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Perfect Pitch

432 Hz Music and the Promise of Frequency

ABSTRACT 432 Hz music is a relatively recent internet-based phenomenon that has attracted listeners and musicians from all parts of the world. Increasingly connected via social media, listeners in this subculture do not necessarily share the same musical tastes or backgrounds. Rather, they have in common a belief that music tuned to the standard pitch of A-440 Hz is in some sense “out of tune” with nature or humanity. Alternatively, they prefer (and in some cases promote and advocate for) music that is tuned to a slightly lower, A-432 Hz standard. This preference is, for many, connected to beliefs that the A-432 Hz tuning reference can be physically, psychologically, and even spiritually beneficial. This article examines the promise of—and skepticism towards—the concept of “frequency” that is at the center of the 432 Hz phenomenon. It draws from research into some of the common historical, scientific, and conspiratorial claims made by 432 Hz advocates, as well as from qualitative data collected from dedicated 432 Hz listeners. After exploring the listening practices and media engagement of 432 Hz proponents, the article asks how the rise of 432 Hz music might relate to other recent and emerging forms of music consumption, the affective marketing of sound, and the management of personal sonic space.

KEYWORDS Popular Music, subcultures, tuning, sound studies

INTRODUCTION

When Lyndon LaRouche died in February 2019 at the age of 96, obituaries remembered him as a far-right political figure who ran for U.S. president eight times and later served a prison term for mail fraud and tax evasion. In his lifetime, LaRouche was known for promoting controversial political and economic causes heavily informed by conspiracy theories. Alongside some of these more extreme agendas, LaRouche also maintained a longstanding commitment to a specific matter of musical reform. In 1989, a LaRouche entity called the Schiller Institute petitioned the Italian legislature to abandon the standard pitch used worldwide as a musical tuning reference in broadcasting, musical instrument manufacture, and in educational and arts institutions. Instead of using the international standard pitch of A-440 Hz, LaRouche’s petition argued that Italy should adopt a slightly lower pitch reference, such that the note “A” above middle “C” would instead be tuned to 432 Hz. At the time, the campaign found supporters among some of the biggest names in opera, such as Plácido Domingo, Luciano Pavarotti, Renata Tebaldi, and Birgit Nilsson. Although this particular initiative was ultimately unsuccessful,

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LaRouche and the Schiller Institute would continue for decades to argue that this subtle change in musical tuning was essential to the preservation of Western art music.¹

Twenty-five years later, in what would seem an unlikely development, the question of an A-432 tuning standard was being hotly debated in certain corners of the internet. For instance, when pop artist Prince hosted a live Q&A on Facebook in 2014 to promote his new album *Art Official Age*, a fan posted a question for the pop star: “Greetings my dear Brother . . . Please address the importance of ALL music being tuned to 432 Hz sound frequencies???” Prince (who had ignored other fan queries) responded to this one by posting a link to an article on a website called collectiveevolution.com. Titled “Why You Should Consider Converting Your Music to A-432,” the article included video demonstrations, audio clips, quotes from Nikola Tesla and Albert Einstein, and links to resources from elsewhere on the web, all encouraging readers to reconsider the A-440 standard. Moreover, the site suggested ways in which curious listeners could experiment with audio software in order to lower the pitch of their digital music files. Since the distance between the international standard pitch of A-440 and A-432 is less than a third of a semitone (31.7 cents), the difference would have been unnoticeable for most listeners.² Yet the article raised questions that any music lover could potentially find disconcerting: Can some musical notes “generate negative effects on human behavior and consciousness?” Can music that sounds good be simultaneously “disharmonious with the natural resonance of nature?” Has modern music strayed from musical truths known to Paleolithic man, Tibetan monks, and great composers such as Mozart and Verdi (not to mention Prince)? And what forces might have conspired to make all of our music “out of tune?”³

In the past several years, online sources like the ones shared by Prince have imbued the idea of “432 Hz” with great musical and mystical significance. Concomitantly, the nature of skepticism towards the internationally accepted A-440 tuning standard has morphed considerably from the pre-internet days of LaRouche’s campaign in Italy. The 1989 campaign had hoped to change the standard pitch of elite institutions of opera and orchestral music in order to protect revered classical repertoire and voices. Today, the issue of tuning to A-432 is no longer about performance practice but instead about the potential implications of “frequency” for those who consume music, irrespective of genre. As is apparent from online discussion forums, YouTube comments, and blog posts about the issue, “432 Hz” has emerged as an uncommon musical preference for a small but global subculture of listeners who create, consume, and share music, audio-engineering know-how, and personal testimony about it online. High-profile artists who promote 432

1. The Schiller Institute, “The Campaign to Lower Tuning Pitch,” 2001, https://archive.schillerinstitute.com/music/petition.html#c=256_petition.

2. To hear for yourself, please compare, for instance, the original album version of Adele’s (2011) “Someone Like You,” <https://www.youtube.com/watch?v=hLQj3WQQoQo>, with a version uploaded by YouTube user Sun432 (2011) that has been pitch-shifted: <https://www.youtube.com/watch?v=HhuTcmpJ5FU>.

3. Elina St-Onge, “Why You Should Consider Converting Your Music to A-432,” *Collective Evolution*, 21 December 2013, <https://www.collective-evolution.com/2013/12/21/heres-why-you-should-convert-your-music-to-432hz/>.

Hz include Terrence Howard, Andrea Bocelli, and the rapper XXXtentacion. Social media have amplified the more dubious and controversial arguments made in favor of 432 Hz music, inviting critique from those who reject the trend as pseudoscientific—a symptom of a cultural moment where online “fringe” subcultures easily converge with conspiracist worldviews.⁴ But social media have also connected listeners who prefer 432 Hz music and employ it as a personal wellness tool; many of these now identify as part of a global community of listeners that advocates to change the international standard pitch.

This article approaches 432 Hz music as an unconventional listening preference rooted in the varied and disputed promises of “frequency.” Without litigating its historical and scientific claims, I offer a preliminary analysis of the culture around 432 Hz music, suggesting it can be understood as an alternative media practice shaped by particular understandings of the utility, purpose, and perils of everyday music consumption—ideas unforeseen in the debates over 432 Hz tuning from the 1980s.⁵ After introducing the online discourses that have emerged in the past few years and have imbued 432 Hz with cosmological, therapeutic, and historical significance, I discuss the experiences, beliefs, and media practices of dedicated 432 Hz listeners, a topic that has not until now been academically studied. Taking inspiration from Anahid Kassabian’s work on today’s culture of “ubiquitous listening,” and adapting Mack Hagood’s work on “orphanic media,” in the final section of this article I examine the ways in which 432 Hz listeners use processes of “conversion” to remediate musical source material in order to regulate sonic consumption. Such practices, I suggest, respond to how our constant connectivity seemingly exposes us to unwelcome (or suspect) media and thus generate novel modalities of listening.⁶

In addition to other sources, this paper builds on information gathered from personal communication with individual 432 Hz listeners and creators, as well as from data collected from 118 individuals who responded to an online survey in the winter of 2019; this survey collected qualitative data about the listening habits, musical ideologies, and sensory experiences of listeners who consume 432 Hz music. Although my research shows that many 432 Hz listeners are also musicians (some of whom create and distribute original 432 Hz music on platforms such as Bandcamp and SoundCloud), my main focus in this article is on 432 Hz music “converted” from commercial recordings and consumed via digital technologies. Also informing what follows are several hundred user reviews,

4. This phenomenon has been explored in other contexts by Michael Barkun, *A Culture of Conspiracy: Apocalyptic Visions in Contemporary America*, 2nd ed. (Berkeley: University of California Press, 2013).

