STUDYING DIGITAL MUSIC

Coloring, sculpting and playing in sound

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rMA Thesis
University of Utrecht
Program Art, Media & Performance
Date 10.08.2021

Acknowledgements

I would like to extend a special thanks to Dr. Maaike Bleeker for her thorough supervision of this thesis and her dedication to being an accessible and helpful tutor. I would also like to thank Dr. Michiel Kamp for his inspiring teaching and for being my second reader. Additionally, I want to give a huge shout-out to Saskia Pouwels for her personal and academic support, and for also designing this cover page. I also want to give a special thanks to the marvelous Aurelio for additional academic and personal support alongside the unwavering support of Shanti van Helden. Finally, I am of course grateful for the support of my family, Nelly van Doorn, Paul & Elizabeth Harder and Aaron Molstaad.

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Abstract

This thesis explores ways in media and performance studies to analyze digital music, particularly hip-hop music, through its production practice. Although the formal elements of popular music such as hip-hop include simplistic structures of lyricism, rhythm, harmony and melody are simple and repetitive, a robust study of the interplay between human and nonhuman actors shows the dynamic nature of sonic emergence. As contemporary hip-hop creation is based in the digital music studio, this thesis first explores contemporary music production as a new musical ontology. Then it will explore digital culture as a set of anxieties and also provide opportunities with which to conceptualize digitally-produced music as dynamic performance. Zooming in on the Digital Audio Workstation, this thesis will also explore how the DAW as a specific digital-material object transforms musical engagement and sensation. Finally, a ludomusical perspective considers the dynamic play between bodies, materiality and sound, augmenting the perceived simplicity of hip-hop sonorities into a vast landscape of complex interactions and agencies.

Intro

Music is felt, heard, moved and perceived on many different levels and sensibilities. It is valued and assessed as an object, through the famous works of composers and the repeatability of recordings. Ultimately, though, music is a phenomenon and it is experienced through the flexible interactions between sound, materiality, ideas and bodies. One can study music through the form seen in sheet music, delineating sound through symmetrical temporal and harmonic abstractions. While this is productive for some musical contexts, our contemporary mediatized environment has changed the way that music is created and conceptualized, therefore traditional forms of music inquiry are not entirely suitable. With this in mind, this thesis aims to show how concepts from media and performance studies can contribute to creating a more inclusive and robust music studies that allows popular, digitally-produced music a place of value within academic inquiry.

This work will use a variety of concepts from media, performance and music studies to present an interdisciplinary approach in studying specifically hip-hop music

production. Using hip-hop music as the object of study, this thesis begins with digital culture as cementing a new way to experience music and, therefore, urges novel methods of analysis. From digital cultures, performativity of digital materials, to the ludic elements of sonic composition, the goal of this thesis is to show intersecting ways to understanding contemporary hip-hop music through its production practice and hopefully evoke new methods in studying music-making in general. These concepts offer different ways to analyze music aside from the musical elements or historically situated cultural contexts. This work begins with the assumption that digital culture has had an important role in contemporary music-making and that music production is not simply a finalizing tool, but a musical process akin to composition and improvisation. Therefore, it is important to use concepts from media studies to show how technology affects our interactions with musical phenomena. The research questions that guide this thesis and its stacked components are the following:

- Main RQ: How can concepts from media and performance studies be made productive for approaches to studying hip hop music that are grounded in its method of production?

    - Sub question 1: Why do we need to study hip-hop through production practice?
    - Sub question 2: What is specific about the digital in music creation and production and how can we reimagine its role?
    - Sub question 3: What are the characteristics of hip-hop production that are specific to its digital materiality?
    - Sub question 4: How is ludomusicality useful in studying digital music production and particularly hip-hop?

These questions provide opportunities to study music that accounts for its entangled emergence between human and nonhuman actors, and how the ontology of music has shifted in this material-cultural context. This thesis uses music production as an entrance into studying contemporary musical creation as music production has become a contemporary means of music engagement and composition. These questions pushed the research as a way to study hip-hop in its interaction with digital tools and the musical play that occurs within the music studio.

Musical Opportunities

Media scholars have written extensively on the agential capacity of digital materiality, which allows a perspective on how human bodies and ideas play a role within and alongside a digitally-saturated culture. Music production is engrained in this discourse, since digital music tools have saturated contemporary music culture and have become widely accessible for musical experimentation. As new technologies have become a part of our relationship to musical creativity, this relationship between human and non-human actors shows a crucial starting point in studying contemporary music composition. Also, in assessing the performativity of digital media within music creation, we can widen our approach to music that moves beyond traditional music disciplines. Many musicians are not trained in the European classical tradition, so studying music through strictly western logic of signage and historicity leaves behind the unarticulated aspects of music-making that emerged from the performance.

In its notated form, the complex elements of music emergence, mediation and perception can be lost to notation systems. Musical structure has been historically cemented as an autonomous system, disengaged from the complex aspects of musicality that include action, interaction and subjectivity. While new musicology productively looks beyond the score and incorporates cultural analysis, there is still room to study music with a variety of tools. In "'We Are All Musicologists Now'; or, the End of Ethnomusicology" (2020), Stephen Amico argues that the early humanities' dedication to scientific abstraction and categorization put musicology and ethnomusicology into an epistemological bind in which methodologies, materials and terms were dictated by lingering colonial ideology. Scholars such as Nicolas Cook, Laudan Nooshin as well as Amico are proponents for encouraging more robust studies of musicology that highlight conflicting voices, methods, temporalities and perspectives that allow many types of scholars or musicians to contribute to broadening the discipline of musicology (Amico 2020, 31). One example is the field of ludomusicology. Generally, ludomusicology aims to investigate musical engagement through means of play, opening up music to the dynamics within musical experience, reception and interaction (Kamp, Summers, Sweeney 2019). These scholarly outputs approach musicology

through progressive disciplinary approaches and have provided the inspiration for this thesis in continuously mining interdisciplinary perspectives and insights into musical phenomena.

Theoretical Bounds

This thesis uses a variety of scholars from media and music to study digitally-produced music through its production. Starting with Adam Patrick Bell's work, *Dawn of the DAW: The Studio as Musical Instrument* (2018), explores how music recording practices have changed traditional delineations between musicians, producers, and audio engineers. Since music production technology has evolved greatly within digital culture and has become more accessible, the use of the DAW is fundamental to studying contemporary music production. Particularly hip-hop is the most relevant in this discussion, as diasporic cultures from Jamaica and New York pioneered the use of playback technologies to creatively rearrange and loop music to rap or sing over (21). This text provides a cultural assessment into how our relationship with technology has led to a new way of conceptualizing music creation (24).

In investigating the specificity of the digital, scholars such as Aden Evens and Anna Munster theorize on the performativity of the digital and our relationship to it. *Materializing New Media: Embodiment in Information Aesthetics* (2006) as well as *Sound Ideas: Music, Machines, and Experience (2005)* are two works that unpack the discourse surrounding digital logic and aim to open up ways of conceptualizing the performative potential of the digital as a part of our aesthetic reality. Evens approaches digital logic as a space that is ordered and highly consistent, yet also malleable and capable of introducing novelty, showing how digital music ontologies produce sound waves that are markedly different than through physical instruments. However, the messiness of live sound can be "injected" into digital platforms, showing how sound is mediated by the digital (96). Anna Munster's text creatively offers Baroque logic as a useful way to consider our aesthetic interactions with the digital. Baroque logic shows a continuous folding and unfolding between aesthetically oppositional forces, implicated sensations and concepts as well. Applied to our interactions with technology, the digital encapsulates the aesthetic inclusion of dynamic folding between objects, bodies, ideas,

and temporalities. These scholars will help to show how sound comes through digital spaces and how we can rethink our engagement with digital code as it molds contemporary sound.

Next, the characteristics of digital music production are mobilized with the concept of the material metaphor. Marianne van den Boomen's work *Transcoding the Digital: How Metaphors Matter in New Media* (2014) is employed to analyze the behavior of digital objects within music production practice. The author explores the layers of meaning within digital artifacts as they present significations and metaphors. Van den Boomen is concerned primarily with digital objects, as they constitute a unique materiality that combines conceptual metaphors with medium modality and signage, which is then executed by machines and has real effects on the world (50). This concept is integral to this thesis as many contemporary musicians have engaged with music solely through digital interfaces and become musically influenced by the digital-material conditions. The iconicity within the Digital Audio Workstation (DAW) makes sonic metaphors tangible and presents digital objects that not only reflect these metaphors but produce physically and aurally palpable experiences. Van den Boomen's work is used to show how the DAW changes our experience with music, making any sound attainable and encourages a minute attention to texture as it pertains to specificity of timbre (frequency) and space (reverb/time), effectively rearranging perceptions of music through its digital materiality.

Finally, the concept of play tied to music is also productive in studying the creative process of hip-hop production. Particularly the concept of ludomusicality set forth by Roger Moseley in *Keys to Play* (2016) provides a media-focused view of music histories as play is approached as the interaction between human and nonhuman. as the concept of play complicates hierarchical assumptions concerning music's ontological emergence, and highlights the interaction between objects, bodies and ideas. In assessing the ludomusicality within digital music production, I hope to contribute to a complex view of hip-hop music that furthers the discourse on music ontology and embodiment. Through theories on media and performance, music creation and music listening can be further discussed as a complex phenomenal emergence.

Method

In order to support my concepts in this thesis, I will use case studies from hip-hop production processes to reveal characteristics of digital music production and the ontological implications. I will use as case studies the Genius video series "Deconstructed," which depicts the processes behind popular songs through the perspective of the producers. The "Deconstructed" series includes many songs, but I will employ the making of the songs "Mo Bamba" (2018) by Sheck Wes,"The Box" (2020) by Roddy Ricch, and "Suge" (2019) by DaBaby will be included, used as primary source material to mine for traces of digital material interactions and ludomusical evidence. Although the media company's goal is certainly to profit off of the popularity of songs, their visibility in the music industry provides intimate interviews with the producers. These video series seem to ask for a general and open-ended insight into a song's production, since the producers all focus on various processes tools, strategies and happy accidents that made their songs. Reading their screens and verbatim comments will reveal the characteristics of hip-hop music composition, assessing the relationships between the producers, digital objects and sounds. This thorough perspective of a localized practice gives a relevant look at the dynamic performance between humans, objects, and technology as it pertains to producers, sounds, digital materiality and approach to music. Used in this thesis, these short films provide evidence that reveals things about contemporary music production and new music ontologies.

The producers in the videos describe the tools they used in their Digital Audio Workstation (DAW), showing viewers their digital interface and allowing a glimpse into what procedures are undertaken and how. This allows a sort of reading of the iconicity as an actor through its performance as a modular interface. The concept of material metaphor is also applied to these cases to assess the filters, plug-ins, and other methods of sonic manipulation and composition that is shown in the DAWs of the producers. Analyzing these digital production tools through their material presentation, as well as their sonic effects, will show how they behave as material metaphors and urge a new conceptualization of sound as the tools icontologize sound. Using the shots of the interface alongside the perspectives of the artists will reveal how the digital

materiality discursively arranges the way that artists approach music composition and conceptualization of sound.

Additionally, the comments from the producers will be used to aid in reading the musical process as one of ludomusicality. Ludomusicality provides an entrance into the producers' comments to show how they interact and respond to their sonic environment. Robert Wallace Fink's text on minimalism will also provide a space with which to enact a ludomusical reading and injects value into minimal music. This, along with the previous concepts, will help to explore the case studies in its context of musical composition and complex emergence. This methodological approach aims to view hip-hop production as a musical locality that arises from a negotiation between digital materiality, sound and bodies.

Role of Hip-Hop

Although this thesis drives the larger goal of studying music in digital landscapes, using American hip-hop as an object of study provides a provocative insight into ways to study, and perhaps appreciate, contemporary music. Hip-hop has defined the American music industry, stretching sound, fashion, and discourse across a cultural landscape. Hip-hop songs have become easily found in the United States' top 100 tracks and its striking drum beats is heard in a variety of genres, even internationally. In general, popular music is not wont for formal musical analysis. The production process and atmospheric beats are focused on the layering of simple loops that are circulated sonically and economically. The music industry churns out short hits and popular music is mostly researched in the context of its sociocultural or economic standing. In its emergence, hip-hop was defended as an urban poetry, while the repurposed samples and lyrics were assessed with focus on culture and linguistics. Today, as hip-hop has saturated the popular music industry, its initial underground tenacity has shifted to become the boisterous, mainstream sound. "Trap" hip-hop, in particular has become wildly popular with its frenetically quick hi-hats and dramatic tropes of violence, sex, and drug abuse. The trap sound, as heard in the case studies used, seems like a caricature, an ugly mutant of rap. However, we cannot ignore people's affinity for contemporary hip-hop as a popular listening experience and as a compositional style. Rather than

exploring the differences that make hip-hop music distinct, this thesis is inclined to find heuristic tools to offer a way to conceptualize music past the death of classical music and find new ways to study music beyond the formal simplicity and repetition heard in contemporary popular music such as hip-hop or trap.

Textual Flow

Chapter 1: This chapter will bring the reader to understand why music production emerged as a novel form of musical creativity that has since changed the ontological landscape of music. Using the text by Adam Patrick Bell and other scholars on sample culture, and recording manipulation, this chapter will show how music production has shifted the act of creation from musical composition to sculpting sound. This chapter will also show how diasporic cultures are tied to this changing musical landscape, tying hip-hop's cultural specificity to this aesthetic and ontological shift.

Chapter 2: Chapter two will explore assumptions on the digital and its contemporary symbolism of sterility and artificiality. Scholars such as Evens and Munster can then help us to rethink the digital's role in our musical landscapes. The gaps between digital logic and classical reason provides a window into our anxieties and expectations, also showing the entangled folding of bodies, code and technologies. This chapter will use digital musical examples to show how we can conceptualize the digital landscape as providing a new entrance into musical sensation. As the digital encases a variety of textural elements, so too can we sense the folding of our bodies and perceptual capacities alongside technology, and elicit new musical readings and subjectivities.

Chapter 3: What do we see when we interact with the digital in the context of music production? This chapter will explore the interface of the DAW and how it shrouds its complex code behind the digital objects. Using media scholarship on the performativity of the interface, the traffic of the material-metaphor, and the sensorial change that twenty-first century media opens up, encourages potential for musical world-building and sensation down to the micro-perceptual experience of sonic sensation. This chapter will explore the hip-hop case studies as a way to unpack how the producers' musical

process is tangled up in the DAW's performance and what it means for musical understandings through digital production.

Chapter 4: This chapter will delve into the agential complexities of the musical process as one that is ludic in its negotiation between human and nonhuman actors. Play's magic circle and Roger Moseley's take on ludomusicality will be used to analyze the umstable and paradoxical play of music composition that is both constitutive and socially engrained. Ludomusicality will then be used to explore minimalism as also a ludic example in its cultural context and how its repetitive nature shows a playful oscillation, opening up potential readings for hip-hop production. Finally, the case studies will be assessed through the comments of the producers' to unpack the ludomusical elements of their production process and how it shows an irrationally productive compositional air.

