

“Let’s Think in Layers”: On Twenty-First-Century Instruments of Public Music Theory

WILLIAM O’HARA 

This article analyzes the provocative interaction between J. Daniel Jenkins’s (2025) notion of hidden music theories and music theorists, and Alexander Rehding’s (2016a, 2016b) idea of music-theoretical instruments. Both concepts show music theory’s propensity to emerge from sources that might go unnoticed, or that even seem to conceal themselves. I analyze several YouTube videos by Digital Audio Workstation (DAW) musicians who, in their illustrations of music production, also highlight novel approaches to musical structure, the roles of tempo and non-musical sounds, and the affordances of different musical interfaces and methods of visualization. These analyses demonstrate how DAWs might operate as instruments of music theory; how the genre of “session breakdown” constitutes a form of public music theory, blending conceptual ideas with analytical insight; and, more broadly, how tools for *doing* music theory can intersect with and greatly expand the sphere of public music theory.

Keywords: public music theory, DAWs, YouTube, music theory pedagogy.

HIDDEN INSTRUMENTS OF MUSIC THEORY

In his contribution to this special issue, J. Daniel Jenkins describes several instances where the sharing of music-theoretical knowledge is unexpected because the source is not typically understood or “framed” as music theory or a music theorist: Stewie Griffin’s song about the affective geography of chords, the MC at the choral concert, the protagonist of *Heavenly Music*, and so forth.¹ I see a provocative interaction between Jenkins’s notion of hidden theories and theorists and Alexander Rehding’s idea of music-theoretical instruments.² Both scholars point out music theory’s propensity to emerge from sources that might go unnoticed, or that even seem to conceal themselves. For Jenkins, meaningful knowledge about music can come from surprising places or yield insight in surprising ways. For Rehding, music-theoretical knowledge alternately arises from and is constrained by the properties of the instruments being used to theorize. The pianos, chalkboards, and sheet music that are fixtures in every university music theory classroom constitute a pedagogical and intellectual medium so widespread as to be almost invisible—a broad disciplinary “discourse network” for the storage, transmission, and realization of music.³ Because the determinative influence of instrumentality so often goes unnoticed, “music theorists do well to take musical instruments seriously,” writes Rehding. “They are embodiments of theoretical ideas about music. All musical instruments carry theoretical properties, and it can be instructive

to consider them in terms of what they can tell us on a more abstract level.”⁴ In another essay, he lays out the stakes even more clearly: “Musical instruments [...] simultaneously generate musical sounds *and* knowledge about music.”⁵

Rehding renders visible the ways in which the background furniture of Western music theory—both figurative and literal, in the sense of the piano and the chalkboard—has shaped our concepts and our approaches. He sketches provocative alternatives to our established intellectual histories, imagining that other metaphors for musicking (such as the monochord or the siren) had taken root instead of the keyboard and the four-part chorale. Music-theoretical instruments, acting as “epistemic things,” can enable new knowledge (as in Henry Cowell’s “rhythmicon,” a device built to produce difficult polyrhythms and experiment with the continuum between rhythm and pitch) or imperceptibly shape and constrain it (namely those pianos and blackboards, which regulate both our theorizing and our pedagogy). Others may serve as a kind of “materialized theory,” reflecting in their very design and construction some body of musical knowledge—think of the many varieties of enharmonic keyboards built to make theoretical consonances practical and audible, ranging from Nicola Vicentino’s 31-tone archicembalo in the sixteenth century to Tanaka Shōhei’s numerous instruments in the late nineteenth century and beyond.⁶

In this short essay, I propose that the affinity between Jenkins’s hidden frames and Rehding’s music-theoretical instruments is especially vivid when one considers what might

¹ Jenkins (2025).

² See Rehding (2016a, 2016b).

³ Here, Rehding invokes Friedrich Kittler’s famous concept of an *Aufschreibesystem*—literally a “writing-down system,” usually rendered in English as “discourse network.” “The *Aufschreibesystem* can best be understood as a medium writ large,” writes Rehding, “as ‘networks of technological and institutional elements,’ and ultimately as production sites of data” (2016b, 254).

⁴ Rehding (2016a, [2.4]).

⁵ Rehding (2016b, 264).