5. When musicians or music scholars have weighed in on the 432 Hz phenomenon in online forums, they commonly take a “debunking” approach to 432 Hz music, as opposed to my aim in this article, which is to describe the background of this phenomenon as well as document some of the experiences of individual listeners, without regard to the scientific or historical legitimacy of particular claims. For one example, see Milton Mermikides, “Hertz so Good? The resonating delusion of the 432 Hz movement,” *The Blog of the School of Arts at the University of Surrey*, 23 April 2014, <https://blogs.surrey.ac.uk/arts/2014/04/23/432-hz-so-good/>.

6. Anahid Kassabian, *Ubiquitous Listening: Affect, Attention, and Distributed Subjectivity* (Berkeley: University of California Press, 2013), xviii–xxi; 109–12; Mack Hagood, *Hush: Media and Sonic Self-Control* (Durham: Duke University Press, 2019).

queries, and communications related to the iOS and Android versions of the smartphone app 432 Player, which are occasionally quoted below.⁷

ACCESSING AND CREATING 432 Hz MUSIC

Since its beginnings in the early 2000s, 432 Hz music as an online phenomenon has been largely YouTube-based, and the site is still the most common way in which fans find and share music and information. In terms of content, much of what is tagged “432 Hz” on YouTube consists of extended recordings of electronic music intended for meditation, relaxation, or sleeping. The music and visual images of these videos, which have titles such as “432 Hz Magical Dreams, Powerful Vibes” and “432 Hz Healing Feminine Energy,” are of a piece with what are sometimes called New Age, ambient, or functional musics. Classical music tagged as “432 Hz” is often explicitly promoted as background music for relaxation or studying. For instance, the YouTube channel “Meditative Mind,” which began in 2009, boasts “classical masterpieces by . . . Mozart, Beethoven, Bach in 432 Hz . . . for calming the mind.” One of their videos, “The Best of Mozart - Slowed Down @ 432Hz | 4.5 Hours,” has nearly three million views.⁸

But offerings on YouTube for those seeking 432 Hz music now go well beyond these categories and encompass commercial recordings by mainstream artists. This content is uploaded to channels by creators using audio software to lower the original pitch of a track (presumed to be tuned to A-440) to bring it closer to an A-432 tuning reference. This process, in the 432 Hz world, is referred to as “conversion.” Conversion is achieved by one of two methods: a track can be pitch-shifted using an algorithm that will produce a track that is slightly lower in pitch, but the same tempo, as the original. Or, the track can be time-stretched, meaning the pitch is lowered by slowing the track down slightly. Before 432 Hz versions of mainstream music became common on YouTube, curious listeners had to convert their personal digital music libraries using audio-editing programs (and, more recently, software products specifically marketed to 432 Hz listeners). This is the way many YouTube channels originally started. The creator of one of the longest-running and consistently updated 432 Hz YouTube channels recalls his early years making YouTube content from his own music library:

I began doing this in 2012 . . . I learned how to convert songs myself using the Audacity program and began doing some of my own personal favorites. There were a few channels doing classical music mainly in 2012. [Another user’s 432 Hz channel] was one of the few doing newer songs, he had mainly Beatles at the time, then we both

7. User reviews of the 432 Player app cited in this article were provided to me by the software developers of the app and date from 2013 to 2019. Thanks to Ophir Paz and Matan Dahan for giving me access to this material.

8. Meditative Mind, “The Best Of Mozart - Slowed Down @ 432 Hz | 4.5 Hours,” YouTube Video, 4:32, 16 May 2015, <https://www.youtube.com/watch?v=BI8Y44J6Mgl>. Such “relaxation” music with the label “432 Hz” is also available on the most commonly used platforms for streaming music today (Spotify, Apple Music, Amazon Music). For more, see Freya Jarman, “Relax, Feel Good, Chill Out: The Affective Distribution of Classical Music,” in *Sound Music Affect*, ed. Marie Thompson and Ian Biddle (New York: Bloomsbury, 2013): 183–204. On music and sleep apps, see Anahid Kassabian, “Music for Sleeping,” in *ibid.*, 165–82.

started doing newer, popular songs . . . we would comment back and forth and like each other's videos.⁹

Today, the number of 432 Hz channels and listeners is still small, allowing opportunities to communicate with one another and maximize the sharing of 432 Hz content. For instance, before uploading a song, a creator I spoke with will generally check to make sure another 432 Hz channel hasn't already posted it (to avoid competing for views). His channel also responds to requests from individual subscribers for 432 Hz versions of particular songs.¹⁰

Thanks to the increased accessibility of digital audio editing software, such as Audacity and Adobe Audition, as well as several popular YouTube tutorials demonstrating DIY techniques for creating 432 Hz music, there has been an increased volume and variety of music videos labeled "432 Hz" on YouTube in recent years. Although songs are occasionally taken down for copyright infringement, it is relatively easy to find 432 Hz versions of songs by any popular artist: The Police, Metallica, Drake, Lizzo, Lil Nas X, Taylor Swift, and Ariana Grande are all represented. Jazz fans can hear Duke Ellington, Herbie Hancock, and Esperanza Spaulding in 432 Hz. The classical offerings on YouTube now far surpass "slowed down" versions of Mozart and include Scarlatti keyboard sonatas, Bruckner symphonies, Mendelssohn oratorios, and Handel concerti.

432 Hz music moved beyond YouTube in 2013, when the first smartphone app developed for 432 Hz music was released. Called 432 Player, the app was created by Israeli software developers Ophir Paz and Matan Dahan, who wanted to share their "love of pure tuned vibrations with the 432 community all over the globe."¹¹ The 432 Player functions as a general music player that can also lower the pitch of MP3s via pitch-shifting or time-stretching in real time, offering a button to toggle between "Converting to 432 Hz" and "Not Converting to 432 Hz." Originally developed for iOS, a version for Android was released in 2016, triggering a flood of downloads. The app caught the attention of the Spanish guitar duo CARisMA, which promoted the app while on tour with the singer Andrea Bocelli in 2015. Since launching, the developers have observed that increased visibility of 432 Hz music, both on- and off-line, has attracted new users to the app. According to the developers, as of the fall of 2020 they had about one million organic downloads. A surge of downloads followed a post about 432 Hz tuning by Spanish vlogger Jose Luis Camacho Espina in 2015, and downloads from Puerto Rico increased following a public talk on the subject given at the Mita Church in Hato Rey.¹² More recently, in May 2019, increased interest in the app was linked to a video by the YouTube personality Solluminati (Javontay Baynes), in which he endorsed 432 Hz music as part of an homage to murdered rapper XXXtentacion, who had been a 432 Hz proponent.¹³

9. Anonymous, personal email communication, 3 February 2019.

10. Ibid.

11. 432 Player, "The 432 Player – Music the Natural Way," <https://www.432player.com/>.