1. Music Production: Sculpting Sound

This chapter will show how modern production practices have unfolded from the advent of the music studio and how recording manipulation affected new music ontologies. Particularly relevant in this discussion is the imprint that hip-hop's roots have left on contemporary music production in general. The genealogy of black diasporic music cultures brought the production practices we have today, showing the entangled dance between cultures, aesthetics and technology. As new technologies play a role in musical experiences and worldviews, the evolution of these recording and production technologies were facilitated by human interaction that held broader, cultural importance. Music production has mediated musical aesthetics and has impacted musical perception. Twentieth-century technologies and musical practice have created a means of musical understanding in which sonic qualities and textures hold precedence over formal, structural elements. In exploring music production, it becomes clear that production is not an entirely goal-oriented tool in which songs are written and formalized. Rather, contemporary production, particularly with the affordances of the digital audio workstation (DAW) and the home studio, show a new musical ontology and compositional orientation. The affordances of the studio and manipulating sound through recording technologies has made a new compositional style of music that affects aesthetics. Through the work of Adam Patrick Bell in *Dawn of the DAW: The Studio as Musical Instrument* (2018), this chapter will show how the history of the music studio has affected contemporary music sensibilities. The DAW, a digital product of the music studio's history, has only extended the reach of musical atmospheres that were created in Jamaican dub remixes or hip-hop production. This turn to producing music has created a musical environment in which sound is no longer composed, but sculpted.

Producing Sound

Adam Patrick Bell's work *Dawn of the DAW: The Studio as Musical Instrument* (2018) explores the evolution of the music studio and how the legacy behind the Digital Audio Workstation combined the various roles of recording, editing and mixing within the music studio into the compact affordances of the home production. The role of the music producer is fairly ambiguous, as they take on many roles within the recording and

editing process, including creative facilitator. Producers can be arrangers, composers, engineers, creative directors, artists, and many other roles that are concerned with musicality, marketing, engineering and more. Bell notes that, first, the producer was considered someone that helped to facilitate recording (Bell 2018, 33). As the music studio evolved, the role of the producer did as well, and production came to be seen as more of a creative endeavor, and the music studio became an instrument in its own right. Bell approaches “the music studio” not as a definitive object, but as a conceptualization of the complexities of contemporary music-making. Since elements and technologies in the music studio can be altered and replaced, Bell compares the studio’s modularity to that of the drum kit. As various percussive elements in a drum kit are open to individual adaptations, the music studio’s technology has changed historically and differs within every home or professional studio as well (34). Although the music studio has a flexibility that seems to conflict with the confines of a discrete tool or taxonomy of traditional instrumentation, Bell writes about the studio as an instrument that reveals how contemporary music culture has shifted greatly under the impact of technological advancement.

Bell provides numerous examples of artists whose experiences with the twentieth-century recording studio show a creative use of music technologies. In the 1950s, for example, producers Jerry Leiber and Mike Stoller pioneered the importance of production, heavily editing musicians’ recorded takes by chopping and pasting tapes together. They also facilitated “overdubbing” or layering various recordings on top of one another (39). Another famous producer, Phil Spector, became notable for his distinct technique known as the “wall of sound” in which large groups of musicians were cramped in a room to be recorded. Bell writes that Spector took “weeks or even months” to create his dense productions, comparing him to Wagner as he orchestrated multiple instruments and large groups to record dense sounds. His sonic mark was recognizable, and Spector pioneered the role of the producer as an artist (Bell 2018, 41). The interventions with musician’s work show an engagement with the music that stages time and space, working with sound as plastic material to be layered, fragmented and rearranged, while also orchestrating the conditions of musical recordings. With recording technologies and the affordances of the music studio,

sounds emerge frozen through repeated listening and minute sonic details are allowed more space to come through perception. The recording materials also become plastic material for arrangement and manipulation, behaving as raw material for the producer or the artist to manipulate in the music studio.

Bell writes that by the 1960s and 1970s, writing music in and with the studio became a normal practice (Bell 2018, 49). Brian Eno, a producer not formally trained in music, is a significant example of producers that use the music studio as an instrument a means towards music creation. Eno describes his process in creating music within the studio as painting, “You could put something on, scrape something else off. It stopped being something that was located at one moment in time. It started being a process that you could engage in over months, even years" (Crane, Larry, and John Baccigaluppi (2011) as cited by Bell, 52) He highlights improvisation in the studio and the spatialization of sound that the studio affords. Unlike many producers, Eno was not a trained musician and learned how to produce through studio experimentation. Today, with the accessibility and user-friendly affordances of the DAW, many artists can make affective musical tracks based on intuitive experimentation with sound, treating the DAW as a tangible and forgiving canvas similarly to how Eno describes his process.

Sculpting Sound

These examples show how music production changed the music-making process, affording a certain plasticity and staging of sound through recording devices. Typically, music production is a vague term. It relates to everything in between recording, arranging, mixing and composing music. Every producer will be different, and their strengths can range, although generally the process is one of layering, sculpting and balancing sound. Music production, particularly with the ubiquity of the DAW, can be seen as sculpting sound. The examples of the early music studio show this aesthetic through the manipulation of recordings by fragmenting and layering sound at will. Due to the DAW’s accessibility this musical ontology has become more widespread and further cemented with its affordances. Mixing and manipulating sonic frequencies is one example in which sound color and tone is made plastic and sculpt-able in the music studio.

Another example is ability to add “reverb” to a sound. Today, digital tools allow producers to take a sound and adjust its decay, manipulating the perceived spatiality of a sound’s source and placement (Dittmar 2013, 36). This has become so advanced within digital technologies that users can produce sound to be relayed in a highly specific, theoretical space. The reverberation, although digitally enacted, plays with perception as we understand the size and quality of space that a sound originated from. This example shows one affordance of the DAW that dictates the manipulation of sound in the way that a sculptor handles the confines of their space.

In the professional music world, the more minute balance and mixing of a track is typically left to an engineer with formal knowledge of acoustic science. While the producer arranges sounds, textures and layers, the role of the engineer is more specialized and requires more training to understand how to choreograph the sound through technologies and create the clearest recording. On the other hand, many producers can aurally and intuitively work with the DAW’s flexibility to experiment and play with mixing sounds. The DAW’s format guides users through accessible visual metaphors that adopt analogue studio styles, allowing any user to play the role of the engineer using aural intuition. In mixing timbres and textures of sound, the producers and engineers are working directly with an assemblage of frequencies. As artists mix tracks, they balance various frequencies through the digital interface using a variety of visual metaphors that “equalize” sound through dials, graphs, and sliders.

A song’s makeup present hundreds of frequencies that are heard as contrasting sonic textures and color. Sonic frequencies are measured by the amount of cycles per second that sound pressure waves travel. The spectrum of audible sound ranges from 20 Hz to 20,000 Hz which represents low and high pitches, respectively. The full frequency range of the audio spectrum is complex, so it is divided up into ranges to make it more manageable and easier to describe and control the balancing act. Using graphic equalizers, producers use controls in the digital interface to limit and boost frequency ranges, adjusting the timbre and tone of the music.

Instruments and voices have fundamental frequencies and associated harmonics. Even digitally-produced sounds have a fundamental frequency which is their concrete pitch. The associated harmonics, or partials are the frequencies above and

below a sound that give it its timbre. Audio engineering presents visualizations of these harmonics as curves and layers of various sound cycles (Dittmar 2013, 24). A trumpet has more overtones and harmonies associated with it, so its timbre has a less central fundamental frequency, giving it a more intense sound. The flute sounds lighter due to having less associated harmonic layers (Dittmar 2013, 24.). For most instrumentalists, the overtone series that their instruments afford is described through metaphors that describe the overall tone or timbre. When instruments are described as dark, warm, or bright, their timbres are bound to specific peripheral harmonies. In an individual's relationship to their instrument through music, harmonic overtones are not particularly helpful heuristic device in executing textural variation. Contemporary musicians are certainly aware of the overtone series, but the emotional variation that a sonic descriptor such as "full" or "shrill" is more affective in changing timbre through the embodied, emotional cue that a metaphor provides. This is still the case with music-making and metaphors will not leave the musical terrain anytime soon, but the DAW encourages users to interface directly with frequencies through their plastic availability. The DAW can thus be seen as changing music making from a top-down hierarchy in which timbre is dictated and achieved through notational metaphors of warmth, but is directly manipulated through the engagement with frequency as raw material.

Audio production entails sculpting sound because you cannot add frequencies, but you can subtract and tweak the balance of a sound through their range of low to high frequencies. Even the visualization in the DAW encourages sculpting sound as users can manipulate curves that dictate balance of frequency. Whether playing with a MIDI drum sound or a recording, producers play with frequencies by bringing out the low, midrange or high ends of sounds to create effect and balance. By boosting or cutting frequency amplitude, producers perform equalization (EQ) on the sonic range. In bringing out the lower ends within a sound, that sound can be heard as full or dark. The midrange can add a clarity or resonance, while a dominant high range can sound weak, bright or airy (46).

Overall, the way that sound is sculpted is crucial in beginning to understand many contemporary sounds as they are produced through sophisticated DAWs. It also

begins to show us how music production can reveal about contemporary styles of music composition. The ontological landscape of music has evolved from writing to sculpting.

Black Music is Popular Music

Since this thesis uses hip-hop music as an example, this section describes the cultural importance of the diaspora on popular music production. Music practices that affected popular music in the U.S., from hip-hop to bubblegum pop, are indebted to the production techniques that color the creative and crafty do-it-yourself musician's cultural scenes. Practices in the 1970s Kingston or the 1980s in New York City have affected contemporary sounds and show how diasporic musical aesthetics have been widely impactful on music creation. Accelerating the possibilities of manipulating music recordings, Jamaican artists in the 1960s and the 1970s relied heavily on recording technologies and birthed a new genre and practice called "dub" (Bell 2018, 54). In his book on Caribbean music, Peter Manuel describes the context of dub music as follows:

> In the early 1970s, recording engineers like King Tubby and Augustus Pablo started manipulating filters, faders, and other effects to reshape recordings, cutting vocal tracks and bringing them back in snippets, and adding reverb and echo in a dreamlike, seemingly random fashion. Though produced on a mixing board in the studio, dub was meant to be heard "live" at the sound-system dance, where dancers and listeners would revel in the surrealistic deconstruction of familiar songs, now presented as perpetually mutating rhythm tracks (Manuel 2006, 200).

Similar to the production practices of Brian Eno and his predecessors, dub musicians manipulated pre-existing recordings to create original musical works. However, dub musicians expanded the possibilities of sound through manipulation, as pre-existing and pre-released records were heavily stretched and manipulated through filters and effects that play with the possibilities of sound qualities. For an outsider at first listen, dub music feels like reggae because it is dub's predecessor and utilizes reggae tracks as well. However, the notably novel dub techniques give the songs an uncanny, almost alien feel as sounds flow in and out of their expected instrumental timbres, while spatial impressions morph through the use of filters and reverb. Time, too, seems to slow and

speed up as musical elements are brought in and out of play and repetition. Adam Patrick Bell emphasizes that since dub artists like King Tubby work with prerecorded tracks, "...his sonic imprint, unlike past producers, did not come from the musicians or how they were recorded. Rather, his contribution came at the mixing stage, and *his* sound was both that of his equipment and how he played it" (Bell 2018, 54). Although the music studio became a crucial instrument in music making, dub musicians like King Tubby show a new music culture that shifts music production towards the shaping of sound and creating musical novelty by emphasizing creative sonic manipulation.

With this, the art of sampling that emerged in the 1980s and 1990s shows a similar manipulation of prerecorded tracks. The "sampler" itself is an electronic tool that allows players to load drum pads with any recorded sound for rhythmic play. However, previously, drum sounds in hip-hop came from drum machines like the Roland TR-808 or from drummers hired by recording studios (59). Bell cites New York hip-hop producer Marley Marl as solidifying the practice of "sampling" in hip-hop music that made hip-hop a distinct musical genre and practice. In 1984, Marl wanted to sample a recorded voice, dissecting a pre-existing song in the way that dub artists have done previously (59). However, a snare drum emerged in the sample as well, and opened up the possibility for music production to utilize any recorded moment in new songs. With this discovery, any recording from past genres or artist could be sampled and refashioned into a new song. Ultimately, sampling does away with the necessity for in-studio musicians as the producers work with blocks of sound, however short. Samples could be used and transformed into a variety of sounds, placing sounds on a canvas like drops of paint that build up with each new layer and loop (62).

King Tubby and Marley Marl's musicianship show the epiphanies of the 70s and 80s that furthered creative production practice. Also, the live performances of DJ culture in the 1970s was another musical practice that shows how music production comes from a culture of black, sonic manipulation (59). Through scratching and looping records on the turntable, DJs like Grandmaster Flash perform similarly to hip-hop producers and dub artists as recordings are manipulated into breaking temporal flows and creating new rhythmic and sonic textures. Performing in the Bronx, Grandmaster Flash, perfected the technique of having two turntables playing and moving between them to create loops of

sound in which he scratches, stops and repeats sections. The goal was to take a few-second instrumental section of a record and lengthen it to a much longer “break” (Bell 2018, 60). Although turntabling and production practices contrast in terms of their liveness, turntabling is a technique similar to dub manipulation or hip-hop sampling that encourages musicians to mimic sounds, morph timbres and intentionally change pitch through sonic sculpting. While turntabling is used by Bell to show the complexities of the studio and push the idea of the music studio as an instrument, he goes on to make important claims about the genealogy of new music such as hip-hop and production practices in general. Bell writes, “Turntablism foreshadowed the compositional possibilities inherent in sampling, and studios strove to emulate it. Just as dub studio practices were an outgrowth of Jamaican sound system culture, hip-hop studio practices were an outgrowth of DJ culture in the Bronx” (Bell 2018, 60). While Bell is writing about the complexity of the music studio and its impact on contemporary music ontology, he points out that contemporary production practices emerge from the legacy of the black diasporic communities in the Americas. As dub remixes, DJs and hip-hop producers created new techniques, professional music studios aimed to keep up with the trends.

With this, the creative techniques that color production practices also come from the home studio practices. Bell writes, “‘DIY recording is often associated with the terms “home recording” or “project recording” and hip-hop played a major role in making such a movement possible” (61). The music studio, however it looks, is where much of hip-hop music is composed (ibid). This legacy of home recordings has found itself in the DAW today, which has solidified itself as a home studio, as music production is feasibly performed on any given laptop.