⁶ See Rehding (2016a, [3.3]–[4.4]). In his use of “epistemic thing” and “materialized theory,” Rehding invokes, respectively, Hans-Jörg Rheinberger and Gaston Bachelard. On the archicembalo, see Rehding (2016a, [5.1]–[5.17]) and Wild (2014); on Tanaka Shōhei’s three enharmonic keyboards, see Walden and Tanaka (2023).

constitute a music-theoretical instrument for the twenty-first century. Many possibilities would fit such a description, including traditional instruments, digital instruments, tools for coding and computer-aided analysis or composition, machine-learning tools, and online networks of communication, distribution, and social interaction. For the sake of brevity, I will focus on one example that unifies some of these categories: a relatively recent genre of public music theory known as the Digital Audio Workstation (or DAW) “session breakdown” or “session tour,” many examples of which can be found on YouTube. My purpose in this brief exploration is to consider three questions: How DAWs might operate as instruments of music theory, especially in contrast to the tools more traditionally used in our classrooms and offices; how the genre of “session breakdown” operates as a form of public music theory, blending conceptual ideas with analytical insight; and, more broadly, how tools for *doing* music theory can intersect with and greatly expand the sphere of public music theory.

“LET’S THINK IN LAYERS FOR A SECOND”: DAW SESSION
BREAKDOWNS ON YOUTUBE

Digital Audio Workstations are software programs devoted to music production. They range from simple interfaces such as GarageBand (which is native on Apple computers) to complicated and expensive professional packages such as Ableton and ProTools. DAWs are used at every level of audio production: from radio and podcasts, to amateur and independent music producers, to professionals throughout the recording industry. “DAWs function as blank canvases, repositories for demos and song ideas, intermediaries for live performance, and [...] tools for multitrack recording,” writes Daniel Walzer. “The boundaries of composition, music production, and song writing blur as technology facilitates a transfer of ideas and experimentation.”⁷

Alongside their utility as tools for music production, DAWs have great potential as music-theoretical instruments. As musical interfaces, they reflect numerous well-established metaphors for musical organization while also making space for new ones. The vertical arrangement of tracks, for instance, mirrors an orchestral score, and many producers follow intuitive musical groupings such as putting the rhythm section on the bottom, the voices in the center, and any additional melodic or contrapuntal instruments on top. Furthermore, these tracks can scroll infinitely from left to right, but—in sharp contrast to a paper score—it is possible to zoom out enough to place an entire project in view simultaneously. This almost architectural view of musical construction encourages users to move individual musical elements around freely.⁸ Patterns emerge visually, and many producers label structures with formal designations for their own reference, or for analytical or pedagogical purposes. Take, for example, Ethan Hein’s annotated video

of “Contrapunctus XI” from J. S. Bach’s *Die Kunst der Fuge*, recorded in Ableton Live with color-coded subject and countersubject, formal labels, and harmonic analysis from Denis Collins’s analysis of the same piece.⁹ As shown in [Example 1](#), the grand staff is split into four tracks, each representing one of the fugue’s four contrapuntal voices. Each track presents “piano roll” notation, in which the horizontal dimension represents time and the vertical dimension represents pitch height, as if a piano keyboard had been rotated 90 degrees counterclockwise. Echoing the visualizations of Bach’s music created 100 years ago by artists such as Paul Klee, in [Example 2](#), and Henrik Neugeboren, the separate tracks of Hein’s visualization make imitation and contour clearly visible between contrapuntal entries.¹⁰ At the same time, the technologies available ensure that videos like Hein’s offer something new: The animation and recording are presented together as one, combining formal and harmonic analyses with piano roll contour, all tracked with the moving playback cursor (the vertical line visible in [Ex. 1](#)). The visualization is freely available to watch, easily circulating on YouTube. Finally, like a battered Steinway at the front of a lecture hall, the DAW is repurposed from a tool for music creation into one also capable of analysis and demonstration.

DAWs also have the potential to shape and reflect the conceptions of musical structure held by the musicians who use them as creative tools. Consider a video by the musician Jacob Collier, who is well-known for his dazzling arrangements and elaborate solo performances, as well as for creating “Logic session breakdowns” of some of his recordings. (Logic is another popular DAW.) In one recording, Collier constructs a cover of The Beatles’ “Hey Jude” from the ground up.¹¹ At the outset, he articulates a novel philosophy of music production, which hints at some of the ways that traditional music theory might fall flat in its attempts to address contemporary music production:

Let’s think in layers for a second. So, “Hey Jude” is a fairly simple song harmonically. It doesn’t go too far. But it’s nice, I think, as a creative person, to think about the edges and think about the decoration. And I, for one, often think about the decoration before I think about the cake, which is sometimes to my benefit, and sometimes to my dismay or to my detriment.¹²

Collier then sings a few unaccompanied bars from the opening of the song. After playing it back to check its quality, he continues, “Now, let’s decorate this. Let’s start with the bass.”