12. Ophir Paz, personal email communication, 30 November 2017.

13. Spiritual So, "XXXtentacion was RIGHT," YouTube Video, 7:17, 29 May 2019, https://www.youtube.com/watch?v=_IWgovrW-Zo&t=116s.

The introduction of 432 Player has enabled listeners to engage in mobile listening of their personal music library pitch-shifted in real time. According to reviews of the app by users who were already listening to 432 Hz music, the app eliminated the “hassle” and “lengthy process” of “manually converting” one’s music library.¹⁴ For new listeners curious to experience the sound of 432 Hz music, the app is an attractive point of entry since requires no specialized audio skills. Indeed, the website for 432 Player invites users to “Press play and start feeling the vibes.” The 432 Player app has also prompted 432 Hz listeners to connect via social media. On the 432 Player Facebook page, people share testimonials about how “retuning” has improved their music and their lives. The player welcomes users with the message, “The 432hz community is rising,” suggesting that users might identify themselves with a burgeoning global movement based on the alternative tuning.

THE CASE FOR 432 HZ: HISTORY, CONSPIRACY, COSMOLOGY

But why retune? As evidenced by the eclecticism of the site to which Prince sent his fans in 2014, there is no single argument in favor of 432 Hz music to which its proponents all ascribe. Online debates and discussions about 432 Hz usually reflect prevailing themes that fall into three general categories. One category of claims argues that an A-432 tuning standard is more historically legitimate than A-440. A second, and related, category encompasses conspiracy theories that attribute the A-440 tuning standard to nefarious political and economic actors. Finally, the most eclectic and influential category encompasses claims that music tuned to an A-432 standard has special natural or cosmic qualities that make it physically, psychologically, and spiritually beneficial to listeners.

The idea that A-432 is a more historically legitimate pitch reference than A-440 has its roots in the fickle history of European and North American tuning standards. Before about 1750, no single pitch standard existed Europe. This was evidenced in the work of Alexander Ellis, a British mathematician, philologist, and pioneer of pitch measurement. In the first systematic study of the history of pitch standards in 1880, Ellis showed that these varied widely depending on historical period and locale. Ellis’s research also showed that historical disparities in pitch standards had become more notable and problematic in the latter part of the 1800s, as soloists, ensembles, and composers began to travel between Europe’s major musical centers.¹⁵

Significantly, Ellis’s work documented not only large disparities in pitch standards, but also a gradual trend of pitch “inflation” in Europe and North America during the 1800s. According to Bruce Haynes, in the 1830s, France was tuning around A-438, Germany and Austria closer to A-444, and England around A-450. With expanding orchestras performing in larger concert halls, musicians and audiences came to prefer the ever more brilliant and bright sound afforded by a higher concert pitch. At mid-century, Ellis’s

14. Apple and Android reviews submitted by users Koorosh Saxton (2016); Ben Thomas (2017); Eric Florence (2015).

15. Bruce Haynes, *A History of Performing Pitch: The Story of ‘A’* (Lanham, MD, and Oxford: The Scarecrow Press, 2002), 302.

research showed that most countries were tuning close to A-450, with England still the highest at A-455.¹⁶ Touring singers complained of the vocal strain caused by high and variable pitches and used their clout to protest. In 1824, the *prima donna* Alexandrine-Caroline Branchu successfully campaigned to lower the pitch at the Paris Opéra from A-431 to a pitch standard of A-413 (last used there in 1780), which required the purchase of expensive new instruments and drew the ire of figures like Rossini, who was outraged to sacrifice the “brilliance and force” of the orchestra for the sake of a singer.¹⁷ The desire to curb this pitch inflation and standardize the major orchestras prompted national and international efforts to establish pitch standards. Regulations were adopted, with Germany instituting A-440 in 1834. In 1859, the French government established the *diapason normal* of A-435, which was quickly adopted by many of the major European concert halls. In 1917, the American Federation of Musicians adopted A-440 as “American Standard Pitch.” In 1939, the International Standardizing Organization (ISO) met in London to adopt a pitch standard, and after much debate A-440 was agreed upon. As World War II had interrupted full implementation, this pitch was reaffirmed in 1953.¹⁸ Although the point may seem obvious, the adoption of an international pitch standard did not result in its universal implementation. Many modern symphony orchestras tune slightly above it, using A-441, 442, or 443 Hz as a tuning reference; early music ensembles commonly tune to A-415, and, obviously, individual musicians and ensembles can use any tuning standard (or system) they desire.

When Lyndon LaRouche began his battle against the A-440 standard in Italy in the late 1980s, he drew from this documented history of pitch inflation to advance his cause. LaRouche argued that the A-440 pitch adopted in 1939 was too high and that it threatened the health of vocalists and the integrity of the operatic tradition.¹⁹ Publications out of his Schiller Institute referred to the A-432 standard as “Verdi Tuning,” and asserted that the Italian composer had been a proponent of an A-432 standard. Verdi had, in fact, promoted standardization and fought pitch inflation, but neither of the two academic monographs of the history of performing pitch supports the strong identification LaRouche made between Verdi and the precise pitch of A-432.²⁰ Nevertheless, LaRouche’s branding of A-432 as “Verdi tuning” was solidified by several articles about orchestral pitch inflation in *The New York Times* and other outlets

16. *Ibid.*, 345.

17. *Ibid.*, 330–32.

18. *Ibid.*, 344, 361.

19. A higher pitch standard will affect the tessitura, or ideal range, of a singer’s voice. When the pitch standard for a particular piece of music is shifted, it will change the points at which the vocalist must shift register (from chest to head voice, for example), and can create infelicities in a melodic line. But for singers themselves the biggest concern is the vocal strain that even small changes in pitch standards can cause. This is a risk especially in female voices, since higher vocal parts are more drastically affected than low ones.

20. According to Haynes, in his lifetime Verdi heard his music performed using many different pitch standards and advocated that a standard be adopted for the sake of consistency. Haynes points to Alexander Ellis, who documented that the opera house in Milan was at 447 when Verdi premiered an opera there and in 1859 premiered another opera in Venice that Ellis had measured at around 450. For some performances in Italy, Verdi formally requested the use of *diapason normal* (A-435). See Haynes, *Performing Pitch*, 346, 353, 364n25. See also Pietro Righini, *La Lunga Storia del Diapason* (Bérben: Arcona, 1990).

during the 1980s.²¹ Today, discourse surrounding 432 Hz music continues to reflect a somewhat confused embrace of the history of tuning, making such claims as, “The great classical composers Mozart, Beethoven and Verdi created their masterpieces in 432 Hz.”²² A YouTube video of Vivaldi’s *The Four Seasons* invites listeners to “Enjoy this great piece of art at original frequencies.”²³ By invoking the names of composers such as Verdi and Mozart, claims about the historical validity of 432 Hz benefit from the cultural legitimacy afforded to classical music.