Nick prior echoes the conjunction of music technologies and cultures in his book, *Popular Music, Digital Technology and Society (2018)*. In a subsection titled “Users Matter” Prior discusses the agency of the artist in relation to music technologies. Particularly, the example of the turntable shows an object that was designed for playing records which was then, “…transformed into an instrument of production through the localized, tactile appropriations of Jamaican and black American hip-hop DJs in the 1970s” (Prior 2018, 9). Prior goes on to say that popular music holds many examples of

users “redefining technology’s functions and meanings” (Prior 2018, 9). Prior highlights the agency of the user as showing a co-creative part in the emergence of new musical practices as well as aesthetic sensibilities. As we have seen in this chapter, new technologies allowed new musical practices that also had effects on one’s experience with music itself. Production practices affected aesthetics and transformed how people can compose and relate to music as seen in the focus on sonic quality and the ability to engage with sound as a plastic art.

The ability to overdub, edit and orchestrate recordings shows that the studio is not just an instrument, but also changes the way we think about music, as more likely a plastic material for shaping. The Beach Boys 1960s recordings were colored by their layered audio, as the band would sing two takes exactly the same way, which provides a “brighter” sound (Bell 2018, 43). Phil Spector would personally orchestrate songs by staging the technology as well as the musicians. In placing large groups of singers, drummers, or guitarists in a room, Spector could create a thick texture. There are many more examples to how producers can achieve different characteristics within the music studio. Ultimately, these examples serve to show how the role of the producer stages sound in a way that highlights the qualitative and aural aspects of music, as opposed to the abstracted hierarchies of form.

The legacy of dub and hip-hop accelerated this movement towards dramatizing sound. Adam Patrick Bell posits that Jamaican dub music privileged small bits of sound above all else by playing with the parameters of sounds and challenging listeners to grapple with textures and qualities as well as sounds that are familiar, unfamiliar or previously only imaginable (Bell 2018, 56). Concerning this culture of sonic atmosphere, Bell writes, “Timbre is not easily notated, and as a result popular music production relies on the ears rather than the eyes in pursuit of making and replicating specific sounds” (57). Although music production spatializes sound due to the recording and editing technologies, the new music coming from Jamaican sound-system or American hip-hop changed the musical landscape by extending the language of music into aurally embodied textures. The hip-hop production group “Bomb Squad” from the 1980s used samples, mixing boards and drum machines like paint to build up tracks create an atmospheric setting for the rapper’s performance (Bell 2018, 62). In hip-hop,

music in general the selection of the drum's timbre was a crucial factor in providing a character and sonic atmosphere for the music (58).

In Nabeel Zuberi's text "Is This the Future? Black Music and Technology Discourse" (2007), Zuberi writes on the connections between diasporic culture, technology and musical innovation. In discussing the implications of sampling in black music, Zuberi writes,

> Once we begin to think of sound as matter that can be broken up into pliable material for new contexts, the notion of "music" can be ripped from the constraints of traditional music theory. The tone and timbre of the sonic moment become the focus for analysis, rather than harmony, melody, and the totality of the work. This forces us to think about the affective power of relatively short pieces of music. It encourages a micrological attention to sound quality (Zuberi 2006, 283-284).

Echoing Bell, Zuberi notes that the practice of arranging sound as blocks mediates conceptualizations about music and requires a minute attention to quality and texture as opposed to the wide formalities of traditional theory. Due to the emphasis on sonic affect, music's form as an overarching signifier becomes subservient to the body's minute reception of sonic quality. Also, the way that sound is handled and created through this musical culture of cutting, juxtaposing and layering, music comes into being is markedly different way than the experience with a traditional instrument.

Zuberi writes that the slave trade's rupture of African culture led to the diasporic practice of rematerializing culture, which can be seen in the close connection to diasporic sound production (283). Due to the disturbance of African culture, Zuberi writes that diasporic cultures rely on nonlinear conceptions of history and culture, as seen in remix and production practices (169). In playing with bits of sound through hip-hop and DJ culture, black diasporic cultures perform collective memories of organizing experiences, history, spaces and temporalities (ibid.). With new music technologies and their emergent techniques, as seen with sampling, Zuberi writes that diasporic organization features aural instances of cutting and cutting back, expressing the desire to cut back historically through repetition, callback and reimagining the spatiotemporal possibilities that were lost in disruption (Zuberi 2006, 287). Diasporic theory makes sense of the play between repetition and difference, building up culture through cutting

back and reimagining or rematerializing elements and experiences. Zuberi gives the examples of sampling, DJ performances, dub cultures, instrumental “breaks” and remixes as that show an aesthetic of disruption, suture and imagination.

New technologies affect musical practice, understanding and aesethtics. The examples from Bell, Prior and Zuberi reveal how musical techniques and aesthetics have changed with the age of electronic music, ultimately showing a complex entanglement between culture, individuals, and technology. More than this, the historical contexts from these authors show how contemporary music production, as a form of musical composition, is steeped in black culture and diasporic creativity. Bell’s text in particular shows how dub musicians shifted the focus of musical elements onto its texture and quality, which was accelerated in hip-hop production practices and the use of electronic devices. Hip-hop particularly pioneered production practices that are still popular today and moved musical aesthetics into the realm of textural and affective impact. Overall, hip-hop music-making is performed in the context of its production practice. With this, hip-hop is no longer a fringe genre, as it has bled and influenced contemporary music. Popular music today owes itself to hip-hop production practices, technological engagement and the reverberations of its aesthetic conceptualization.

2. Digital Music Anxieties and Possibilities

This chapter uses media scholars to show new ways to conceptualize digital music in light on the increased reliance on Digital Audio Workstations. First, it is important to understand what the “digital” means. This chapter will first examine how the digital functions as sets of discourse, how the digital mediates contemporary culture and what makes sound digital. This will be used as the basis to understand anxieties concerning binary code and, in turn, provides a space to open up understandings of digital culture. Scholars such as Aden Evens and Nick Prior are useful in describing what the concept of the digital means and how digital mediation affects conceptualization of sound. With this, such scholars show how music in code affects sound and music-making. According to Mark Hansen, the digital is a network, or a symptom of twenty-first century media. The digital is not merely a tool but constitutes a variety of actors that affect our worldly experiences. Exploring these realities will set the stage to reimagine the digital’s logic as a privileged actor within music production. Offered in Anna Munster’s text *Embodiment in Information Aesthetics*, the digital will be then reimagined using baroque logic, and will present a way to newly interpret digital culture. Finally, examples using popular music such as hip-hop and Jamaican dub are employed to show how they invite the reimagining of injecting the baroque into the digital. As early electronic interventions with music shifted the focus onto sculpting sonic quality and texture, this aesthetic has permeated further with the digital age. Music production has only become more popular and accessible since the home studio techniques of the 1980s, and many people today are experiencing music creation through only digital means. This has significantly changed the musical landscape and conceptualization of music creation and perception. However, the shift from analogue to digital technologies also furthered cultural anxieties concerning increasing reliance on technology and code**.** These scholars help to imagine the digital as a realm of great possibility and breathtaking effect of enfolding sonic elements alongside the interactions between the fleshy and technological.

Digital Discourse

First, the term “digital” does not mark an essential time period or singular object. Rather, for Nick Prior, the digital marks a variety of discourses and technology that have become increasingly palpable with the visible advancements of the twenty-first century (Prior 2018, 14). Pinning down the digital is difficult as it is often essentialized in opposition to analogue. The movement into digitization and the loss of analogue technologies seems to mark a loss of authenticity that is the rigidity of binary code consumes. Prior writes that the digital, “...can only exist as a category as a result of its construction as new and ‘other’ to the analogue (which is then marked as either outmoded, traditional or ‘warm’ in comparison)” (Ibid). The digital has been obscured through nostalgic discourse that reifies binaries between traditional and modern, warm and cold. Prior goes on to explain that romanticizing technology reveals a productive space to challenge assumptions and employ objective analyses of the relations that occur in the everyday interaction between people and technology.

> The challenge, then, is to extract from these reifications a detailed description of the complex folds of musical life and the everyday practices of those involved in music.... Not to assume, a priori, the era-defining qualities of a digital revolution, but to explore technology’s potential traces in ordinary practices of making and doing (Prior 2018, 14).

Prior’s text begins our exploration into digital reifications and digital possibilities. Instead of assuming essential qualities concerning technologies, Prior proposes analyzing the behaviors and interactions that arise between human and non-human actors. This perspective creates opportunities for analyzing the digital as a complex set of actors and processes, as opposed to assuming a static classification that marks discrete separations between time periods, people and objects.

Mediation

As contemporary life has become increasingly reliant on digital tools to mediate functions in the world, the idea of mediation evokes intimidating notions of power as

nonhuman technologies dictate worldly dynamics. In his text, Nick Prior defines the term “mediation” as the following:

> Mediation, then, refers us to a process of conducting one thing through another and the resulting effects of that conduction. It follows that mediation refers to an active process of transformation of what is mediated. For its mediation, an object is changed. This may be no more than a shift in presence – from relative obscurity to a state of greater visibility – or something more dramatic like a transformation of the object’s intrinsic nature. When we talk about music’s mediation, for instance, we necessarily have to link this to music’s changing ontology. Music’s very essence changes as a result of its dissemination through the act of recording and reproduction (Prior 2018, 18).

Our experiences in the world are mediated through many facets of bodies, tools and technologies. However, there are various mediating conditions for which the effects of mediation become more visible and increased. The emergence of phonographic recordings, for instance, mediated music in a way that created a spatiotemporal distance between a sound’s origin and listener, ultimately highlighting phenomenological issues of sonic perception and epistemic concerns. As digital technologies have saturated contemporary culture, issues of schizophonia have accelerated. Nabeel Zuberi quotes ethnomusicologists Steven Feld writing that sonic blocks mutate rapidly and present "...sonic copies, echoes, resonances, traces, memories, resemblances, imitations and duplications [that] all proliferate histories and possibilities" (Feld 263, as cited in Zuberi 2007, 295). As the digital mediates the increased dispersion of copies, their cuts and modulations, the latter half of the twentieth-century mediated the essence of music as seen in artists’ focus on sonic quality and texture (Zuberi 2006, 283). Zuberi writes that digital technologies have, “...understandably heightened anxieties about musical authorship, intellectual property, and copyright” (295). Zuberi’s text shows how digital mediation has changed music’s ontology and made certain behaviors and issues more visible.

The most prominent anxiety that has reverberated through digital discourse is the concern with loss of authenticity. With the increase of musical aesthetics that rely on cutting, remixing, and duplication, comes a nostalgia that laments the loss of aura or uniqueness in musical works. Adam Patrick Bell writes that those critical of the DAW

itself see it as a preprogrammed device that is not neutral since it seems to exercise a more dominant role than the human producer (Bell 2018, 35). He writes, "…players simply drag and drop premade pieces of music on the screen of their digital device and an instant song is produced with little effort. The question becomes, whom (or what) has the agency?" (Bell 2018, 35). Contemporary DAWs condense the music studio's hardware into one program, exhibiting tracks, mixers, and drum machines compacted into a user-friendly interface. Players can easily search through lists of plug-ins to experiment with a variety of instrumental sounds using a virtual or MIDI keyboard as a controller. With this, most DAWs have a large list of premade loops, or discrete blocks of melodic or rhythmic sounds, that users can drag and drop to create new songs. At first glance, the DAW's mediation of music composition may warrant skepticism, as traditional instrumental performance is lost amidst a digital engagement with music. The drag-and-drop technique can be seen as lacking the bodily engagement with music, as instruments are no longer being engaged with corporeally, so sounds remain contained to the audiophile's cerebral engagement with digital music. With this, the binary data of MIDI technology can also be seen as an inherently sterile presentation of music that loses analogic organicism through digitization. However, these perspectives assume the DAW and MIDI are used as digital tools that satiate a desire for easy music making, or a means to an end. However, mediation is not always so one-sided as seen in writings on twenty-first century media.

In his text, *Feed-Forward: On the Future of Twenty-First-Century Media* (2015), Mark B. Hansen argues that twenty-first-century technology has become so ingrained in our worldly relations that technology is no longer a tool that provides a means to an end or behaves as a one-dimensional meditative object. Rather, technology comprises a network of different agential capacities that work within human networks. Digital music, through this perspective, is not a static object emerging from the authority of a tool. Rather the digital field shows a complex network that links humans with machines in a way that extends agency to machines (Hansen 2015, 37). In approaching the DAW (and MIDI) as a prominent mediating actor for contemporary music production and music doing, what does digital mediation mean in affecting music's ontology and aesthetics? The next section will follow Zuberi's conclusive question: What does it

mean for human voices and aesthetics to be “digitally inscribed” (Zuberi 2007, 297)? How can we assess digital music through this lens in which humans, ideas and code perform?

Mediating Through MIDI

Although “the digital” maps a complex discursive and material field, there are technologies within music that effectively mark it as digital by transferring musical elements into abstract code. The revolution of the digital audio workstation, for instance, made music production efficient, portable, transferrable and accessible, shuttling music into digital culture. Producing high fidelity music recordings quickly and without the costs of professional studio equipment was not possible until software evolutions in the 1990s, in which the accessibility and ease of the DAW can mark the departure from analogue into digital (Bell 2018, xxii). The elements within early, professional music studios were compacted and digitally materialized through the DAW. Purchasing or pirating software such as FL Studio, Pro Tools, or Ableton allows anyone to become a producer and musician today, certainly marking a digital, musical revolution in the 2000s. Inside this revolution is the role that MIDI technology quietly played on sonic aesthetics, also shuttling music into digital culture.

The invention of MIDI (Musical Instrument Digital Interface) technology can be seen as facilitating the beginning of digital music cultures in close connection with the development of the compact DAW. Prior writes that MIDI became an industry-standard in 1983 as electronics companies decided to streamline musical data into a language that is transferable between computers and any technological tools (Prior 2018, 12). Prior explains:

> MIDI unified what could have become a fragmented landscape of musical instruments...MIDI represented a fundamental change in how music information could be manipulated. As binary data, music could be copied and pasted non-destructively, without deterioration; hence, it no longer made sense to draw a distinction between ‘original’ and ‘copy’, putting into question all the ideological baggage associated with these terms (Ibid).

The use of MIDI standardized the technical language that transferred musical ideas to hardware as MIDI translates musical quality into binary quantification of pitch, velocity (how hard or soft a sound is articulated), tempo, and space (panning to the right or left of a stereo or headphones). Prior attests that MIDI data is a mostly invisible aspect of the conversation between humans and technology, but can be heard in the "highly sequenced, multi-layered tracks from the 1980s and 1990s" (Prior 2012, 66). The precision that MIDI brings is audible in its aesthetic quality and seems to mark the onset of the new age of digital music. One can hear MIDI in the tightly knit rhythms of various layers and loops, which are mechanically weaved together through definitive musical time. In the DAW, MIDI data is expressed through the piano roll editor, where colorful blocks lie on an interactive space of time and pitch, emulating the marks on piano player rolls. While aurally, MIDI did affect musical aesthetics and its exacting language created a "digital" sound, it also cemented the digital as a field of discourse in which perfect, digital copies problematized the notion of original or authentic.