The idea of a bass line as “decoration” is immediately surprising, given the centrality of the bass both within the classical tradition and in many popular genres. The bass is usually the bottom “layer” of the cake, not the decoration—it holds the

⁷ Walzer (2020, 79–80). The literature on DAWs from the perspectives of both music technology and music education is vast; starting points include Ruthmann and Mantie (2017) and Bell (2018).

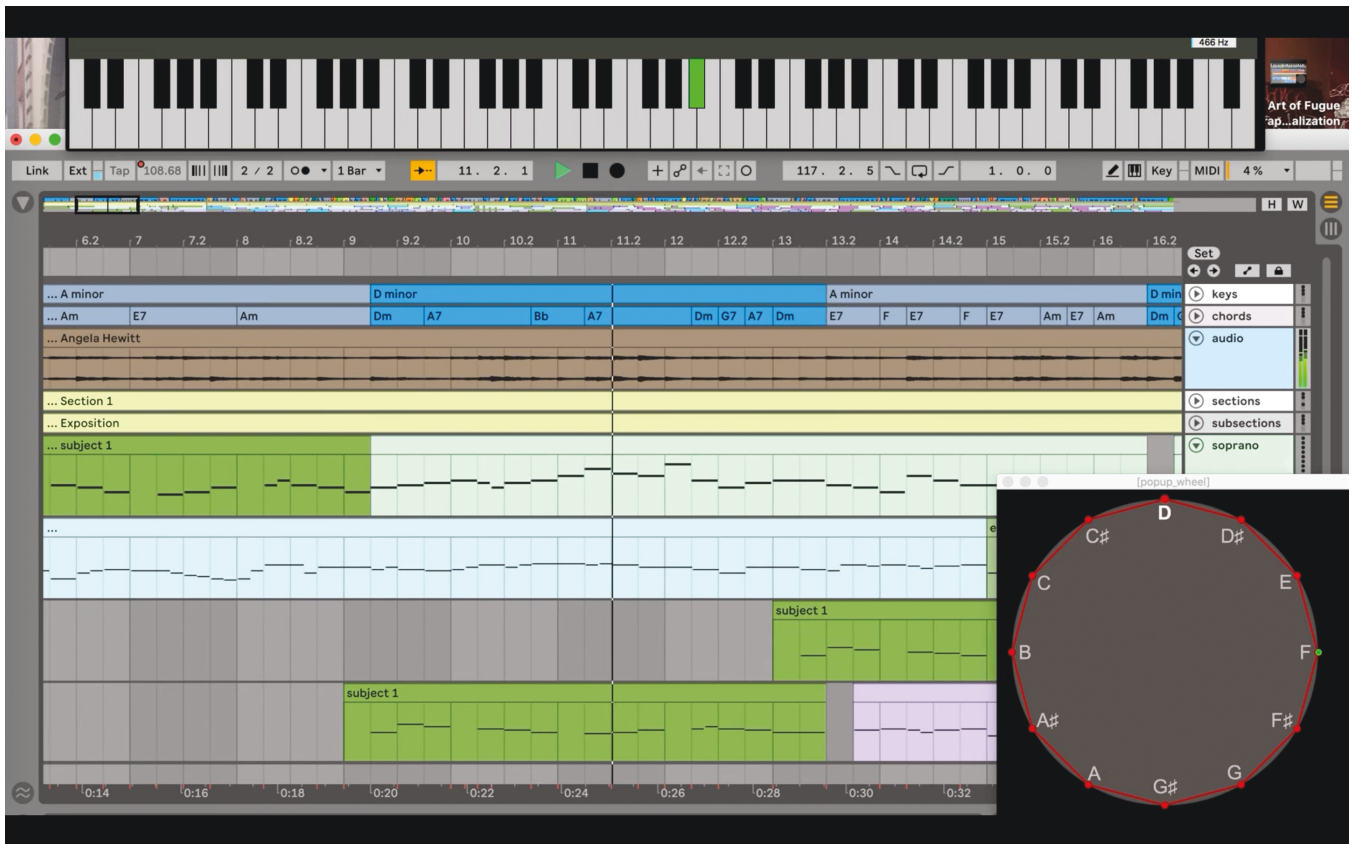
⁸ For more on the visual metaphors of DAWs, see Marrington (2011).