In addition to forging the connection between Verdi and the A-432 tuning standard, LaRouche is partly responsible for the conspiracy theories about the A-440 pitch standard that have become a major (and much ridiculed) element of the 432 Hz vs. 440 Hz debate today. In a LaRouche publication from 1988, still currently circulating online, LaRouche associate Laurent Rosenfeld argued that the Third Reich had been instrumental in the adoption of the A-440 tuning standard. His article, titled, “How Nazis Ruined Musical Tuning,” claimed that Joseph Goebbels, then director of the Acoustic Committee of Radio Berlin, was instrumental in the 1939 ISO meeting in which the A-440 pitch was adopted. Rosenfeld suggested the Nazis had excluded any dissenting voices from the conference and bowed to the interests of instrument makers who wanted to expand into the American market, “where the influence of jazz had raised the pitch to 440 and well beyond.”²⁴

It is not difficult to see how LaRouche-based conspiracy theories about A-440 would come to dovetail with historically backed claims about the legitimacy of 432 Hz. The A-440 conspiracy theory builds upon historical fact to create skepticism about why pitch standardization exists at all and identify bad actors who “imposed” A-440 on unwitting listeners. For music consumers with little musical experience, discovering the mere existence of a relatively modern, international standard pitch can inspire curiosity and doubt. A 432 Hz listener interviewed for this project described her discovery of 432 Hz music, “It was beyond anything I had ever heard . . . I had to know more. What is 432hz frequency and why is most music played by society now tuned to 440hz? Has it always been this way? With these questions, I had to have answers . . . and the search began!”²⁵ Even some musicians, who may have assumed A-440 to be a sort of inviolable acoustical law practical have expressed discomfort about the pitch standard. The electronic musician Richard D. James (Aphex Twin), who experiments with alternate tunings, recalled when he got his first synth, “I remember looking at the master tuning of 440 Hz and thinking I would change it, for no other reason apart from it was set by default to that frequency

21. The story of pitch inflation in classical music, battles over musical tuning in major orchestras, and Lyndon LaRouche’s “Verdi’s Pitch” garnered attention in the music sections of prestigious periodicals. See Fred T. Abdella, “As Pitch in Opera Rises, So Does Debate,” *The New York Times*, 13 August 1989; Bernard Holland, “Singers Join in Lament about Rising Pitch,” *The New York Times*, 1 January 1989; A. Porter, “Musical Events: Touching Pitch,” *The New Yorker*, 1 May 1989; Joseph McLellan, “Lyndon LaRouche’s Pitch Battle,” *The Washington Post*, 27 May 1989.

22. <http://returnto432.blogspot.com/p/432-benefits.html>.

23. ClassicalMusic432 Hz, “Antonio Vivaldi - Four seasons - complete at 432 Hz tuning,” YouTube video, 42:01, 8 March 2015, <https://www.youtube.com/watch?v=6f3DV-PoljY>

24. Laurent Rosenfeld, “How the Nazis Ruined Musical Tuning,” *Executive Intelligence Review* 15, no. 35 (1988).

25. Kaili Maluskas, personal email communication, 16 January 2018.

and that it could be changed . . . I've since gone on to learn more about this damn 440 Hz. It was a standard introduced in 1939 by western governments, so I'm very glad I trusted my instincts."²⁶

The connection that Rosenfeld made between A-440 and the Nazis back in 1988 provides a foundation upon which today's A-440 conspiracy theories now proliferate on the internet, recently even popping up in discourse related to QAnon. Although Rosenfeld made no such claim, online iterations of the conspiracy theory today identify what they call malevolent entities (the Illuminati, the Rockefeller Foundation, or the music industry generally, etc.) that supposedly use A-440 as a tool of covert manipulation because it causes feelings of stress, aggression, and confusion in listeners. In a 2010 article online entitled "Musical Cult Control," Leonard G. Horowitz argues, "The monopolization of the music industry features this imposed frequency that is 'herding' populations into greater aggression, psychosocial agitation, emotional distress . . . predisposing people to physical illness, financial impositions profiting the agents, agencies, and companies engaged in the monopoly."²⁷ Such claims are frequently invoked in discussions of 432 Hz music, becoming part of an arsenal of justification for 432 Hz music. For instance, a blog selling "Return to 432" conversion software offers "wellness" products almost wholly based on Horowitz's "scientific" claims. It refers to 440 Hz as a "silent invader" that was "set into motion nearly 100 years ago by some crafty and conniving philanthropists named Rockefeller and Rothschild. From information gathered in the late 1800s about the detrimental effect of certain vibration sequences on the human body, the simple tuning of what had been standard for millennia changed from 432 Hz to 440 Hz."²⁸

Today's conspiracy theories about musical tuning are premised on the idea that music tuned to A-440 negatively affects the human body or mind and can thus be weaponized against listeners. The same premise is at the heart of the speculation most commonly expressed by 432 Hz proponents, which is that 432 Hz has special scientific, cosmic, or occult qualities that make it preferable and/or beneficial to tune to. The idea that music has the potential to affect our mental and physical state is commonplace and finds expression in a multitude of contexts (in western literature, Plato, Aristotle, and the myth of Orpheus are just some of the most familiar instances). New Age spiritualism and alternative medicine embrace sonic practices and tools (crystal bowls, gongs, etc.) that rest on the idea that certain combinations of sounds or vibrations can resonate with, relax, and heal the body.²⁹ Smartphone technology has made tools such as natural soundscapes, guided meditation, and sleep apps easily accessible for the same purpose.

In the case of 432 Hz music, its benefits are largely promoted in an eclectic discourse that draws from New Age spiritualism, alternative healing (with an emphasis on the

26. "Richard James Talks to Tatsuya Takahashi," Warp.net, 6 October 2017, <http://item.warp.net/interview/aphex-twin-speaks-to-tatsuya-takahashi/>.