The use of MIDI and the compact ease of the DAW has undoubtedly made the music production process much quicker. Also, MIDI has extended the potential for sonic manipulation, as audio recordings have less flexibility than the potential that MIDI data holds. Unlike audio recordings, the musical elements of MIDI can be edited convincingly and perfectly. Pitch can be moved endlessly, alongside timbre, instrumentation and tempo. The use of MIDI today shows that the ontological shifts in music that were facilitated by producers in the 1970s and 1980s has been further accelerated through the dissemination of MIDI. The onset of user-friendly digital software and the unified MIDI language shows how music became digitized in a series of processes. It also marks a new potential for discourse on how the digitization of music and highlights the power that the digital has in contemporary music making. While this marks an interesting new chapter in music history, the digitization of music into data and the reliance on code and technology can also be seen as flattening the possibilities of music creation through the banality of binary logic. To explore these positivist notions of technology, the next section will assess digital mediation and its unique twenty-first-century behavior.

Reimagining the Digital

To explore digital assumptions and opportunities, the work of Aden Evens in *Sound Ideas: Music, Machines, and Experience* (2005) provides a thorough assessment of digitization and sound, De Mul's "The Work of Art in the Age of Recombination" (2009) provides a performative interpretation. With this, Anna Munster's *Materializing New Media: Embodiment in Information Aesthetics* (2006), which provides readers with exciting interpretations for conceptualizing of the gap between the binary and corporeal engagement with digital culture.

In the chapter "Sound and Digits," Aden Evens writes on the role of digital logic and how it affects musical experience. Attached to discourse on the digital includes binary code itself as 0s and 1s work together to dictate abstract forms of repeatability and perfection. Employing Heidegger's approach to technology, Evens describes that there is no truth stemming from the digital as it is not capable of referring "...to its creator or to its immersion in any of the many worlds through which it passes, materially, historically, economically" (64). He writes that the digital, "...has shown everything in its initial appearance and so provokes no questions, poses no problems, demands nothing of its observer" (69). The digital is as imagined, as its code presents only static form and does not denote any underlying meaning. With this, as the digital attempts to capture real world images and sounds, Evens writes that, "There will always be an excess, always more than the digital can capture, because the actual is not fixed and static but creative" (70). The standardization of the digital is pure form and the dynamic qualities of real-world elements must be flattened to fit into the standardization of form. In this way, the digital is never unique, for the purpose of a standard form is pure replication. With its form, digital code does not actualize and remains abstract. "It represents but does not present" (76).

By assessing the digital's formal logic, we can begin to separate material objectivity and human sensibility. Although objectively, the digital shows closed strings of binary articulations, digital logic need not define our relationship to it. And while our world is mediated heavily by the digital, it does not engulf society through its logic. Evens's text shows that we must further explore how we relate to the digital. After all, the digital on its own, does nothing. When imagining only code's representations, the

digital is "...indeed confined to abstraction, sacrificing fertility for perfection, innovation for predictability" (79). However, the digital is never on its own as it "engages constantly with the human world of actuality" (ibid). Various technologies and human intervention move the digital into action and make it utterable. Evens reiterates, "The digital is always a code, and as such, it requires a *decoding* before it can be used" (ibid). Since the digital is not mobilized without technology and human interference, it does not mediate cleanly or one-dimensionally, but it behaves as one actor amongst many human and non-human relations. As the digital is an abstraction, there are many facets that make it available for concretization. "The digital is alive only where it is challenged, where the pipe that passes from the digital to the actual bursts its seams to carry the digital beyond itself, to show its limits even while surpassing them" (Evens 2005, 81). The digital, as a stagnant form, becomes active through the mobilization of other elements that brings it to life. Although the digital shows one standard, content is ultimately created by a multiplicity of authors, tools and uses that bring about diversity and unforeseen progress (Ibid).

Evens also delves more deeply into the practicalities of digitized sound, working with the importance of MIDI. Concerning MIDI, Evens writes that there are usually 128 different variations within the language, as MIDI code "preinscribes" finite possibilities concerning pitch, dynamics and length (89). Since acoustic instruments allow infinite gradation of sound quality, does the finitude of MIDI and binary code cripple music into homogeneity? Evens writes that there is creativity in music production, as users exploit the gaps between code and technology, showcasing complex feedback potential. Also, in producing sound, sonic complexity can be purposefully "injected" through a variety of digital actions, even if acoustic instruments are initially more complex in their interaction with humans (96).

The liminal space between code and technology that can be exploited by humans shows an invisible field of performance that highlights our interaction with the digital and potential for novelty within binary logic. With this, the capacity for remix and recombination also shows a similar potential for instability and performativity. As Bell noted, it is tempting to think of digital music production as merely recycling material, rejecting the possibility for unique creation. However, considering Jos de Mul's work

“The Work of Art in the Age of Digital Recombination” (2009), digital recombination invites a performative lens. De Mul’s work riffs on Walter Benjamin’s “The Work of Art in the Age of Mechanical Reproduction” (1935) as Benjamin concerns himself with the loss of the unique, auratic artwork and its influence on society. Although reproduction has brought a sterility to the unique work, De Mul argues that the aura can be reimagined with the opportunity for manipulation and recombination in the digital age (De Mul 2009, 98). Our increasingly datafied world has seeped into art aesthetics and the database is used to remix and recombine elements, even in modern art. Instead of seeing this as a banality of finitude, De Mul argues that the ability to incessantly combine elements in a database, and implant new ones results in a potential for infinite combination (100). While music production software is not a database, it behaves similarly as the affordances of the contemporary DAW allow sharable and discoverable sound pools that are both technically finite and also open for novel insertion. Nabeel Zuberi even argues that audio production has urged a logic of the database as well, as sounds are used for their quality, categorizing sonic quality through past musical styles as archival material (Zuberi 2007, 294). Therefore, we can see the DAW as a database in the sense that its discrete pool of data (or sound) is searchable, manipulatable and affords infinite combinations. De Mul also argues that, “...digitally manipulated objects are even more transient than mechanical reproductions. Because of their manipulability, digital objects seem to be inherently unstable, like the performing arts process rather than product” (Bolle 1992 as cited in De Mul 2009, 103). In the realm of possible combinations, digital objects seem to increase our awareness of the performative entanglement between bodies, data, ideas and complex phenomena. The liveness and performative instability of the digital becomes possible through human involvement. Through human interaction with digital technology, the expansive, nonhuman networks that saturate society are not determined by a binary logic but appear to come alive through their imagined and enacted interactions.

While De Mul offers one conceptualization of the digital as affording new means of performance, the work of Anna Munster in *Materializing New Media: Embodiment in Information Aesthetics* (2006) furthers a way to conceive of the digital as a dynamic emergence of bodies, code and technology. Munster begins with the idea that the digital

is conceptualized through Cartesian ideals that separate the mind and body, favoring abstract ideas. However, invoking baroque logic affords a new way to think about the digital that folds the banality of binary logic into the excess of human sensibility and reality.

Descartes' coordinate system has greatly influenced mathematics and computer logic, bringing classical divisions into contemporary assumptions (Munster 2006, 2). Munster writes that new media artists and theorists in the 1990s approached the digital with a "...strong desire for control over the messiness of bodies and the unruliness of the physical world" (2). The exactness of the digital was essentialized into a techno-determinist agent pioneering fundamentalist ideals. This cartesian logic cemented itself into modernity, keeping mind and body separations continuously enacted through the epistemological divisions between cognitive and sensual experiences. This legacy still dictates how technology is discussed, as classical dichotomies of body and mind, or rational and irrational grant sway over our relatedness in the world and the embodied experience with digital culture. Munster writes that, "We need to radically question the birth of digital culture as one that has been shaped largely via a binary logic" (3). A similar sentiment to Evens, Munster writes that classical ideological constraints have dictated how we relate to the digital and contemporary culture deserves a different approach to digital culture.

Munster guides readers towards the baroque as providing conceptual possibility for approaching the digital's role in art. Baroque aesthetics can provide a new way to think about digital cultures as they are not steeped in essentialisms or binary interpretations. With the baroque, there are no striking separations between elements, but, rather, a fluidity that relates the close connections between humans, animal and machine.

> The digital, conceived as part of a baroque flow, now unfolds genealogically out of the baroque articulation of the differential relations between embodiment and technics. This differential logic places body and machine, sensation and concept, nature and artifice in ongoing relations of discordance and concordance with each other (Munster 2006, 5).

The use of the baroque in modern interpretation breaks down classical logic in which the world is colored with stark contrast between objects. Baroque logic allows the world to fluidly unravel between concordant and discordant elements, even questioning historical delineations that separate time periods. The baroque offers a highly sensual aesthetic, incorporating the body through "…clusters of objects, images, sounds and concepts that belong together in variation and in dissonance" (Munster 2006, 6). This is highly applicable to digital culture as the ease and speed with which the digital posits a variety of objects, sounds and concepts that are experienced in their conjunction and contemporaneity. It is also the idea of the differential within baroque logic that can be seen in binary code. As binary code articulates threads of 0s and 1s, gradation of quality becomes absorbed by indiscriminate abstraction that staggers differential connections through dispersed points.

Conceptualizing the baroque flow and its differentials is also aided by Deleuze's "fold" (Deleuze 1988 as cited in Munster 2006). Munster writes, "Folded in its structure and form, matter cannot be divided into atomistic units—parts that add up to a whole—but instead is both continuous and differentiated in and between its parts" (7). To explore how we can imagine the baroque sensibility, the idea of the fold shows how discrete parts do not cohesively add up to form an individually distinct whole. Rather, the idea of the fold imagines matter as moving fluidly between various aspects of continuity and difference. Munster invokes the fold to show how the close relations to different actors creates a complex thing that is not static in nature. To concretize the fold, Munster imagines a folded piece of paper.

> …the fold in a piece of paper or fabric is both confluent and dissonant: it joins sides and marks the difference between them. I suggest that the fold entwines two important issues for information aesthetics: the production of contemporary embodiment-the corporeal experiences of living in and through information culture-and the relation of this to its aesthetic, epistemological and ontological genealogies (31).

Digital form can be seen through the fold, as digital logic allows doubling and cutting through virtual fields that afford speed and simultaneity. In digital fields, we experience cutting and doubling of our virtual bodies, affecting perception of time and

space. Munster goes on, "... the fold simultaneously describes the experience of living the discontinuities and connections of digital sensory experience. These experiences of crossing thresholds between here and there, continuous and differentiated, corporeal and incorporeal" (Munster 2006, 8). The fold can help to picture our embodied relation to digital experiences, as the fold shows no discrete separation between the body and mind, but instead a dynamic emergence in which various elements of abstractions and sensation coincide. In the digital field, we become more aware of the folding in between bodies, ideas, and tech. Munster reiterates, "My enfolding of digital and baroque aesthetics concomitantly marks a new space for understanding the relations of connection and difference between bodies, other materialities, affect, and the inhuman spaces of code and its flows" (9). Munster's sentiment is one that is also a sentiment expressed by scholars such as Evens, Bell and Zuberi, who acknowledge how digital cultures have affected action, perception and culture, urging a new look into the dynamics that relate bodies and technology. Particularly, how music editing capabilities have highlighted our awareness of the entangled agencies between people, technologies and ideas. Munster's concern helps to further these ideas by offering a new route that moves beyond the classical assumptions that birthed static essentialisms and hierarchies, seen in music studies.

The fold can help us to imagine the spaces and connections between bodies living amidst information and technology. With this, the idea of the fold can also complicate classicist ideas concerning temporality and historicity. In general, events do not unravel linearly but historical narrative imparts periodicity later. A folding logic can incorporate many bursts of history that impact the present, regardless of time period (40). The idea of the fold also alleviates the boundaries that enact the divide between baroque and classicism, opening up possibilities for a variety of genealogical threads. The baroque is not a counterpart to the classical period, as its logic does not concern essentialist binaries (41). Baroque unfolding rejects classical, historical authority by opening up space for complex genealogies to be acknowledged. Munster says, "The fold becomes a strategy for dealing with history or time from the point of view of the present: a way to read events not as historical inevitabilities but as pliable possibilities for the present" (Munster 2006, 41). The fold can present multiple, coexisting lineages

that are not historically demarcated later as inevitable. Including baroque thought in the discourse surrounding digital media helps to challenge the idea that digital culture, "...completes the project of classicism" (54). Munster's perspective shows a dynamic reality that reveals the movements between bodies, ideas and technology, as opposed to condemning the digital to a static fixity. This approach can also help to illuminate anxieties within digital music, as musical classicism holds onto assumptions concerning form, time and Cognition.

Folding Digital Sounds

The offer of baroque folding, applied to digital culture, can show productive ways to conceive of digital music as a dynamic unfurling of textural variety. With De Mul's perspective, the recombination of sonic blocks or engagement with MIDI can be seen as a fluid performance in itself. Scholars such as Aden Evens and Nick Prior find digital performances through assessing the interactions between human and nonhuman agents. Using Munster's way of the fold, we can hear and further understand the specificity of the digital aesthetic through a variety of styles of digital or electronic music. While the classical musical perspective favors teleology and cartesian control of time and harmony, the fold opens up the musical domain to include the highly sensual relation to texture, time and technology.

The idea that sonic quality is now the primary focus of music creation also invites the fold as these atmospheres unfold between a variety of textures and sounds. Munster shows how digital culture is inherently intertwined in a folding of dissonance and consonance that arises from its distinct parameters. Chaos can arise between its diagram and concretization, producing novel digital artifacts. Computers glitching or sound speakers failing to perform under digital commands reveals the folding that creates phenomena. With DJ turntabling, the scratching of the needle exhibits a folding where human gesture, technology, and materiality coincide and speak out. From Jamaican dub musicians to early American DJ practice, these musicians show a folding logic, or a differential approach where sound flows between the spaces that differentiate human from nonhuman.

The juxtaposition of textures that are musical, nonmusical as well as synthetic and real-world, expresses the sensibility of the fold, as artists play with and highlight the rippling gaps between technology, humans, time and texture. In Jamaican dub practice, well-known tracks are morphed into pulsating differentials in which sounds gain new space through reverb or echo. Instruments are taken in and out of the conversation, as changing the minute factors results in an uncanny sonic experience. The play between the continuum of sounds exhibits a conversation between actual sounds, musical, or the presentation of imaginable sounds now phenomenally available through the digital. Dub, and its legacy, plays with senses and perception as listeners are challenged to unpack the variation of sonic origin. It exhibits the fold as these sounds are simultaneously existing as purely digital yet performing the schizophonic differences between ghostly remembrance, alongside imaginable and familiar sounds. In being challenged with the variation of sounds and their gradation, listeners grapple with sonic unfurling, as their qualities meet in concordance and dissonance of pitch, texture and spatiality (reverb). Using filters and dials that play with reverb or echo, producers can make sounds feel as if they were recorded in various physical spaces, bending feedback and physical possibility. These characteristics of new music have further accelerated the schizophonia that marked recording technologies. The nondestructive capabilities of digital production spaces in general make users more aware of sonic splitting, doubling and the juxtapositions of texture, space, or time.