⁹ See Hein (2021a) and Collins (2018). The entire analysis (Hein 2021b) can be viewed at: <https://www.youtube.com/watch?v=MuwQbycj3HY>.

¹⁰ On these visualizations of polyphony, see Probst (2020).

¹¹ TheLeapTV (2020). The video is worth watching in its entirety.

¹² TheLeapTV (2020).



EXAMPLE 1. *Ethan Hein, annotated recording of J. S. Bach, “Contrapunctus XI” from Die Kunst der Fuge. Performed by Angela Hewitt. Screenshot by the author from Hein (2021b)*

other layers up. Allan Moore formalizes the notion of “functional layers,” the lowest two of which the “explicit beat layer” and the “functional bass layer” are usually provided by the drum kit and bass line, respectively.¹³ Collier’s conception of texture is built not from the ground upward, but from the melody outward. He regards the vocal line as the central pillar, treating the bass as only one aspect of a fuller texture that he will soon erect using rapid arpeggios that he calls “pyramids” or “ladders of notes,” which are shown in [Example 3](#). As the video proceeds and the track grows in complexity, other “decorations” appear, such as cascading keyboards and chimes; as a fluent user of Logic, Collier can construct these accompanimental textures extremely quickly and across many parts (e.g., the twelve distinct vocal entries in the third column of [Ex. 3](#)). Such mastery of the interface is a kind of virtuosity in itself, and many of the comments on YouTube indicate that this expertise is part of

the appeal. “It’s like the man is speedrunning Logic Pro X,” one commenter writes, referring to the popular genre of online video in which videogames are completed as fast as possible through skill, advanced techniques, and unintended shortcuts.¹⁴ For Collier, producing music within a DAW is an opportunity for experimentation: He growls into the microphone, slows down the sound of a gong that he finds laying around the studio, and playfully pairs lyrics such as “sad song” and “make it better” with sounds that might be considered antithetical to those sentiments. Some of these sounds serve only as creative scaffolding before being taken away later on, but the process illustrates how the DAW itself facilitates an additive view of musical structure, as layers of tracks expand farther and farther down the virtual page. “His biggest advantage,” another commenter writes, “is not even his vast musical knowledge and skill but rather the approach he has to freely explore possibilities.”¹⁵

Consider one final video. In a twenty-five-minute tutorial, the independent producer Ruff gives a tour of one of his recent

13 Moore (2012, 20–21). The additional two layers are the “melodic layer,” comprising the lead vocals and/or instrumental melodies and solos, and the “harmonic filler layer,” which describes the other instruments that fill out the texture of a recording. To these, [Lavengood \(2020\)](#) has added the “novelty layer,” which describes the tendency in some eras and styles of popular music to include timbrally contrasting instruments (such as synthesizers) that add distinctiveness to a recording and stand in contrast to the other layers.

14 YouTube comments do not currently have precise timestamps, nor do they offer the ability to link directly from the outside. This comment can be found on [TheLeapTV \(2020\)](#), left by the user @aldenwalker2336. On the connections between speedrunning and music performance, see [Lee \(2024\)](#).

15 See [TheLeapTV \(2020\)](#), commenter @UliLozano.



EXAMPLE 4. *Three kinds of audio tracks (piano roll, drum loop, and waveform)*

tracks, “Reasons.”¹⁶ Like Collier’s demonstration, it unfolds completely inside the interface of his DAW, which in this case is Ableton. While Collier speaks extensively about harmony and accompaniment figures, there is very little discussion of harmony or even rhythm in Ruff’s video. Instead, Ruff views music production as the creation of distinctive and dynamic sonic environments: He speaks in detail about constructing textures in a sonic space that he conceives of broadly in terms of both pitch register and the spatial characteristics of studio sound. The former is a very common concern within music theory, while the latter is mostly absent from analysis, with some notable recent exceptions.¹⁷ For instance, in describing how he uses a string loop, Ruff narrates: “I typically have four orchestral sounds. I’ll have one in the low octave that’s pretty mono. I’ll do one in the high-mid that will shift to the right in the stereo field. One I’ll shift to the left, and then a really high octave that I’ll put really wide.”¹⁸ Ruff also speaks of using “Café Ambience” tracks—field recordings of the quiet murmurings of coffee shops or libraries, which are popular among YouTube users as background noise while working or studying—as a sound layer in nearly all his productions: “Without these atmospheric elements,” Ruff mentions, “the track is really kind of closed.” Finally, he speaks frequently of elements that ensure that a track is exciting, such as speeding the tempo up almost imperceptibly as one section transitions to the next; for example, the chorus might be 2–3 beats per minute faster than the verses surrounding it.