27. Leonard G. Horowitz, "Musical Cult Control," *Medical Veritas*, 7 May 2015, <https://medicalveritas.org/musical-cult-control/>

28. <http://returnto432.blogspot.com/p/about-432-hz.html>

29. Owen Coggins, "Dirty, soothing, secret magic: Individualism and spirituality in New Age and extreme metal music cultures," *Popular Music*, 38, no. 1 (2019): 105–20.

significance of the chakra system), astronomy, astrology, numerology, and cymatics (the study of how vibrations move through different media). One common trope seen in discussions of 432 Hz music is the electromagnetic resonance phenomenon sometimes called the “Earth’s Heartbeat,” or “Schumann resonances.” Named after the physicist who identified them in 1952, these result from lightning strikes that occur between the earth’s surface and the ionosphere. These extremely low frequencies (the fundamental of which measures at about 8 Hz) are characterized by NASA as a “repeating atmospheric heartbeat.” Scientists use them to track global lightning activity and temperature variations.³⁰ Some adherents to the idea of 432 Hz tuning believe that this “heartbeat” resonates sympathetically with music tuned to A-432, such that our bodies’ atoms, thought waves, and even our DNA respond positively as we listen.³¹

References to Schumann resonances lend a sense of scientific rigor to discussions of 432 Hz, as does a commonly cited written source on the topic—a 1984 book by Maria Renold. An acolyte of the mystic Rudolf Steiner, founder of the Anthroposophical Society, Renold shared Steiner’s belief in the metaphysical significance of music, the “cosmic sources of musical inspiration,” and the “occult experience” of musical modes.³² Renold’s book, *Intervals, Scales, Tones, and the Concert Pitch C=128*, argued for the cosmic significance of A-432 Hz based largely on numerology. But Renold also conducted listening experiments on more than two thousand individuals, 90% of whom, she reports, preferred the A-432 tuning and found music tuned to A-440 to cause discomfort, irritation, and pain. Her published work does not meet conventional academic standards, yet I mention it here because her work is frequently cited as “scientific proof” of the natural human preference for A-432 tuning.³³

LISTENING TO 432 Hz LISTENERS

The three categories of argument in favor of 432 Hz music outlined above dominate online debates about its merits. But for those engaged in habitual listening to 432 Hz music, at least as persuasive as any historical or scientific evidence are their personal physical and psychological experiences as listeners (and, for some, as musicians). It bears

30. National Aeronautics and Space Administration, “Schumann Resonance,” 28 May 2013. https://www.nasa.gov/mission_pages/sunearth/news/gallery/schumann-resonance.html

31. The website to which Prince directed his fans includes a statement of this sort, “It is said that 432 Hz vibrates with the universe’s golden mean, Phi, and unifies the properties of light, time, space, matter, gravity, and magnetism with biology, the DNA code, and consciousness . . . The number 432 is also reflected in ratios of the sun, Earth, and moon, as well as the procession of the equinoxes, the Great Pyramid of Egypt, Stonehenge, and the Sri Yantra, among many other sacred sites.”

32. Rudolf Steiner, *The Inner Nature of Music and the Experience of Tone* (Herndon, VA: Anthroposophic Press, 1983).

33. Because her book was published within a few years of LaRouche and Rosenfeld’s own manifestos on pitch standards, it is possible that it was Renold’s conclusions (and not Nazi experiments, as is often claimed) that substantiated conspiracy theories premised on the idea that A-440 had been “proven” to have negative effects on humans. Maria Renold, *Intervals, Scales, Tones and the Concert Pitch c=128 Hz*, trans. B. Stevens (East Sussex: Temple Lodge, 2004). A more recent, academic study to determine whether listeners displayed a preference for music tuned to 432 Hz vs 440 Hz found a slight preference for 440 Hz among its subjects. See Hugo Fastl, “Basics and Applications of Psychoacoustics,” *Proceedings of Meetings on Acoustics* 19 (2013), 10–11.

repeating here that music that has been converted to 432 Hz from its original tuning is not dramatically altered in terms of its formal musical elements or style. This distinguishes 432 Hz music from other internet-based music genres that are stylistically defined by pitch-shifting or time-stretching, such as forms of electronic dance music, nightcore, vaporwave, or “chopped and screwed” remixes of pop songs. In fact, the adjustment to pitch and/or speed of a converted track is so subtle that YouTube comment sections for songs labeled 432 Hz routinely contain user disputes over whether the track is actually converted or is “still in 440 Hz.”

Nevertheless, dedicated listeners of 432 Hz music claim to experience it as anywhere from noticeably to profoundly different from music tuned to the A-440 standard. In response to an online survey circulated for this project and targeted towards habitual listeners of 432 Hz music, in addition to listening to meditative and ambient music, 432 Hz listeners report regularly listening to 432 Hz/converted versions of mainstream artists, including Ed Sheeran, Duran, Phil Collins, Pink Floyd, The Red Hot Chili Peppers, Janelle Monae, Rush, Bruno Mars, Daft Punk, The Who, and Europe. They report converting and listening to a wide range of traditions and styles of music, including bhangra, lo-fi, classical, chill-step, gnawa, indie-rock, and country. Despite the familiarity of the music and the artists being consumed, these listeners find the sound of 432 Hz music distinct from and preferable to that of “regular”/non-converted music. Asked to articulate further, some respondents explained their preference using words associated with timbre. For instance, some said the sound of 432 Hz music was “warmer,” “softer, less harsh,” “more resonant,” “richer harmonically,” “clearer,” and “less distorted.” Some listeners find 432 Hz music to have a “better blend between voice and instruments” and reported that “slightly down-tuned music has a significant effect on the ability to hear specific background tones.” Another felt the music had “way more fidelity,” and that 432 Hz provides better “nuance and reverb.” Another commented: “The instruments and vocals sound a lot more present . . . [and] the instruments express nuances of sound I would not otherwise notice at 440 Hz.”³⁴ Users of the app 432 Player note how “music sounds completely different at the correct frequency,” and observe a “highly noticeable improvement” in music after conversion to 432 Hz. As one user wrote, “It’s like putting on a good pair of headphones and realizing how much yours used to suck.”³⁵

These comments attribute a perceived audible improvement in sound quality and tone color to 432 Hz music. But many listeners describe their experiences with 432 Hz music not in terms of what they hear, but rather in what they “experience” or “feel” as they listen. For a representative snapshot of these sort of reactions one can observe the

34. Participants for the anonymous, online survey were solicited via 432 Hz groups on social media sites, such as Facebook and YouTube, and responded from many different parts of the world. The survey was aimed at listeners who were already engaged in 432 Hz music in some manner. The survey collected information on listening habits, experiences, preferences with regard to 432 Hz music and music in general. The 118 respondents varied in their relative engagement with 432 Hz music. Approximately 11% of respondents exclusively listen to 432 Hz music; 53% report that at least half of the music they consume is 432 Hz, 22% were occasional listeners, and 14% of participants said they rarely listen to 432 Hz music.

35. Apple and Android reviews submitted by users Mark Gillette (2018); Marlon Bramlett (2018); Carlotta Hood (2013).

(specifically positive) comments left by users in response to a pitch-shifted, 432 Hz version of Adele's 2011 hit "Someone Like You" on YouTube. Users remarked, "It FEELS so much better in 432hz. She is so beautifully moving," and, "This version just FEELS happier, I love this," and, "I'm not listening, I am feeling the music." One user addresses the creator of the channel Sun432, writing, "Thank you for putting these great songs in 432 Hertz. To me this tonality hits my gut and heart where 440 has an annoying edge. It is soothing and more enjoyable."³⁶ The creator of a 432 Hz YouTube channel likewise emphasized the importance of "feeling" in his work converting and posting songs, "Above all I just really enjoy converting a song over to find out how it sounds and how it 'feels,' and then sharing it." A user of the 432 Player app enthused in a review, "Good god. It's nice to be able to actually feel the music."³⁷ Some anonymous survey responses characterized it this way: "I become the music, I feel it throughout my being," or more specifically, "I feel a slight pressure in the crown of my head while listening in 432 or 528 Hz . . . more vibrant," and, "It makes me shiver from extreme audio pleasure."