With this, the emphasis on looping in digital music, whether sampled or played, folds various temporalities together and plays with textural sameness and difference. As producers use blocks of samples or compose their own, the ability to loop sounds pushes a logic of the baroque differential. Through addition and subtraction, producers add on melodies, drum beats, and filters, riffing on loops and highlighting how sounds unfurl and change. With sampling, we can see a similar logic. Compositionally, sampling other works are treated through the skill of the producer as they hide or highlight samples through creative sound manipulation, which also shows a differential logic of the sonic world. Similar to the dub genre, samples are executed through a pulsing gradation of effects and timbres.

The DAW spatializes music in a visual and tangible way so that sounds can be sculpted nondestructively, almost like plastic material. This provokes a sense of atemporality or non-linearity that is always present in musical engagement in the digital landscape. The DAW affords a sensual engagement with music as it folds data, time and space alongside emphasis on musical, textural sensations. There is a dizzying multiplicity of layers for recording disparate sounds that exist simultaneously atemporal and transtemporal, and always available for contemporaneous performance.

Temporally, samples perform as a database of the musical archive in which units of sound are added and recombined. In playing with samples, producers not only reimagine the archive, but they resuscitate it as well. Samples are not mere reinterpretations of music but constitute the actual music through its recording (Katz 2004, 140). Since samples are not interpretations, but, in the age of recordings, present the actual musical performances, they already show a temporal folding in which the past and present meet in one moment. As artists sample and loop, we can see the topology of the fold as sampling draws out genealogies indiscriminately.

Taking the example of Jamaican dub music, the artists manipulate tracks to play with the continuum of sound perception, stretching the imagination of conceivable sounds and timbres. With this, DJ culture also used vinyl records and technological tools to play with recorded sounds. Although the technology used by 1970s musicians was not necessarily “digital,” the recording and manipulation capabilities of mixers, drum machines and records show a genealogical thread of musical aesthetics in which sound is treated for its textural quality and affective potential. Although digital technologies did ease some musical processes, the musical aesthetics did not drastically change from analogue to digital. With analogue technologies and manipulation of recordings, we see a specific musical ontology that is also present in the digital. The use of analogue technologies in the 1970s not only foreshadows the accelerated use of musical technologies and digital cultures, but also shows a folding amongst contrasting technologies that emerge from a specific ontological atmosphere. Analogue hardware is now grafted onto digital screens as these tools represent a specific treatment of sound that sculpts sound, injecting qualities and textures. We can place Jamaican dub, live DJ music, digital production and baroque aesthetics in close historical proximity due to a

temporal folding in which the lines that dictate digital and analogue, or new and old musical sensibilities are blurred in favor of the aesthetic focus towards sonic manipulation emphasis on texture

Aesthetically, we can place baroque music in close relation to digital aesthetics due to similar treatment of aural textures and differential modulations. Although the musical characteristics sound entirely different, there are musical ethos that coincide. The first similarity is the baroque's use of repetition. Highly repetitive pieces can represent a logic similar to digital looping. Next, the sensuality of baroque aesthetics reverberates into that of digital music. Baroque performance favors detached notes, creating larger gaps between sound and silence. It is also highly ornamented with trills, mordents and turns, decorating the music as a sort of aural shading while also playing with perception of time, and rupturing ideas of continuity and teleology. By emphasizing contrasts between sound and silence, light and dark, baroque music shows a saturation of multiplicity and playing with difference that is also afforded in digital spaces. Baroque music, like digital, does not urge a literary assessment of harmony and form, but favors a landscape of affect through sonic quality. Perhaps digital production highlights the folding between human and non-human actors as the technologies and abstractions have made us more aware of a shifting musical landscape. The folding of contrasts, senilities and temporalities are seen in digital and baroque**.**

Additionally, the idea of baroque folding within digital music allows new room for interpretation that rejects classical concerns. Music scholars historically, treat music within discrete cultural lineages that demarcate the formal characteristics between them. Academically, baroque ornamentation and Caribbean drum beats represent various instances of ethnomusicological specificity. However, the digital does not discriminate. First, binary code cannot *represent* the cultural contexts or the organic sounds. In code, the elements that characterize the pitches, rhythms and sounds of various musical moments become flattened into discrete articulations of their differences. To emulate certain instruments or orchestras, the digital producer injects complexities into sounds using filters and manipulating frequencies. With this, digital music producers favor their individualism through creative manipulation of sound. Sounds become enmeshed through production, as musicians can mix sounds to

highlight or diminish the differences between musical elements. Here, there is less room for a classical dichotomy between musical essentialisms, as there is no room to consider correct or authentic musical characteristics. Rather, there are only differential gradations between texture and quality that loop and modulate. This invites a baroque sensibility that posits sonic elements as gradations of textures to meet and divert, never staying static in their performance or reception as sounds infiltrate the bodily senses. In baroque fashion, this music disturbs sensation and perception, as historically or ethnically delineated musical styles are interwoven and juxtaposed incessantly, often surprisingly or unclearly.

Digital culture invites a new way of conceptualizing the use of binary logic. By reimagining the use of baroque aesthetic and the possibility of the fold, we can see more dynamic ways to look at digital music that is not seeped in classicist distinctions concerning form. As the latter half of the twentieth-century brought about a way to conceive of music that highlighted sonic quality, this has only been exacerbated by the twenty-first century digital. The fold can show us how digital code is but one actor in a dynamic convergence and divergence between human and machine or artificial and natural. The digital's indiscriminate code and incessant cuts and juxtapositions show that aesthetic elements and temporalities can be embraced for their fluidity between sameness and difference. Ultimately, this disrupts classical musicological assumptions as it is forced to ignore abstract forms over the rippling of sonic indulgence and embodied affect. The digital, and digital music production is not fated to musical poverty, as the digital is inviting at all times a view into its parts that are fluidly conversing with bodies, technology and physical reverberations.

3. Coloring Musical Sensibility and Perception in the DAW

While the previous chapters have opened up ways to consider music in digital culture, this chapter will apply media scholarship to specific examples concerning the DAW as a prominent actor in music creation, showing how we can further study the DAW as an instrument that mediates musical perception. Using scholarship from media studies as a basis, this chapter will show how the digital audio work station colors societal and cultural engagement through its digital materiality. Using scholars such as Johanna Drucker, Marianne Van den Boomen and Mark B. Hansen, the chapter will explore how the nonhuman action within the DAW perform musical phenomenon and engagement. Looking at the DAW through its digital materiality, we can better understand how its behavior effects perception and engagement with music. Using specific examples from hip-hop music producers, their process highlights the importance of the DAW in hip-hop production

The concepts of material metaphor and interface prove useful in studying music production as they focus on how new media works alongside us to affect our experiences with the world. First, Drucker's conceptualization of the interface will help to show how the digital platform for music production is a non-neutral actor affecting subjectivities. The role of analyzing the DAW as interface helps to understand the perceptual experience that comes with digital music production. This will also be supported by Van den Boomen's text concerning material metaphor, as digital objects such as the DAW show a unique materiality that behaves as a sign and a tool, affecting real world phenomenon surrounding the musical experience. Van den Boomen's concepts help to shed light on how the DAW performs numerous visual and musical metaphors that dictate, not only actual sonic phenomena, but also user perception and sonic understanding. Then, the implications of this will be explored using Mark B. Hansen's ideas concerning sensibility, new media and the power of nonhuman actors. These concepts and theoretical backgrounds will prove helpful in assessing what exactly the DAW does within musical experiences, how it performs and affects our relationship to music. Using concrete examples from cases of hip-hop production, this chapter will explore how producers' actions are shaped in the DAW, how it materializes sonic metaphors, and what we can extrapolate from these experiences.

Interfacing Music

The performative capacity of the production interface is relevant within music production as we can further explore how digital materiality shapes our relationship to music. The Digital Audio Workstation is a complex, multi-tooled interface that mediates our engagement with music through the production and manipulation of sound waves. Anything can “interface” our relationship to the world such as how traditional instruments mediate our relationship to music in markedly different ways. A variety of affordances can be found in their material confines. However, new media and digital interfaces are unique mediators whose reach extend beyond their apparent characteristics. New media scholar, Johanna Drucker, has theorized on how the modularity and indexicality of the interface shows a dynamic field that provokes cognition and urges a performative assessment of the digital materiality. Instead of assuming that the appearance of the interface defines it, Drucker argues that we must assess what the material does or how it performs (Drucker 2013).

Johanna Drucker’s work “Humanities Approaches to Interface Theory” (2011) shows how a diverse set of interface readings can reveal the dynamic interactions that emerge from use. Such readings can include formalist approaches of graphics and frames alongside “constructivist theories of perception” and the variety of semantic interpretation that arises from the individual’s interactions (2). In Drucker’s account, the “interface” is not one thing, or a discrete object (8). The interface, for the holistic media scholar, constitutes a field of events and possibilities. While an interface sets conditions and presents certain affordances, there are multitudes of potential that lie within our engagement to the interface.

In other words, the interface is not a simple transistor that indiscriminately brings users to another space. Rather, the interface represents complex processes that also constitute, “a zone in which our behaviors and actions take place” (9). In this regard, embodied cognition and digital materiality are inseparable as the interface’s affordances and formal elements mobilize behavior and interpretation. Drucker writes, “Interface is what we read and how we read combined through engagement. Interface is a provocation to cognitive experience” (Ibid). The interface shows icons and subsequent indexicality that represents complex technological behavior integrating into our worldly

experiences. In the more formal sense, elements such as color, texture or shape become narratives in our minds and effect our cognition. Drucker uses the example of the newspaper to show how the formal elements of font and style affect our readings and are not neutral aspects to the materiality. Drucker writes that artifacts like books or newspapers, although not as modular as the screen, still constitute an interface in that they present zones of possible readings. They are not “between” spaces that channel intentions or behaviors, but they serve as spaces to mediate our experiences (Drucker 2011, 10).

In this dynamic approach, user behavior is no longer determined by static feedback loops and motivations and cognition are not determined by binary paths. Rather, world experiences and subjective constitutions emerge alongside the behavioral dynamics of the interface (12). We can picture the interface in new media as a landscape in which embodied perception can emerge and change. “The aesthetic dimensions and imaginative vision make interface a space of being and dwelling, not a realm of control panels and instruments only existing to be put at the service of something else” (ibid.). Interface icons, formatting and other visual markers are not merely tools to an end goal, but represent the entangled potential for sensation, action and perception. Drucker’s interface theory writes that the aesthetic, sensorial characteristics of interface creates a dynamic space for potential cognition and semantic interpretation. It also complicates subject/object relationships as the interface is recognized as an important actor within our experience.

With this theoretical basis, Drucker writes that the expansive realm of the interface performs as a “…discourse field, a web of interpretive activities that assumes spatial dimensions on the screen, rather than being flattened into the space of pages” (17) The digital interface then affords particular movement that spurs diversity in behavior and cognition. Comparing interface to more fixed artifacts, Drucker describes interface engagement as “*moving through*” a “landscape” such as the case in examining an archive, rather than “*looking at*” a flat scheme (17). In the case of digital music production, interface theory can also be applied to the DAW versus written music notation. While the DAW presents similar parameters to traditional sheet music, the flurry of potential actions and morphing visualizations presents a dynamic landscape

actively moving alongside our musical engagement. musical notation concretizes sound into abstractions of pitch and time, fixing music to a schematic idea. Notation is thus prescriptive as opposed to processual. Time is abstracted to symbols that represent behavior to be interpreted and performed later in instrumental practice. With music production, temporality is directly engaged with as it reverberates through embodied interfacing with musical time afforded by playback and nondestructive, repeated experimentation. More challenging, timbre is notoriously tough to notate and may be written on scores as metaphorical performance prescriptions described by the composer and also implied through prescription of selected instruments. The DAW, on the other hand, interfaces music in a way that does not make it into the fixed object of a score but allows users to move through a modular musical landscape of textures by manipulating layers of frequencies and temporalities, rebuking theoretical form in favor of sensuous texture.

Text and other fixed artifacts certainly exhibit these dynamic capabilities. However, electronic media increased awareness of these operations of embodied subjectivity and cognition (18). Like the musical score, these fixed artifacts are not inherently static due to the liveliness that the lived social, cultural and subjective experience brings. However, the DAW as digital musical interfacing makes the landscape for constitutive possibility much more visible, broad and accessible. Its structure displays colorful fields of sonic tracks, plugins and filters that afford vast possibility and flexibility of sonic experimentation. It creates a zone of dynamic possibility that plays with temporality and texture, or the potentiality behind musical sensation.

Material Metaphor

While the interface constitutes a zone for possibility and performance of human cognition, it also presents a unique type of materiality. Marianne van den Boomen's book *Transcoding the Digital: How Metaphors Matter in New Media* (2014) explores how new media technologies and interfaces rely on metaphors to conceal and highlight digital action. For example, our interaction with screens includes behaviors such as cutting, pasting, and searching (12). These actions feel real to users but are purely

metaphorical when considering what is happening technically. The author writes, “In fact, even the very notion of ‘zeros’ and ‘ones’ is metaphorical, since computers do not recognize numbers, but just different voltage states” (Van den Boomen 2014, 12.). In using the word “transcoding” Van den Boomen investigates how these metaphors structure our relationships and readings of media and how we can decipher the role of these metaphors in relation to the complex network of human and nonhuman actors.

Digital objects are unique in that they are metaphorical, yet materially tangible. The icons and indexicality present in digital objects represent metaphors as well as concrete and complex machinic processes (14). Our comfort with these metaphors makes them invisible so as to reify their power to become “a thing in itself” Ibid. While we remain comfortable with digital metaphors, there is a set of non-human actions that is being performed behind the conceptual metaphor (15). Digital metaphors are not only embodied cognitively, but their traffic is being conducted by invisible action. Between metaphors and digital performance, this presents a network of interactions between the sociocultural arena and a technological one. Van den Boomen writes, “Digital-material metaphors thus enable translations between the digital, the material, and the semiotic, that is, between the non-arbitrary and the arbitrary, thereby evoking and constituting conventions and ideologies” (25). Thus, digital objects function as mediators between not only ideas, but concrete actions that hold tangible effects on the social world.