Ruff’s session breakdown helps to emphasize an important reality of contemporary music production: DAWs and

the finalized recordings that they produce are spaces in which different forms of musical and non-musical sound coexist. As shown in Example 4 (and in various parts of Ex. 1 and Ex. 3), zooming in on any given track reveals distinct forms of musical information living alongside one another. Some tracks (such as the grand piano in green in Ex. 4, or Hein’s fugal voices in Ex. 1) use MIDI data, which is often represented as a piano roll, named after the rolls that would feed performance information into a mechanical player piano. But other tracks, such as live instruments, Collier’s vocalizations, or the acoustic guitar in Example 4, exist only as waveforms. These convey information about volume, and they can show articulation, phrasing, and the saturation of sonic space; skilled producers can easily parse these to find specific moments within a recording. However, waveforms notably *omit* pitch information and filter other data through their rather abstract visualization. Still, other kinds of tracks, such as pre-recorded drum loops, provide minimal musical or sonic data, if any; they identify themselves only by generic labels such as “Latin Groove 2” or, as in Example 4, evocative titles such as “Crash the Party.” In these aspects of digital audio production, our visual metaphors fail; as much as DAWs produce high-level visualizations of an entire piece of music, they often eschew notation and notation analogs such as the piano roll. To glean these other forms of musical information, DAW producers must rely on their ears rather than their eyes—an intriguing counterweight to the ocularcentricism of Western music theory.

TWENTY-FIRST-CENTURY INSTRUMENTS OF PUBLIC MUSIC THEORY

While not always explicitly didactic, DAW session breakdowns are closely related to the collection of educational YouTube channels often referred to as “Music Theory YouTube” (MTYT),

¹⁶ Ruff (2021).

¹⁷ See, for instance, Zinser (2021) and Duguay (2022), as well as responses to the latter by de Clercq (2024) and then Duguay (2024).

¹⁸ Ruff (2021).

in which a variety of musicians illustrate theoretical concepts using diverse examples ranging from free jazz to children's television tunes.¹⁹ MTTT intersects with what John Moore has described as a "music digital subculture": a community of interest that watches music theory and other educational videos on YouTube, discusses music on various social media platforms, and shares and debates concepts and examples.²⁰ Furthermore, YouTube videos need not be explicitly pedagogical in order to serve as public music theory. As I have argued previously, solo cover videos on YouTube function as *de facto* analyses: They begin with the artist's own analysis of a song, then gradually stage it through some combination of loops, live performance on modified or retuned instruments, and a visual production style that mirrors the song's component parts.²¹

The emerging genre of the DAW session breakdown also bridges two otherwise disparate genres of musical media. On one side are "behind-the-scenes" podcasts devoted to pop music, such as *Song Exploder* and *Switched on Pop*, which interview artists and play excerpts of their prominent recordings. These take an external, journalistic and/or analytical point of view, whereas DAW breakdowns are often presented by the producer. On the other side are technical tutorials about programs like Ableton—videos designed to teach users how to produce music from the ground up. In one sense, a DAW session breakdown is hardly different from a video tutorial that teaches viewers how to change a spark plug or how to bake bread. However, there is a crucial difference: Those how-to videos rarely embed a theory of internal combustion or hint at a hidden ontology of leavening. Session breakdowns tend to begin from first principles and thereby propose entire ways of creating from the blank canvas of a DAW interface. Is melody or harmony primary? Does one begin with a drum loop, a riff, or a sample? How a musician organizes musical (and non-musical!) figures and fragments within a DAW gestures at entire theories of sonic organization, both personal and pragmatic, that are waiting to be teased out. They call to mind a famous line of public scientific communication from Carl Sagan's documentary *Cosmos*: "If you wish to make an apple pie"—or, in Jacob Collier's case, a cake—"from scratch, you must first invent the universe."²² There is, in other words, no "from scratch" when speaking of physical substances; flour, butter, apples, and the like all have deep atomic histories. So, too, is each artistic decision built on the affordances of an instrument or interface, leaving many fundamental elements to be scrutinized.