These responses speak to the affective (bodily, preconscious) response, the sort that, as writes Anaheed Kassabian, "takes place before conscious apprehension."³⁸ For 432 Hz listeners, the "feeling" of the music can trigger a sense of physical relaxation and emotional well-being. An interlocutor told me, "Listening to 432hz music allows my mind, body and soul to truly feel connected to the world around me . . . [even] just as background music, [it] provides a totally uplifting and lively environment . . . while relaxing my body and putting my mind at ease."³⁹

Indeed, some listeners report finding that 432 Hz music seems primarily a bodily experience, one that even seems to dampen mental stimulation and negative judgements that might give rise to anxiety. One survey respondent wrote, "Takes me out of my head into my heart space," and another, "It really cuts all the unnecessary 'noise' and useless thoughts." Online reviews of the 432 Player note, "It's quite different than all the built-in players. It's really peaceful," and, "I've never had an app that has improved the quality of my life so quickly. My mood is elevated when I listen to almost any song in 432 Hz."⁴⁰ The 432 Hz listeners I surveyed made similar comments when asked why they choose to listen to 432 Hz music. "It feels like bliss;" "It makes me feel good, the music feels more alive, making me feel more alive." A more detailed survey response explained,

[It's] calming, deepening my inner states, similar to when I meditate, inner love shared with audience and musicians when I perform, feeling inspired and joyful without feeling exalted [egotistical] even when performing at peak. For years I felt tormented by my strong passion and love for music as I was always out of balance and did not understand

36. Comments posted to Sun432, "ADELE | Someone Like You | A=432hz," YouTube Video, 4:44, 28 November 2011, <https://www.youtube.com/watch?v=HhuTcmpJFSU>

37. Android review submitted by user Valerie B (2016).

38. Kassabian, *Ubiquitous Listening*, xiii.

39. Malauskas, personal email communication, 16 January 2018.

40. Android reviews submitted by users Fatch Rao (2018); johnbellwrites (2017).

why so many music artists died young or had miserable lives, now instead I feel guided by inner intuition and I am on a better path.

For some listeners, the benefits of 432 Hz music go beyond an experience of physical relaxation and emotional well-being. Although there is a paucity of scientific studies dedicated to this subject, some listeners report using 432 Hz to alleviate chronic pain and other physical symptoms.⁴¹ A user of the 432 Player app observed, “With this app my daily appointment with headache is out!” A notable number of app users reported they can listen to music longer and at any volume with less discomfort or “stress” to their ears.⁴² One survey respondent said they used 432 Hz music “To heal stress and depression,” and others mentioned that they had discovered 432 Hz music while trying to manage conditions such as electromagnetic hypersensitivity and schizophrenia. The creator of a 432 Hz YouTube channel told me he used to suffer headaches as a result of chemicals he was exposed to at his job detailing cars. He explained,

I want to emphasize that when I first discovered the 432 Hz music on YouTube in July of 2012, I was in a lot of PAIN!! Headache pain from cleaning chemicals at work. One in particular that was used to test a mask I use. I had always heard and known that music had healing qualities, Bach in particular I heard many people said had healing qualities to his music’s sound . . . I noticed right away that the 432 Hz frequency was alleviating the headache pain and pressure, so that is how I came across the community in the first place. I was so excited about it, that I searched all I could online about it and eventually figured out how to convert songs myself.⁴³

“CONVERSION” AS SONIC SELF-CARE AND SELF-DEFENSE

Much of popular, online discourse around 432 Hz tuning amplifies and recirculates claims of dubious scientific or historical merit, and can veer into conspiratorial excess, as I described above. But in soliciting and analyzing feedback from habitual 432 Hz music listeners and creators for this project, a more nuanced picture of the 432 Hz user community starts to emerge. It is worth noting that out of more than one hundred responses to an anonymous survey, only two individuals mentioned the Illuminati, the Third Reich, or other specific conspiracy theory. Survey responses showed that while

41. Similar to studies that link classical music to health benefits (such as Uchiyama et al., 2012), what studies there have been produce ambiguous results due to problematic choices of music and/or listeners. A one-hundred-person study at the University of Florence played 432 Hz music to patients as they underwent dental procedures (Di Nasso et al., 2016). The study found fewer physical symptoms of anxiety in those patients who were exposed to five tracks played on pianos, guitars, synthesizers, and Eastern instruments that were tuned to a 432 Hz standard. The study concluded that “432 Hz music administered to subjects during root canal treatment significantly decreased” blood pressure and heart rate during the endodontic procedures (1338). The control group, however, was played no music, as opposed to A-440 Hz music in particular; no meaningful conclusion about A-432 Hz music can be drawn. Luca Di Nasso et al., “Influences of 432 Hz Music on the Perception of Anxiety during Endodontic Treatment: A Randomized Controlled Clinical Trial,” *Journal of Endodontics* 42 no. 9 (2016), 1338.

42. For example, “Can listen for hours.” Android review submitted by user Ashish Rana (2015), and “Finally, music doesn’t hurt my ears.” Android review submitted by user Blvkk Svn (2016).

43. Anonymous, personal email communication, 3 February 2019.

listeners had a preference for 432 Hz, this did not mean they were necessarily invested in its occult or cosmological meaning. One response read, “I personally don’t think there’s anything secret or mystical in it.” Another responded, “432 Hz has helped with the growth that I’ve had in my life . . . [although] some could think that all I’m saying is a delusion.” Another wrote that the positive effects they were experiencing were “likely” a placebo effect, but that this did not diminish their appreciation of 432 Hz music.

432 Hz listeners attribute significant meaning to that which is not necessarily *heard* but nonetheless profoundly experienced, and thus they direct their affective engagement with music in a way understood to support physical health and emotional well-being, privileging what Nina Eidsheim calls the “material ramifications of music” over aesthetic or generic preferences.⁴⁴ Nearly 70% of survey respondents reported that they consider listening to 432 Hz music to be part of other health and wellness practices they engage in, such as special diets, acupuncture, yoga, meditation, and so on. Such responses allow for some preliminary analysis of the 432 Hz phenomenon as a form of sonic self-care that also seems to promise listeners a measure of control or defense against that which seems “out of tune” in their immediate environment and in the broader world.

