in ‘the zone of indiscernibility of beast and man’ (Deleuze and Guattari 1994, 179), affect is both based on species difference and allows for its transcendence. Critiques of the colonial frameworks of new materialism and the ontological turn offer important counterpoints to such perspectives on species difference (e.g., Todd 2016). Affect theory has long been concerned with mediating between culture and ontology and applying it to interspecies functional music offers a potential framework for its robust use in understanding acoustic violence. The example of the Mosquito is useful because it demonstrates the importance of understanding the cultural basis of vernacular notions of sonic ontology; attending only to the physical materiality of soundwaves at the expense of investigating their cultural frameworks, or vice versa, would miss much of the larger picture.

So: the ontological, precultural understandings of sound which are foundational to the Mosquito are made apparent partially through its investment in interspecies sonic communication, an investment which is part of a genealogy that ties the Mosquito to programmed music and lo-fi. What might first appear to be humorous animal metaphors are in fact openings through which an investment in interspecies sonic communication can be observed. These are the same investments which are latent in, but central to, the imaginaries of programmed music and lo-fi. The Mosquito cannot be properly understood, and thus effectively critiqued, without an understanding of the culturally-specific investments in interspecies vibrational ontology – through both sound and affect – which link it to other forms of functional music.

The preceding paragraphs present an example of how programmed music and lo-fi, and the critique surrounding them, can enable better understandings of a contemporary form of acoustic violence; I do not claim that my attention to these linkages through interspecies relationalities is the definitive or proper way to interrogate the Mosquito, but rather a particularly interesting example of how such critique might function. The above discussions of how programmed music and lo-fi have been studied and critiqued present other paths forward as well. How might understandings of the politicized and utilitarian nature of silence developed for Muzak and lo-fi better explicate the perceived public nature of the space into which the Mosquito intervenes? How might the Mosquito’s racial politics be analyzed with or against the notion of pseudoindividuality as it has been used to better understand programmed music? How might lo-fi’s reworking of the notion of ‘low fidelity’ fit together with the analysis of programmed music’s ‘aesthetic of loudspeaker sound’ to elucidate the role of the loudspeaker as a medium through which the Mosquito functions?
I have been arguing throughout this article that programmed music, lo-fi, and acoustic violence are interlocking nodes on a shared genealogy of functional music. In making such an argument, I am not seeking to equate the experience of listening to a lo-fi stream with that of being subjected to sonic torture. Indeed, I am following scholars such as Sianne Ngai (2015) and J. Jack Halberstam (2011) in looking to mass-market commodities such as programmed music and lo-fi as sources of inspiration for the critique of institutionalized violence. Along with Anne Anlin Cheng, I am invested in the analysis of how ‘an economy of trivial things alter[s] how we think about the indispensability and expendability that inform labor and life, people and things’ (Cheng 2019, 17).16

The apparent mundanity of early forms of functional music, such as programmed music in shopping malls, is belied by the Muzak corporation’s technological, political, economic, and philosophical ties with the US military; locating the direct instrumentalization of acoustic violence within the same genealogy as Muzak is thus perhaps an all-too-obvious move. What is important, however, is not the identification of this genealogy in-and-of itself; rather, it is what the elucidation of this genealogy enables.

This branching genealogy of functional music allows not only for an understanding of acoustic violence which is nuanced by the history of and commentary on programmed music and lo-fi, but also a reinterpretation of the relationship between these three phenomena which enables more robust understandings of their social positionings and histories. Despite the moniker of ‘functional music’ I have been using throughout this article, these practices cannot be understood solely as ‘music’ in any traditional sense, as their meaning (as understood by many of their practitioners) depends upon culturally specific notions of sonic ontology. They are, to borrow a Muzak marketing slogan from the 1960s, ‘more than music.’ To better understand these practices, scholars must embrace the tension between ontological and cultural approaches to the study of sound, examining the porosity between culture and ontology that is already demonstrated by the Mosquito and innumerable other technologies and practices within the genealogy of functional music. It is in its interconnections with the histories of other sonic practices that the keys to understanding contemporary forms of acoustic violence lie.

16It is important to acknowledge that I am personally imbricated in these histories. My current institution, Cornell University, was one of three universities contracted by the CIA to develop the techniques of psychological warfare that would come to include no-touch torture (Cusick 2006). The funding that supports my research and teaching is thus connected, even if indirectly, to the military-academic regimes which enabled the development and proliferation of sonic torture in the first place.
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