CONCLUSIONS

Where does this leave us? Is YouTube an instrument of music theory? Is screen-capture software? How about a podcast aggregator, a Facebook post, or a share button? Perhaps they are not *strictly* so, in the sense of creating musical knowledge, but they are certainly *meaningfully* so in the sense argued for by Paula Harper: Listening and sharing are vital extensions that constitute meaningful forms of communal music-theoretical creation and consumption.²³ They are, in Jenkins's terms, hidden sources of public music theory. So, what can scholars learn from these forms of digital musicking and theorizing?

First, these tools of digital public music theory emphasize the close ties among theory, composition, and performance—ties that scholars often mention, but that always bear repeating. Each one does not merely *support* the others; rather, it makes the others *possible*. With that said, pragmatic tutorial videos are by nature also deeply speculative in that they propose ways in which music could go. They offer new perspectives on musical structure. In cover song arrangements—whether performed live or broken down and then reconstructed, as by Collier—we see essential features of songs extracted, rearranged, and emphasized. In the case of DAW tutorials, musicians and producers pull back the curtain on a conception of music that prioritizes timbre, arrangement, processing effects, and groove just as centrally as harmony, melody, or rhythm. These and other digital artifacts demonstrate that one of the most vital areas of inquiry for music theory research going forward will be how we negotiate musical information in all its forms, treating both notation and soundwaves as computationally legible data and tackling the hard problems of helping computers to translate between them.

These digital artifacts of contemporary public music theory are defined not only by their materials, but also by their participation in the social media ecosystem, which embeds a drive toward repetition, iteration, and viral shareability. The music producer and multi-instrumentalist So Wylie, for instance, posts her production tips on YouTube as "Shorts"—brief vertical-format videos designed to circulate quickly and easily, imitating competitor platforms such as TikTok.²⁴ As another example, the musician and YouTuber Andrew Huang hosts a video series entitled "4 Producers Flip the Same Sample," which brings together four musicians to tackle the same musical challenge: "Four Producers, One Sample" or "Four Producers Remix a Song."²⁵ These videos are not only addictively watchable (much like a cooking competition TV show); more than this, they emphasize the social and collaborative nature of music-making on YouTube. A rotating cast of producers appears in different combinations, and many of the musicians active on YouTube appear frequently in each other's videos, building virtual

19 See accounts of "Music Theory YouTube" in Moore (2019), Grasso and Arnold (2022), and Moore (2023). Notes of caution have been sounded by Piilonen (2022) and Belcher, Kim, and Reese (2023). On music theory in online media more generally, see O'Hara (2018) and Barna (2021). Mosley (2024, 255–56) offers useful reflections on digital public musicology in comparison to music theory, while Lavengood and Mitchell (2022) and Mitchell et al. (2022) chronicle a related music-theory-oriented social media community on Reddit.

20 Moore (2019, 69).

21 See O'Hara (2022, [1.0.1]–[1.0.6] and [4.1]–[4.4]).

22 Sagan (1980).

23 Harper (2019, 7–13).

24 For a representative example of Wylie's YouTube shorts, see <https://www.youtube.com/shorts/IcMEvRmxvgc>.

25 See Huang (2018) for a playlist of these videos.

communities of practice and inviting their viewers along for the ride. As Paula Harper has shown, one of the chief logics of social media is variations on a theme.²⁶ This is the essence of the meme as a recognizable comedic structure or a context-driven statement. All of the examples that I have shared in this essay gain their currency by participating in additively iterative loops: One more harmonization. One more weird cover. One more Ableton production trick.

Moreover, song analyses, from podcasts to DAW tutorials and everything in between, function most effectively as a kind of archive, gaining significance and utility as they catalog more and more examples and make them easily browsable. In essence, then, the ultimate music-theoretical tool of the twenty-first century is the internet itself. The connections forged between artist and audience, the ability of an otherwise disparate audience to crystallize into an enthusiastic following or even a “music digital subculture,” the share button, and the promise of viral success thanks to a novel instrumental experiment or a new machine learning toy—all of these are essential contexts. Thus, the communication technologies of the social internet are not only the media through which music-theoretical ideas flow today; these digital communication technologies, and the people who use them both inside and outside the academy, also essentially *shape* music-theoretical knowledge in the new millennium, helping to set the agenda and to push music theory in new directions.