In this way, I would suggest that 432 Hz music might be usefully understood under the umbrella of “orphic media,” a term Mack Hagood uses to refer to “the technological fabrication of physical and psychological space through the aural.”⁴⁵ Orphic media promise to help the user cope with chaotic or stressful spaces via sound, with devices such as noise-canceling headphones, white noise machines, smartphone apps for sleeping, and in-ear smart devices offering the user “microspaces of freedom for the pursuit of happiness.”⁴⁶ Hagood demonstrates how, for example, noise-canceling headphones promise to remove undesired or “othered” sounds from the user’s environment, protecting the individualism of the neo-liberal self when forced to share public space where difference (both sonic and social) intrudes.⁴⁷ Similar to how noise-canceling headphones give the user an on/off interface with an imposed or unwanted soundscape, an app such as 432 Player gives the listener the option to toggle between converted/not converted music (“othered” sounds) and thus enter and exit their preferred sonic space at will.

Practices of conversion used by 432 Hz listeners promise to tune out what is negative in music (understood as “frequency”) without requiring the consumer to make a compromise based on genre, style or artist. In a sense, conversion effects a remediation of sonic material by “cleansing” it and creating a version understood to be a healthier option. The conceptualization of 432 Hz as a kind of healthy sonic diet is reflected in the language used by listeners and also in the way that conversion apps and services are marketed reflect this. For instance, the product “Return to 432” is marketed as a “*clean conversion* tool.”

44. Nina Sun Eidsheim, *Sensing Sound: Singing and Listening as Vibrational Practice* (Durham: Duke University Press, 2015), 3.

45. Mack Hagood, “Quiet Comfort: Noise, Otherness, and the Mobile Production of Personal Space,” *American Quarterly* 63, no. 3 (2011), 575.

46. Mack Hagood, *Hush: Media and Sonic Self-Control* (Durham: Duke University Press, 2019), 3.

47. On race and the marketing of noise-canceling headphones see Alex Blue V., “Hear what you Want: Sonic Politics, Blackness and Racism-Canceling Headphones,” *Current Musicology* 99-100 (Spring, 2017): 87–106.

Likewise, the 432 Player site says: “When we talk about music, we talk about *clean, pure* sound.” User reviews of 432 Player reflect this as well: “Been listening to *pure* 432 Hz music all week.”⁴⁸

As a practice of sonic self-care, the choice to consume 432 Hz music would seem to offer an appealing sense of control in a world of 24-hour connectivity, in which streaming services offer seemingly endless musical choice, and one is exposed constantly to “ubiquitous” music in workplaces, gyms, shops, and cafes. 432 Hz music offers the listener a framework in which to understand negative or overwhelming interactions with media by locating this negativity in a specific frequency (A-440) as well as opportunities to exercise self-control over what is aurally consumed. Once committed or conditioned to 432 Hz music, some listeners observe that other music feels unpalatable or unhealthy. In a recent documentary made by self-described 432 activists, an advocate observes, “When you really start listening, after returning to 440, you notice that something is wrong. It’s like the difference between organic and industrialized food.”⁴⁹ YouTube users sometimes comment that the original recordings give them headaches or make them feel uneasy or nervous after listening to 432 Hz versions. One listener told me she finds all A-440 music “disharmonious and distorted” when compared to her preferred 432 Hz music.⁵⁰

The desire for control over their physical and psychological space is evident in references to techniques of sonic self-defense reported by 432 Hz listeners who seek to avoid exposure to non-converted music. Some were somewhat casual about this (“If given a choice, I listen to 432 Hz”), while more than half agree that they make conscious efforts to avoid listening to non-432 Hz music. Techniques reported by listeners included the use of headphones, earplugs, the lowering of the volume of radio or TV if possible. A survey respondent wrote, “If I’m out at a venue to listen and the band is using standard 440 Hz tuning, I focus on the groove/rhythm or on ‘warm’ sounds and focus on the crowd more that night.” Another response said, “I just do not go out much . . . if I’m forced to, I can live with it as I retune myself back to 432 when I get home.” Another participant in this project responded,

I don’t consume much “non” 432 Hz music. I avoid it to the best of my ability, but surely it’s not always possible: at work, shopping, other’s music, when my parents watch TV, to name a few. Mostly I can avoid these situations by choosing to tune my mind into 432 Hz frequency where other unnatural frequencies don’t affect me nearly as much. After continued use and hearing of 432 Hz frequency, the difference is quite clear to me on every level so choosing to do would be torturous to the natural rhythm of life. For example, my boyfriend hasn’t converted his music to 432 Hz and can’t find them on YouTube so sometimes I do hear other frequencies besides 432 Hz which can reinforce why I don’t listen to it anymore.⁵¹

48. Android user review posted by Marlon Bramlett (2018). All emphases mine.

49. *432 Activists*, YouTube Video, 57:43, 19 February 2018, <https://www.youtube.com/watch?v=NbTjAOaNUmM>

50. Malauskas, personal email communication, 16 January 2018.

51. *Ibid.*

Most of this article has been about dedicated listeners to 432 Hz music and the community of listeners that engage with one another in online spaces. But one can observe how the culture and market of “wellness” and “self-care” increasingly incorporate sonic practices and products alongside other trends premised on detoxification, cleansing, and behavioral hygiene. Beyond the 432 Hz phenomenon, we may see “frequency” become more visible as an environmental element that consumers are persuaded to track and measure for their health and well-being. For instance, there are wellness websites that offer tips for achieving a “high vibration” lifestyle that tout particular diet and hygiene regimes along with 432 Hz conversion products. Consumers can purchase “high frequency essential oils” or a product called Body Vibes, (stickers for the skin that promise to contain frequencies to harmonize the body). The language of healthy and/or healing tones and frequencies is increasingly used to market all sorts of products. Automobile company Lexus is currently advertising the “Active Sport Exhaust” feature on their 2020 LC model to suggest that the car’s sound is calibrated (and scientifically proven) to optimize the driver’s mood:

Some sounds aren’t just heard, they’re felt. They move you, invigorate you. We were curious: Is it possible to create an engine sound that isn’t just subjectively thrilling, but scientifically? Studying the brain’s response to frequencies, we learned that while 400-Hz notes produce a feeling of composure, 800-Hz notes produce a feeling of elation. Tuning components down to the millimeter as you would a wind instrument, we transformed the intake and exhaust sounds that naturally occur during acceleration into specific notes within this range, and blended them in perfect harmony.

The idea that music and musical sound contain invisible, persuasive elements to which humans are susceptible (for better or for worse) is not a new one. The 432 Hz phenomenon brings this premise together with a dense and eclectic history of beliefs about sound, music, affect, and the body that coalesce around the idea of frequency. The potential and solace that its listeners find in being able to create and access music, both new and familiar, that they experience as especially attuned to their needs do not dissolve in the face of the bemused reception of this subculture as merely a “strange brand of spiritual self-help.”⁵² As an elective, alternative sonic reality, 432 Hz music (for now) remains outside the reach of the algorithmic maws of Pandora and Spotify, yet one more layer of defense against sonic intrusion. When 432 Hz listeners locate music’s virtue or malignancy in its frequency, based on evidence, experience, or both, they engage with a very old question: whether music is always good and ennobling or whether we should be suspicious of the power it has over our minds and bodies. ■

REFERENCES

- “The 432 Player – Music the Natural Way.” n.d. <https://www.432player.com/>
- Abdella, Fred T. “As Pitch in Opera Rises, So Does Debate.” *The New York Times*, 13 August 1989. <https://www.nytimes.com/1989/08/13/nyregion/as-pitch-in-opera-rises-so-does-debate.html>
- Anderson, Paul Allen. “Neo-Muzak and the Business of Mood.” *Critical Inquiry* 41, no. 4 (Summer 2015): 811–40.