To explore the boundaries between the semiotic and material world, Van den Boomen explores the use of signs, tools and the digital capacity for sign-tool combinations. “Signs belong to the order of language, they function in the domain of naming, referring, predicating and signifying, while tools belong to the order of being, they function in the domain of doing and transforming” (43). To bridge the ontological gap between doing and signifying, Van den Boomen describes the importance of metaphors as connectors. Metaphors bridge different fields using statements of sameness and difference that need not be confirmed. To connect different discursive fields, metaphors borrow ideas and descriptors, transcoding ideas between different ideological and semantic domains. She writes, “Hence, metaphors are vehicles of transference, notably transference between conceptually semantically different domains, but also between ontologically different domains or modes: between words

and objects, words and images, images and objects, gestures and words – and thus, maybe, also between signs and tools, digits and symbols" (44). Metaphors express abstract concepts through familiar terms and objects, which is expressed in the interface where we work with digital objects as both signs and tools. The iconicity makes digital actions palpable through visual metaphors, yet they have concrete action encoded into their signage. Using the "mailbox" icon as an example, the author writes:

> The mail metaphor enables the writing and sending of mail messages, the windows metaphor enables shifting between multiple screens – not just because we attribute mail-like or windowslike behavior to these acts, but because they are materially and formally designed to act this way (Van den Boomen 2014, 49).

The appearance of these virtual metaphors are not purely metaphorical, as their design entails decisive materiality.

These are not only signs or tools. Material metaphors present an autonomy that circulates and has real effects on our world. Van den Boomen reiterates, "We work with them as sign-tools and data objects, but they also backfire on us, rearranging social relations, signification, and communication patterns" (50). Material metaphors are unique in their agential power to act upon human cultures, revealing the distributed agency that is woven between humans and digital materiality. In their symbolic representation and materiality as tools, digital objects are the primary candidates in discussing material metaphor.

Applying this to music, we can think of musical blocks and sounds within live performances, as signs that spur cognition and interpretation. Western art music, particularly, has a rich history of musical metaphors that are used to pin down formal structure such as the musical phrase. A live orchestra, for instance, is typically described through metaphors of texture that apply to both harmony, orchestration, melody and rhythm as listeners grapple with solidifying sonic descriptions. However, the aural signs or the signage inscribed in sheet music are not tools and do not enact musical execution in the real world, like an instrument would. The manipulative affordances of the DAW or digital score-writing programs, however, moves signage into action, affecting real world phenomena. Unlike digital notation programs, the DAW has more thorough effects on sound and texture as users manipulate frequencies directly

and producers do not merely write music but generate the final sound in tandem with digital materiality. The moveable graphs and dials let musicians play with sound waves through visual metaphors of color, gradation, curve and texture. This creates concrete sonic effects while also enabling the way we think and talk about sound. The DAW spatializes sound and focuses the producer on the potential sonic, textural atmospheres. The idea of the material-metaphor, in its unique materiality, can be seen as performing alongside us and conducting our behavior, as these objects often result in unforeseen change to our social and phenomenal world.

In the author's words, material-metaphors, "…condense iconicity and indexicality by blending immediate and dynamical objects… But precisely because they are condensed assemblages, they can also be disassembled and parsed into their constitutive parts" (Van den Boomen 2014, 71). Leading us to the next point, we can deconstruct material metaphors by reading into what is happening behind the objects' facade—what is materially being conducted and what the implications are.

New Media Senses

Mark B. Hansen's work, *Feed Forward: On the Future of Twenty-First-Century Media* (2015) focuses on the phenomenological implications of twenty-first-century media and the role of nonhuman agents. The concepts of interface or material metaphor provide ways to examine our contemporary experiences that are found in the landscapes of new media. Hansen focuses on these media landscapes as encapsulating complex networks of human and nonhuman agents that is specific to twenty-first-century media. While Drucker and Van den Boomen discuss the effects that digital materiality has on constituted subjectivities and social relations, Hansen takes an explicitly post-phenomenological look at assessing the powerful agential capacity of twenty-first century media. Rather than media extending our perceptual capacities or behaving as a mere tool, twenty-first century media, to Hansen often appropriates our high-level perception while it behaves independently to humans. For Hansen, perception constitutes a conscientious awareness of being in the world that is based on raw, sensory data from a particular environment or experience (Hansen 2015, 46). Therefore, Hansen sees sensation as the raw data or "atomic" units, while perception is

a higher-order operation (ibid). Hansen posits perception as conscientious interpretation of sensation, while sensation can be seen as the immediate experience of being in the world. Twenty-first century media often implicates and circumvents our experiences since it constitutes networks that operate on microtemporal scales and effectively evade our perceptual or sensorial capacity (Hansen 2015, 49). Contemporary media evades our perception in favor of feed-forward loops of anticipatory interpretation on microtemporal scales. Hansen uses the example of older media forms like writing to show how it expands our reality by providing experiences that have never been lived by our consciousness but are ultimately possible. On the other hand, twenty-first century media circumvents our perception by feed-forward loops, cementing a markedly non-human sensibility to the world. For instance, the author uses the example of biotechnical apparatuses that circumvent our sensorial and perceptual understandings to gather biological data, feeding into data loops that remain inherently inaccessible for humans due to the microtemporal scale of action (59). This contemporary environment shows human and nonhuman senses parallel to each other, but Hansen argues that this invisible nonhuman experience can provide us “access to an unknown world” if we can begin to recognize how our experiences are implicated by contemporary networks (54). If we acknowledge the dynamic and dizzying nature of contemporary media’s affordances, we can begin to understand how they affect human senses and can potentially aid in expanding our experiences (55).

Although Hansen’s main concern is the potential for biological and social data exploitation, his approach to twenty-first century media is applicable to our changing relationship with music that is affected by black-boxed agents. As digital objects and actors cut out more traditional experiences with musical tonality, structure and time, the affordances and microtemporal operating capacity of the interface also intensifies our musical experience and changes our sonic sensorial experiences completely. For instance, behind the DAW’s playful allure, the MIDI data is working impossibly fast to create loops, layers, modulations and combinations of frequencies that were not previously experienceable through one body and one instrument. It provides a new world of sounds that are heard as distinctly electronic, or in terms of textural quality. As the digital actors move faster than our cognition and bodily capabilities, aural senses

are affected as we grapple with understanding our raw sensorial experiences with sonic quality.

Hansen's text is useful in exploring how our worldly sensibilities and perceptual interpretations are affected by our relationships with markedly new media. The author writes that contemporary discourse should consider "…a model of human experience as fundamentally hybrid, as a composition of higher-order perceptual self-reference and lower-order bodily and environmental sensibility" that is also affected by mechanic thinking (Hansen 2015, 65). Since our music-making experience is experienced in, and often dictated by, twenty-first century media, studying the specificity of our digitally saturated experience seems now more than relevant to studying new music. While interface theory highlights the subjectivity and world-building of the interface's modular affordances, Van den Boomen's material-metaphor makes visible the power of digital materiality on iconicity and ontology. Both scholars express sentiments of meaning-making and becoming. As Van den Boomen focuses more on the agential capacity of digital materiality, this author brings us to Hansen's work that highlights the importance of nonhuman actors in affecting our very perceptual capacities, or our senses within the world.

Producing Hip-Hop in the DAW

The Genius video series "Deconstructed" provides a look into how famous songs such as "Mo Bamba," "Suge" and "The Box" came about. These short, narrative videos focus on the producer's own perspective during the musical process, as the artists digress open-endedly on a retrospective look into how a song's production unraveled. Alongside this, the videos show shots of the producers' DAWs and music studios as a means to visualize what steps they took and how a song materialized within the digitally-steeped process. In this respect, viewers are allowed an insight into what production steps or digital tools the producers used that were integral in shaping their popular songs and signature sounds. Through directly referencing the DAW's affordances as part of the process, it becomes clear that the producers' musical process emerges alongside and with direct encouragement from nonhuman agents, pointing to them as important parts within the process. In this regard, the videos exhibit what

contemporary music production can look like, and how the tangible, visual metaphors concerning sound stand as iconographic synecdoche's that compact the workings within the complex digital environment.

Within these videos, producer teams Take A Daytrip, Jetsonmade, 30 Roc and Dat Boi Squeeze describe how their famous songs came about, pointing to their engagement with the DAW. Although they use different programs, they are generally similar in displaying multiple tracks for audio or MIDI instruments and are compatible with many plugins on the market. Programs such as FL Studio, Ableton Live, Pro Tools or Logic Pro are the most famous DAWs, while these producers work with Logic Pro and FL Studio. Although various DAWs are programmed differently, their capacities are generally the same and their differences can be conflated in discussing music production generally. The rest of this chapter is dedicated to reading the visual markers of the production process through the concepts of interface, material-metaphor and twenty-first-century media. Zooming in and out of the interface screens and the testaments of the producers, we can begin to mine the complex dynamics that play out between the musical humans and nonhumans.

In "The Box", the producers aim for a big orchestral sound to give a powerful entrance to their desired track. The song begins with the sound of a large orchestra playing a note in unison, but producer 30 Roc has played only one note on his piano. The DAW's capacity for Virtual Studio Technology affords the organic pitch discrepancies and textures of a live orchestra. Using a VST orchestra, this plugin provides samples of recorded sound that are MIDI compatible. Using this VST orchestra sound, 30 Roc is able to play one note on his keyboard and piano roll that sounds much bigger than it looks. MIDI data is used mostly in digital music-making as it is more manipulatable than audio recordings and plenty of effects can be applied to change the frequency. If a producer does not play a certain instrument, they can dictate a composition for the computer to playback with any sound in perfect timbre, pitch and time. In writing the rhythms, the producers often paint in beats in the drumroll to be played in perfect time, visualizing the spatiality of time and treating sound as a modular field of possibility.

With the song “Suge,” too, the producer Jetsonmade uses a VST package called “Purity” to play simple synthesizer sounds that emulate the electronics of the 1980s. These sounds, in their datafied package, present abstractions of desirable sonic packages that color an orchestra or an instrument. The fast accessibility of any sound, space, timbre, instrument or collection of instruments moves musical appreciation into a landscape of textural imagination—an interfacing with sound.

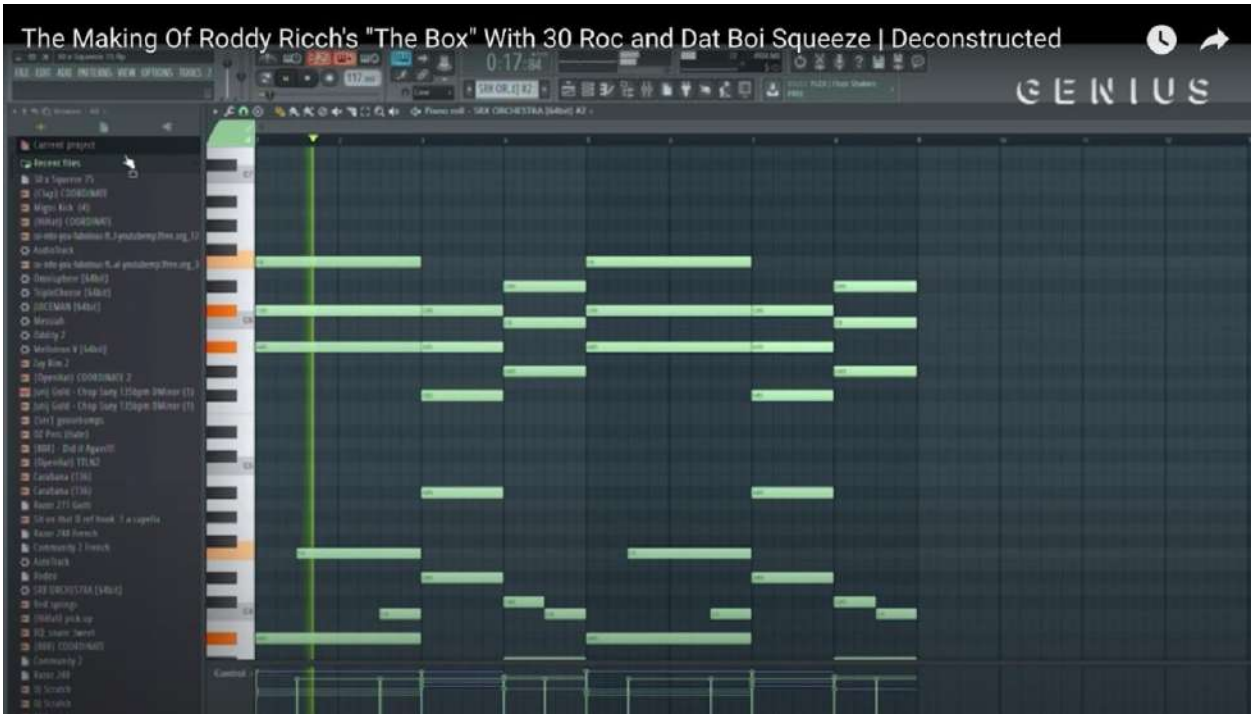

Figure 1: The ambient flute orchestra underlaying “The Box” played by 30 Roc on his keyboard.

The piano roll (Fig 1) expresses MIDI data through placement of pitch and rhythm in a tangible way. No matter the instrument used, a non-pitched percussive instrument, a chordal or melodic instrument, the piano roll exhibits blocks that represent relation of time and pitch. Although, at first glance, it exhibits a visualization similar to the dimensions of the score, the DAW interfaces with and mediates sound production in a way that constitutes true musical action. Traditional notation places musical abstraction on an x- and y-axis of pitch and time, which seems to be expressed similarly through the DAW’s tracks and piano roll. However, the DAW affords real musical playback, expanding the formal visuals into complex frequencies and experimental potential. While the score is prescriptive, the DAW conducts sound through abstract

code and data that is ultimately descriptive and sonically palpable. While showing the complexities of a sign-tool, it also represents the imaginative possibilities that the interface affords. In the DAW, producers are afforded any instrumental ambience, replicating whole ensembles, orchestras or time periods as particular technologies are replicated. Although they are represented in the digital, these sounds becaome a tangible reality for contemporary production as producers hold access to any sound, instrument, pitch range or spatial setting. Musical worlds are thus expanded to modular experimentation of sound as the plastic realm of production is nondestructive and atemporal.

The DAW's piano roll represents a dynamic space that provokes users musically as sound is transformed into manageable blocks where musical time and pitch can be engaged with transtemporally. The DAW's piano roll interfaces sound as iconographic relations of time and pitch in which complex machine behavior is at work that spurs human creativity and cognition. The piano roll is a compelling example of a material metaphor because it colorfully conceptualizes abstract note placement, but yet it is bound to complex machinic action that executes the performance of full sound. This makes it a dynamic interface where a flurry of elements are not static, but modular in an open web of human action.

The DAW piano roll represents the notes played alongside an equalizer for constant balancing. The "Mo Bamba" producers describe how the gritty heaviness of the bassline was a desirable characteristic of the song. Yet, when the rapper begins his high-powered vocals in the middle section of the song, the bass is "too overbearing" for the rapper's sound ("Mo Bamba" 3:57). Using the equalizer, the producers "take out some of the low end" of the frequencies to give "room" for the rapper (Ibid.) (Fig 2). In this regard we see how the producers interface with music, moving through a digital landscape in which sound stretches between potential parameters of digital and experiential *space***.** In removing the weight of the bass for Sheck's flow, the sound can be heard as thinner in the way that the sound does not boast the full weight of overtone harmonics, and the highest partials are more present than the lowest, to balance the baritone flow of the rapper. As seen in the equalizer in Figure 2, the sound is also visualized spatially as being thinner as the producers interact with the bass parts of the

sound, physically thinning the lower parts of the curve. The ability to adjust the minute aspects of sound through the graphic representation of sound and space affects perception of musical sounds by the potential landscape of sonic weaving.