WORKS CITED

- Barna, Alyssa. 2021. “Music Theory and Mainstream Digital Journalism.” In *The Oxford Handbook of Public Music Theory*. Ed. J. Daniel Jenkins. New York: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197551554.013.32>.
- Belcher, Owen, Catrina Kim, and Alan Reese. 2023. “Public Music Theory’s Neoliberal Learning Outcomes.” *Music Theory Online* 29 (2). https://www.mtosmt.org/issues/mto.23.29.2/mto.23.29.2.kim_belcher_reese.html.
- Bell, Adam Patrick. 2018. *Dawn of the DAW: The Studio as Musical Instrument*. New York: Oxford University Press.
- Collins, Denis B. 2018. “Horizontal-Shifting Counterpoint and Parallel-Section Constructions in Contrapuncti 8 and 11 from J. S. Bach’s *Art of Fugue*.” *Music Theory Online* 24 (4). <https://mtosmt.org/issues/mto.18.24.4/mto.18.24.4.collins.html>.
- de Clercq, Trevor. 2024. “Some Proposed Enhancements to the Operationalization of Prominence: Commentary on Michèle Duguay’s ‘Analyzing Vocal Placement in Recorded Virtual Space.’” *Music Theory Online* 30 (1). <https://mtosmt.org/issues/mto.24.30.1/mto.24.30.1.declercq.html>.
- Duguay, Michèle. 2022. “Analyzing Vocal Placement in Recorded Virtual Space.” *Music Theory Online* 28 (4). <https://mtosmt.org/issues/mto.22.28.4/mto.22.28.4.duguay.html>.
- . 2024. “Response to Trevor de Clercq’s ‘Some Proposed Enhancements to the Operationalization of Prominence: Commentary on Michèle Duguay’s ‘Analyzing Vocal Placement in Recorded Virtual Space.’” *Music Theory Online* 30 (1). <https://mtosmt.org/issues/mto.24.30.1/mto.24.30.1.duguay.html>.
- Grasso, Julianne, and Cory Arnold. 2022. “Music Theory YouTube.” In *The Oxford Handbook of Public Music Theory*. Ed. J. Daniel Jenkins. New York: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197551554.013.32>.
- Harper, Paula Clare. 2019. “Unmute This: Circulation, Sociality, and Sound in Viral Media.” Ph.D. diss., Columbia University.
- Hein, Ethan. 2021a. “Art of Fugue—Contrapunctus XI.” *The Ethan Hein Blog* (blog). Accessed 24 November 2024. <https://www.ethanhein.com/wp/2021/art-of-fugue-contrapunctus-xi/>.
- . 2021b. “Bach—Art of Fugue—Contrapunctus 11—Ableton Live Visualization.” YouTube video. Accessed 19 December 2024. <https://www.youtube.com/watch?v=MuwQbycj3HY>.
- Huang, Andrew. 2018. “4 Producers Flip the Same Sample feat. Red Means Recording, Cuckoo, Rachel K Collier.” YouTube video. Accessed 19 December 2024. https://www.youtube.com/watch?v=bWL_MVbpGT0&list=PLW9UYOmoXTQmEQecw3OwifUBEwCrMf625.
- Jenkins, J. Daniel. 2025. “Hidden Public Music Theory.” *Music Theory Spectrum* 47 (1): 28–30. <https://doi.org/10.1093/mts/mtae014>.
- Klee, Paul. (1922) 1961. *Paul Klee Notebooks, Volume 1: The Thinking Eye*. Ed. Jürg Spiller. New York: G. Wittenborn.
- Lavengood, Megan. 2020. “The Cultural Significance of Timbre Analysis.” *Music Theory Online* 26 (3). <https://mtosmt.org/issues/mto.20.26.3/mto.20.26.3.lavengood.html>.
- Lavengood, Megan, and Nathaniel Mitchell. 2022. “/r/music-theory: Making Music Theory on Reddit.” In *The Oxford Handbook of Public Music Theory*. Ed. J. Daniel Jenkins. New York: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197551554.013.6>.
- Lee, Dickie. 2024. “A Speedrun within a Rock Show.” *Journal of Sound and Music in Games* 5 (4): 1–33. <https://doi.org/10.1525/jsmg.2024.5.4.1>.
- Marrington, Mark. 2011. “Experiencing Musical Composition in the DAW: The Software Interface as Mediator of the Musical Idea.” *Journal on the Art of Record Production*. <https://www.arpjournal.com/asarpwp/experiencing-musical-composition-in-the-daw-the-software-interface-as-mediator-of-the-musical-idea-2/>.
- Mitchell, Nathaniel, Sarah A. Gilbert, Tim Byron, and Justice Srisuk. 2022. “Facilitating Musical Discussions on Reddit: An Interdisciplinary Conversation.” *SMT-Pod* 1 (9). <https://smt-pod.org/episodes/season01/#e1.9>.