52. Colin Dickey. “Pitch Battles: How a Paranoid Fringe Group Made Musical Tuning an International Issue,” *The Believer* 95 (2013), <https://believermag.com/pitch-battles/>

- Adele. "Someone Like You." YouTube Video, 4:44. 29 September 2011. <https://www.youtube.com/watch?v=hLQ3WQOoQo>
- Barkun, Michael. *A Culture of Conspiracy: Apocalyptic Visions in Contemporary America*. 2nd ed. Berkeley: University of California Press, 2013.
- ClassicalMusic432 Hz. "Antonio Vivaldi - Four seasons - complete at 432 Hz tuning." YouTube Video, 42:01. 8 March 2015. <https://www.youtube.com/watch?v=6f3DV-PoljY>.
- Deagan, J.C. "A=440 Pitch Adopted: Pitch versus Temperature." *The Musical Quarterly* 4, no. 4 (October 1918): 587–92.
- Dickey, Colin. "Pitch Battles: How a Paranoid Fringe Group Made Musical Tuning an International Issue." *The Believer* 95 (2013). <https://believermag.com/pitch-battles/>
- Di Nasso, Luca & Nizzardo, Andrea & Pace, Riccardo & Pierleoni, Felicità & Pagavino, Gabriella & Giuliani, Valentina. "Influences of 432 Hz Music on the Perception of Anxiety during Endodontic Treatment: A Randomized Controlled Clinical Trial." *Journal of Endodontics* 42, no. 9 (2016): 1338–343.
- Eidsheim, Nina Sun. *Sensing Sound: Singing and Listening as Vibrational Practice*. Durham: Duke University Press, 2015.
- Fastl, Hugo. "Basics and Applications of Psychoacoustics." *Proceedings of Meetings on Acoustics* 19 (2013) doi: 10.1121/1.4800482
- Glitsos, Laura. "Vaporwave, or Music Optimized for Abandoned Malls." *Popular Music* 37, no.1 (2018): 100–18.
- Hagen, Anja Nyland. "Music Streaming the Everyday Life" in *Networked Music Cultures*. Edited by Raphaël Nowak and Andrew Whelan. London: Palgrave Macmillan UK, 2016. 227–45.
- Hagood, Mack. *Hush: Media and Sonic Self-Control*. Durham: Duke University Press, 2019.
- _____. "Quiet Comfort: Noise, Otherness, and the Mobile Production of Personal Space." *American Quarterly* 63, no. 3 (2011): 573–89.
- Haynes, Bruce. *A History of Performing Pitch: The Story of 'A'*. Lanham, MD, and Oxford: The Scarecrow Press, 2002.
- Horowitz, Leonard. "Musical Cult Control." *Medical Veritas*, 7 May 2015, <https://medicalveritas.org/musical-cult-control/>.
- James, Richard D. "Richard James Talks to Tatsuya Takahashi." *Warp.net*, 6 Oct. 2017, <http://item.warp.net/interview/aphex-twin-speaks-to-tatsuya-takahashi/>.
- Jarman, Freya. "Relax, Feel Good, Chill Out: The Affective Distribution of Classical Music." In *Sound Music Affect*. Edited by Marie Thompson and Ian Biddle. New York: Bloomsbury, 2013. 183–204.
- Kassabian, Anahid. *Ubiquitous Listening: Affect, Attention, and Distributed Subjectivity*. Berkeley: University of California Press, 2013.
- _____. "Music for Sleeping." In *Sound Music Affect*. Edited by Marie Thompson and Ian Biddle. New York: Bloomsbury, 2013. 165–82.
- Koc, Alican. "Do You Want Vaporwave, or Do You Want the Truth?" *Cognitive Mapping of Late Capitalist Affect in the Virtual Lifeworld of Vaporwave*. *Capacious* 1, no. 1 (2017). <https://doi.org/10.22387/cap2016.4>.
- Meditative Mind. "The Best Of Mozart - Slowed Down @ 432 Hz | 4.5 Hours." YouTube Video, 4:32. 16 May 2015. <https://www.youtube.com/watch?v=BI8Y44J6MgI>
- Mermikides, Milton. "Hertz so Good? The resonating delusion of the 432 Hz movement." *The Blog of the School of Arts at the University of Surrey*. 23 April 2014. <https://blogs.surrey.ac.uk/arts/2014/04/23/432-hz-so-good/>.
- McLellan, Joseph. "Lyndon LaRouche's Pitch Battle." *The Washington Post*, 27 May 1989. https://www.washingtonpost.com/archive/lifestyle/1989/05/27/lyndon-larouches-pitch-battle/756e0713-65eb-4059-90b2-037fd2ff6e1/?noredirect=on&utm_term=.ae02141fe11e

- Porter, A. "Musical Events: Touching Pitch." *The New Yorker*, 1 May 1989, 95–98. href="https://archives.newyorker.com/?i=1989-05-01#folio=094
- Renold, Maria. *Intervals, Scales, Tones and the Concert Pitch c=128 Hz*. Translated by Bevis Stevens. East Sussex: Temple Lodge, 2004.
- Righini, Pietro. *La Lunga Storia del Diapason*. Bérbén: Arcona, 1990.
- Rosenfeld, Laurent. "How the Nazis Ruined Musical Tuning." *Executive Intelligence Review* 15, no. 35 (1988).
- The Schiller Institute. "The Campaign to Lower Tuning Pitch." 2001. https://archive.schillerinstitute.com/music/petition.html#c=256_petition
- Steiner, Rudolf. *The Inner Nature of Music and the Experience of Tone*. Herndon, VA: Anthroposophic Press, 1983.
- St-Onge, Elina. "Why You Should Consider Converting Your Music to A=432." Collective Evolution. 21 December 2013. https://www.collective-evolution.com/2013/12/21/heres-why-you-should-convert-your-music-to-432hz/
- Spiritual So. "XXXTentacion was RIGHT." YouTube Video, 7:17. 29 May 2019, https://www.youtube.com/watch?v=_IWgovrW-Zo&t=116s
- Sun432. "ADELE | Someone Like You | A=432hz." YouTube Video, 4:44. 28 November 2011. https://www.youtube.com/watch?v=HhuTcmpJSFU
- Tanner, Grafton. *Babbling Corpse: Vaporwave and the Commodification of Ghosts*. London: Zero Books, 2016.
- Winston, Emma. "Nightcore and the Virtues of Virtuality." *Brief Encounters* 1, no. 1 (2017). http://dx.doi.org/10.24134/be.v1i1.20.