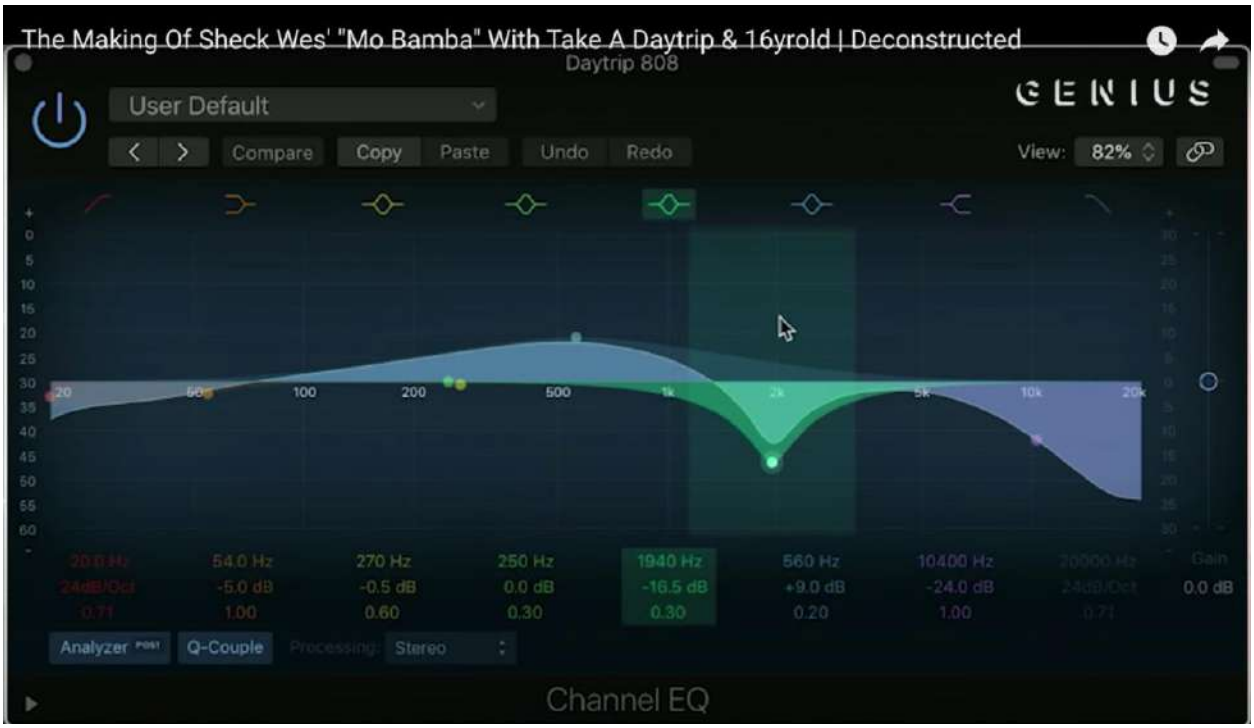

Figure 2: Equalizing “Mo Bamba” and giving sonic room for the rapper’s vocals.

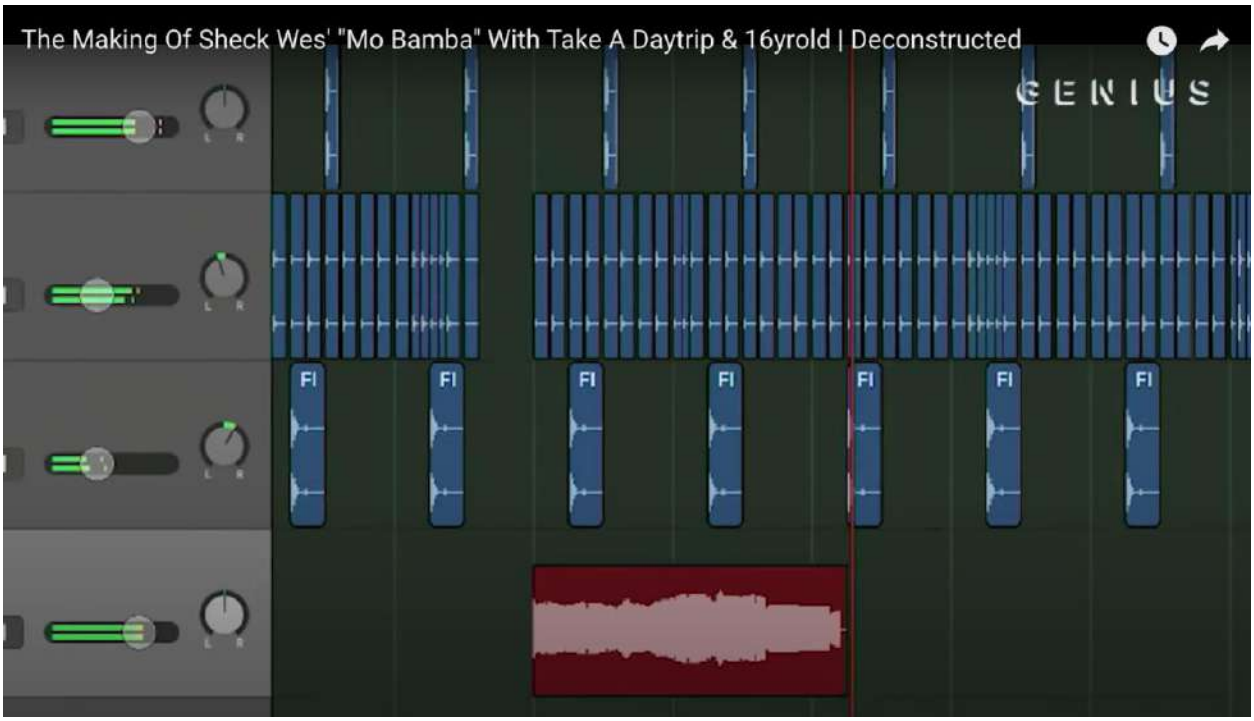

Figure 3: Visualization of “Mo Bamba” tracks showing the dispersion of drum beats alongside the audio recording of rapper Sheck Wes.

In the DAW, sound is spatialized and the textural layers gain autonomy over music creation. Music is no longer a performance of prescriptive interpretation, but the interface presents an imaginative balancing act of frequencies and textures. The sonic visualization is important to spurring creativity and cognition as producers can play around with the potential of sound and silence. The visual metaphors and the formatting of the DAW encourages sonic experimentation through accessing time, texture and quality of instrumental character. In Sheck Wes’s original vocal performance of the song, the producers describe moving around drum beats and taking instruments in and out of the song as time goes by during the rapper’s improvisatory vocals (Fig 3). In doing so, the DAW affords a flexibility of sound in which instruments can be cleanly and quickly shuttled through the song, moving in real time as it is played back, or existing atemporally in the DAW’s abstract workspace. The interface is not a static conductor of sound ideas, but it presents levels with which to interface with music through this complex space of being and emerging with the multidimensional possibility of sound. Music is materialized in the most tangible way and is no longer a fleeting phenomenon.

Instead, the liminality of performativity exists within the interface space as users perform alongside digital objects and their affordances of overwhelming sonic potentiality. The producers perform a contemporary digital music performance using the DAW as a complex, modular instrument and moving through the spaces that it affords.

The DAW and its associated plugins present a nonhuman agency that affords far-reaching musical movement through the domain of its structure and indexicality. However, its modularity and infinite combinatory relation to sound and time opens up our musical imaginations and provides a dynamic landscape of possibility. In the piano roll, users loop sounds and experiment with unwavering sign-tools that dictate pitch, silence and time and the gradient of quality in the experience of space and time.

The presence of a piano roll, equalizer and track modularity are features that are present on almost any DAW. With this, there are other ubiquitous characteristics such as the use of plugins to emulate most any instrument, filters that one can download and use in any DAW for many textural effects, as well as a variety of equalizer functions that visualize the balance of frequencies.

To describe their production process, the producers put as much emphasis on the sonic manipulation as they do on dictating pitch or rhythm. For instance, the piano line and the bassline in “Mo Bamba" is discussed in terms of its quality felt through filtering sound and equalizing frequencies. After finding a melodic line for these respective parts, the producers immediately mention that they use plugin effects such as iZotope Vinyl, Sausage Fattener, or King’s Microphone these pre-programmed filters dictate the overall impact of the bass and piano melody through its quality of texture.

For the piano line in “Mo Bamba,” one producer first plays the melody on the Prophet 12 synthesizer followed by two equalizing filters, iZotope’s Vinyl and the King’s Microphone from Waves. These filters act as a kind of blackbox of hidden programming, that audibly affects the sound quality, which the producers generally know how to describe. Some descriptors show an intimate knowledge of frequency manipulation while sometimes the producers describe general aesthetic effects. For the melodic line, Denzel Baptiste describes how the King’s Microphone works at “taking out some of the bass,” as it replicates vintage microphone technology. (“Mo Bamba,” 2:20).

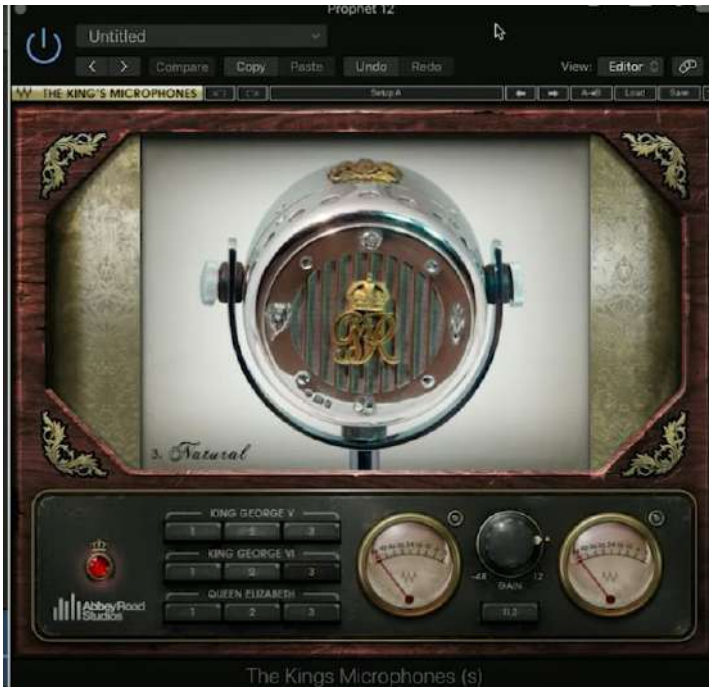

Figure 4: Wave's "The King's Microphone"

The concept of material-metaphor can be seen in the King's Microphone, as it shows a convincing visual metaphor of lost analogue technology that is materialized in the digital (Fig 4). This filter offers three vintage microphones to apply to an audio or instrument. The plugin is decorated with wooden decor for a nostalgic romanticism for the early twentieth-century studio. Similar to the mailbox icon, this material-metaphor is simple in its iconicity—it refers visually to a past period of ambient radio crackle and the perceived warmth of analogue technology. Although it's iconicity is simple, the information beneath its surface provides a much more complex process. Since the actual data process remains unknown, an engineer or producer can only assume how the Waves company promises such an effect. Through specific compression, distortion and manipulation of frequency response, the plugin emulates a past technology's affordances, manipulating digital sound into replicating the deficient frequency response that older technologies have since evolved beyond.

Using a VST plugin that produces the sound of a flute ensemble, producer 30 Roc plays a loop of minor and dominant chords on the keyboard, using the RC-20 Retro Color to change the sound ("The Box," 2:42). The producer shows viewers how he manipulates the dials on the filter that read descriptions such as "space" and "wobble,"

the producers change the sound of the flutes by adding reverb and wobble to the flutes, which gives the sound more perceived space and pitch inconsistency, adding a liveness to the sound. This plugin is simple as well, showing a few colorful boxes to play with different parameters (Fig 5). When discussing this filter, the producer mentions that there is also an option to equalize the sound that is hidden below the colorful facade. Without much insight into the technical aspects, the “space” dial changes the theoretical acoustics of sound, adding reverb and manipulating the physics of sonic decay. Performing as a material-metaphor, this filter changes the perceived spatiality of sound, yet in its digital-material manner, it succeeds in producing the physical sound waves in playback.

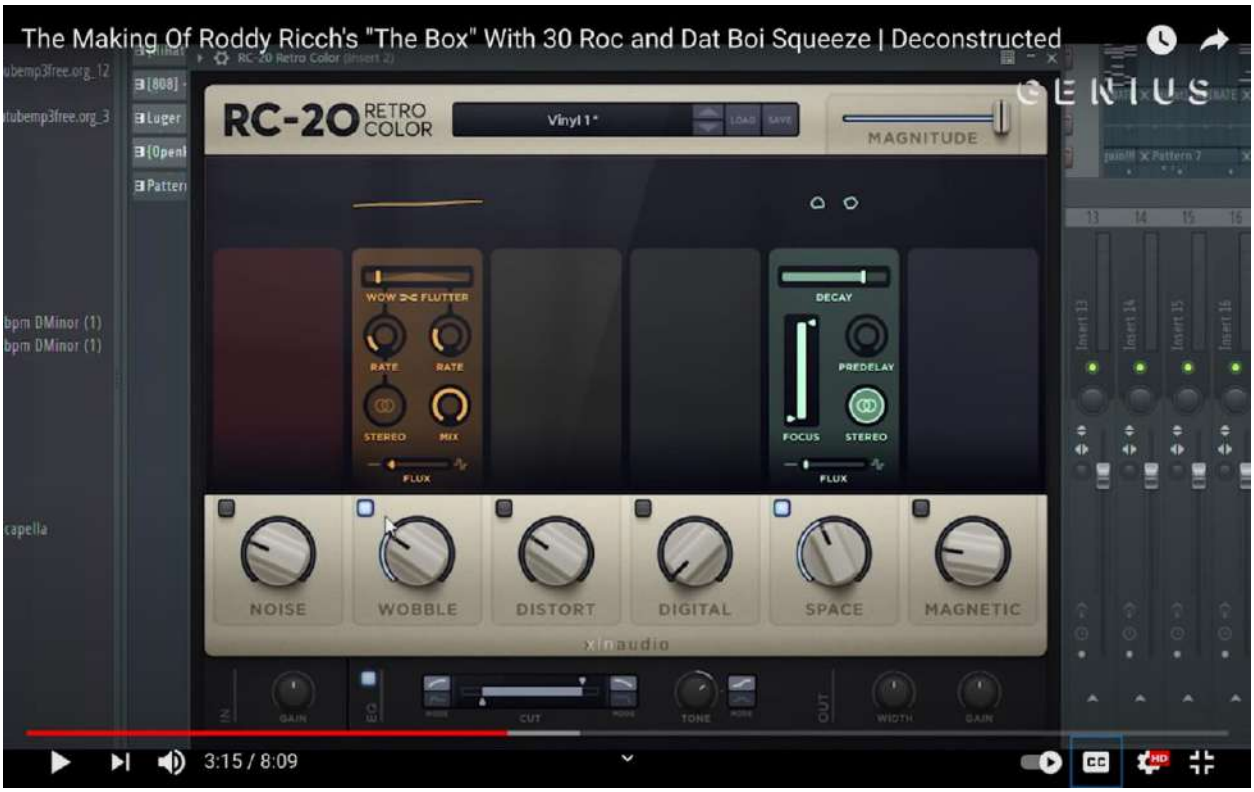

Figure 5: RC-20 Retro Color

The producer here shows the power of the DAW as a material metaphor in the capacity for sound to be metaphorically and concretely constituted and manipulated. Not only does the DAW make material the layers of audio and midi tracks, but the conceptualization of sonic frequencies and their physicality becomes another dimension of layers in which sound is heard and seen in reference to instances of depth, space,

color or quality. The ability to play with the equalizer and affect sound in a nondestructive way shows how sound is thought of in terms of constitutive manipulation and the plasticity of music.