26 See Harper (2019, 43–55).

- Moore, Allan F. 2012. *Song Means: Analysing and Interpreting Recorded Popular Song*. Burlington, VT: Ashgate.
- Moore, John. 2019. "Negative Harmony and the Illusion of Musical Profundity." M.A. thesis, University of Liverpool.
- . 2023. "The New Language of Music Theory in the Digital Age." In *YouTube and Music: Online Culture and Everyday Life*. Ed. Holly Rogers, Joana Freitas, and João Francisco Porfírio. 133–48. London: Bloomsbury Academic.
- Mosley, Imani Danielle. 2024. "Digitizing Public Musicology." *Journal of the American Musicological Society* 77 (1): 255–63. <https://doi.org/10.1525/jams.2024.77.1.255>.
- O'Hara, William. 2018. "Music Theory and the Epistemology of the Internet; or, Analyzing Music Under the New Thinkpiece Regime." *Analitica: Rivista online di studi musicali* 10. <https://hcommons.org/deposits/item/hc:25671/>.
- . 2022. "The *Techne* of YouTube Performance: Musical Structure, Extended Techniques, and Custom Instruments in Solo Pop Covers." *Music Theory Online* 28 (3). <https://mtosmt.org/issues/mto.22.28.3/mto.22.28.3.ohara.html>.
- Piilonen, Miriam. 2022. "Music Theory and Social Media." In *The Oxford Handbook of Public Music Theory*. Ed. J. Daniel Jenkins. New York: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197551554.013.14>.
- Probst, Stephanie. 2020. "Pen, Paper, Steel: Visualizing Bach's Polyphony at the Bauhaus." *Music Theory Online* 26 (4). <https://mtosmt.org/issues/mto.20.26.4/mto.20.26.4.probst.html>.
- Rehding, Alexander. 2016a. "Instruments of Music Theory." *Music Theory Online* 22 (4). <https://mtosmt.org/issues/mto.16.22.4/mto.16.22.4.rehding.html>.
- . 2016b. "Three Music-Theory Lessons." *Journal of the Royal Musical Association* 141 (2): 251–82. <https://doi.org/10.1080/02690403.2016.1216025>.
- Ruff. 2021. "How I Made My Song 'Reasons'—Ableton Project File Breakdown." YouTube video. Accessed 24 November 2024. https://www.youtube.com/watch?v=SIETBR6-A_E.
- Ruthmann, S. Alex, and Roger Mantie, eds. 2017. *The Oxford Handbook of Technology and Music Education*. New York: Oxford University Press.
- Sagan, Carl. 1980. *Cosmos: A Personal Journey*. Episode 9, "The Lives of the Stars." Dir. Adrian Malone. Aired on 25 November 1980 on PBS.
- TheLeapTV. 2020. "Creating Song in Logic | Jacob Collier | USC Performance Science Institute." YouTube video. Accessed 24 November 2024. <https://www.youtube.com/watch?v=tVHyuhsAles>.
- Walden, Daniel K.S., and Tasuku Tanaka. 2023. "Tanaka Shōhei's Keyboards as Instruments of the Global History of Theory." *Acta Musicologica* 95 (2): 151–76.
- Walzer, Daniel. 2020. "Blurred Lines: Practical and Theoretical Implications of a DAW-Based Pedagogy." *Journal of Music, Technology & Education* 13 (1): 79–94. https://doi.org/10.1386/jmte_00017_1.
- Wild, Jonathan. 2014. "Genus, Species and Mode in Vicentino's 31-Tone Compositional Theory." *Music Theory Online* 20 (2). <https://mtosmt.org/issues/mto.14.20.2/mto.14.20.2.wild.html>.
- Zinser, Zachary. 2021. "Sound, Syntax, and Space in Studio-Produced Popular Music." Ph.D. diss., Indiana University.