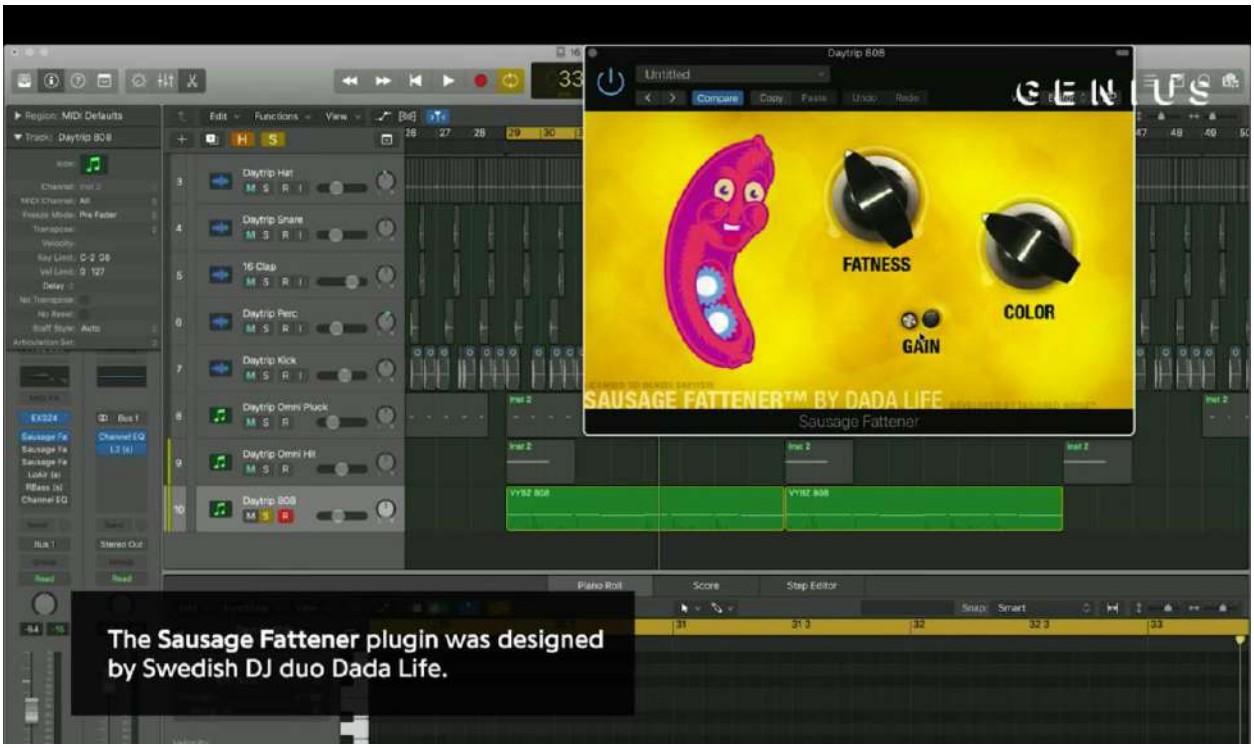

Figure 6: Sausage Fattener Plugin Applied to “Mo Bamba” bassline highlighted in green. This screenshot also gives credit to the highly popular musicians that capitalized on their signature process.

The producers of “Mo Bamba” also discuss their use of the filter, “Sausage Fattener” which they used to make the bass darker. This playfully metaphoric filter shows a colorful box with only two dials and is marked with a cheeky, cartoon sausage (Fig 6). The two knobs read “fatness” and “color” which keeps the specifics of sound engineering invisible. Aurally, and most likely, these dials seem to distort the harmonics for a more demanding sound, while balancing sonic compression that brings in a “crunch” or “edge” (Music Radar 2011). The “fatness” knob can be played with to add a fullness to a sound as it adds sonic weight through increasing volume and by adding corresponding upper harmonic frequencies (Splice 2014). The color knob then plays with the amplitude and saturation of the upper harmonics (Ibid). It is felt as adding a “brightness and edge” to it, balancing the commanding weightiness of the fattener

(Music Radar 2011). The blog Music Radar describes the plugin as an “arrangement effect” to make sounds more prominent and commanding even as no new instruments are added. The slides and dials that have become a facet for all digital audio workstations encourage an experimental attitude to find what fits the sound. Even if EQ readings are more minute for audio engineers, and those with intimate knowledge of the information behind the programs, the ability to play intimately with waveform makes the ear more aware of the gradients in sound. Even an audio engineer would have to use their ear to guess what is happening here. Metaphors like “fat” speaks to a heavy bass sound and the cartoonish sausage icontologizes this metaphor of heaviness, a variation between heavier and less heavy that is cemented in the DAW. The creators of the plugin promise a “greasiness” of sound that seems to point to a specific balance of upper and lower frequencies that brings about this complementary, and demanding weight and bite to the sound. These plugins are creatively designed through specific equalizing steps and with icons to match the promised effect. Although the “Sausage Fattener” points to a weightiness of sound, the colorful design and the equalizing dial of “color” seems to add a new layer, or dimension, of sonic texture. An example of a material-metaphor, the Sausage Fattener hides the complex, nonhuman action as well as the production steps that laid the model for the plugin. By giving these production qualities an icon, the popular plugin cements contemporary attitudes towards the attainment of unique sonic textures and the importance of textural variation in new music.

As musicians play with the texture of sound through frequencies and filters, they can manipulate the physics of sound through the theoretical constitution of the audio software that reproduces and concretizes the theoretical qualities and reverberations into real sound. As Marianne Van den Boomen writes, “In these instances of metaphor the transference is not between linguistic concepts or semantic domains, but between words or other symbols and a material-physical system that affects a state of affairs in the world” (Van den Boomen 2014, 51). It is through the capabilities of the digital performance that our metaphorical understanding of sonic texture becomes actualized through symbolic dials that reference weight, color, or space.

These examples are shrouded in a black-box through their playful designs by using iconic metaphors that show color, nostalgia or idiosyncratic musical descriptors like dirty and fat. They are effective plugins that capitalize on the popularity of certain genres or producers' style, reifying and cementing attitudes towards music as users aim to add sensory factors such as color, warmth, weight, nostalgia or bite. While affecting informatic traffic and highly abstract musical presentation, the digital actors have real world impact on physical sound waves and cultural attitudes.

With this, our aural senses become ultra-tuned into the gradient of texture that is encouraged through free-play with the interfaces. Considering the differences between the human and nonhuman actors within the twenty-first-century-media, the producers' cognition inevitably moves much slower than the affordances of the digital logic, putting higher-level interpretation beside in favor of pure instinct. This seems to overwhelm our musical senses as producers can play within the breadth of new musical worlds that combines a dizzying multiplicity of sonic dimension. The DAW brings together sounds that feel old, new, futuristic, far away, near, warm, heavy, or shrill. More than just timbre, the DAW's material-metaphorical behavior shows a manipulation of sound that extends timbre beyond pitch or texture, but into domains of possibility in which texture is shuttled to ears through a multi-directional balance between a variety of mostly invisible tools. It is tough, even for audio engineers, to pin down exactly what is happening in these pre-packaged material-metaphors and what the digital actors are doing. It seems that the majority of the music-making performance happens within the DAW and evades our perceptions, since there seems to be a purely sensual understanding of music that is described through variations of texture, space, time and general affect. The musical metaphors used by the producers may not be entirely new, but this is due to how perception is circumvented in favor of complete saturation of aural embodiment. The producers use general terms to discuss what the micro temporal digital action does to create sounds, because there is not much human cognitive capacity that is employed in the intuitive equalizing that occurs behind such metaphors as "color" or "space". Producers layer sounds and aim for certain structures, but the imagination and the hearing skin propels the production process when manipulating sound in the form of these filters. The plugins conduct the musical traffic, while their design tells us that what

is most important. Texture is supreme while their blackbox is irrelevant to the process. The DAW's tools affect senses since their design guides a playfully inquisitive and experimental attitude towards sound design. Users can try a plugin, play around with its dials and move on to the next. The computer does all the work, so all you need is to understand what comes viscerally as sonic desirability.

Although metaphors to describe sound are imprecise and fleeting, the DAW has allowed a digital culture of music to wrestle with sound through complex and dense ideas of visual material. Terms such as fatness, saturation, brightness or color, act as a material metaphor in the way that these symbolic associations become actualized in the physical recreation of sound. Van den Boomen reiterates: "Decisive is the traffic they enable, conduct, or invoke between the symbolic and the material, thereby constituting what can be known, imagined, and narrated, and how it can be addressed, appropriated, and enacted" (Van den Boomen 2014, 55). Although some of the ways to describe sound have only become accessible in the twentieth-century by audio engineers, the ubiquity of the DAW and the ease of digital manipulation has led to a new onset of musical imagination. The realm of symbols has become expanded through the interface that presents slides and dials encouraging sonic experimentation. Even if technical interpretations concerning frequencies or decibels are still more understandable for engineers, the ability to play intimately with sound, as it pertains to its physical implications, shows the performance of the digital actors as it makes the ear more aware of sonic gradation and possibilities.

4. Playing and Performing Sound

This chapter will continue to provide new ways to conceptualize and study music. In establishing the new music ontologies that established the digital age, Chapter two provided new ways to consider these new sounds, as baroque enfolding of disparate elements. Chapter three explored the DAW's interface as it allows great modularity and new musical landscapes that play with sensation. Now, this chapter will explore how media studies has aided musical interpretations of playing and making music. As the previous chapters showed how sound is an entangled web of sensation and disparate elements, this chapter will show how music-making itself is also a web of entangled actors. Using Roger Moseley's argument of ludomusicality provides a useful tool to uncover the serendipity of music making as a ludic practice. First, the chapter will explore ludomusicality as a tool to mine the playful web of interactions to be found in musical histories. This concept uses a variety of behaviors, actors, and opportunities, which is particularly relevant in discussing the distributed agencies at play within digital music production. Ludomusicality helps to explore how play allows music analysis to read into the lively intersection between bodies, cognition, sociality and materiality and what a playful orientation means for music as a dynamic phenomenon. Next, minimalist music provides an avenue to search for ludomusicality, and provides examples of ludomusical connections. Robert Fink's text on American minimalism provides a culturally rich reading of new media's effect on music. Particularly, minimalism's repetitive musical cycles parallel hip-hop and can be used to defend repetition in music as an example of meaningful musical play and sonic revelry. As ludomusicality provides a portrait of the entangled human and nonhuman elements, author Kodwo Eshun is also employed as his interest in blackness and electronica helps to show how ludomusicality can be seen in contemporary electronic music as a sonic, posthuman participant of musical play. Finally, quotes from hip-hop producers are mined to discuss how we can see ludomusicality in their interactions with social, material, physical and cognitive negotiations shape their sonic landscapes.

Ludomusical Opportunities

Play is a useful concept in our contemporary media environment as many scholars point to our cultural as becoming more centered around play as a method of worldly investigation. From games to technology, play has become crucial for consumer involvement and, on a basic level, playful media environments show a heightened visibility on play as an important asset for learning in the world (Raessens 2014) (Resnick 2017) (Turkle 1999). We play within the world, with materials and, most relevant here, we play music. In Roger Moseley's text *Keys to Play: Music as a Ludic Medium from Apollo to Nintendo (2016)* the author makes an evocative string of musical comparisons that place many different time periods and genres on the same plane of exhibiting ludomusical characteristics. Rather than studying music as a categorization of linear compositional evolution, Moseley's text investigates play as a ubiquitous approach to music and technologies within disparate time periods which effectively complicates hierarchical ideas of music creation as a purely rational, top-down creation. Ludomusicality is a useful tool to study music making that assesses music outside of its theoretical form, and within the complex web of human and nonhuman actors, or the interaction between people and their environment. Ludousicality does not reify music as a discrete epistemological object but emphasizes the conditions of the phenomenal emergence. Moseley writes that ludomusicality does not denote a specific type of play that produces music. Rather, music constitutes a set of various interactions (16). He writes

> … music is not merely the outcome of a certain type of play, but constitutes a set of cognitive, technological, and social resources for playing in and with the world through the medium of sound, its mechanisms, and its representations. Play, in turn, becomes the means by which such musical behavior is made audible….ludomusical play fluctuates between the preordained and the unforeseeable, emerging in relation both to the performance of familiar cultural scripts and to the imperative to improvise (Moseley 16).

Play can be many things, but this ludomusical perspective considers the conditions behind sonic emergence that encapsulates the serendipitous discover that emerges between the temporally specific cognitive, technological and social conditions. Play is not a singular musical approach, but the ripples of playful encounters can be mined from the intersection of various actions and conditions that produce the formation of

sound. Ludomusicality accords music the simultaneity of cultural scripts alongside the constitutive and presemiotic iterations of individual performance. Seen in the structure of a typical jazz performance, playing with sound is predicated on balancing form alongside improvisation.

In his famous 1938 text, *Homoludens*, Johan Huizinga assessed play as constituting a performative space that exists outside of normal life. Often attributed to Huizinga, some scholars picture a “magic circle” as constituting the behavioral boundaries that encapsulate the social and cultural expectations of acceptable play. Although the concept of the magic circle has been contested due to play’s porous nature in daily life, Moseley’s text finds purpose in the magic circle, as it portrays a visualization of the rules that are concomitantly created alongside the permeability for transgressive improvisation. For Moseley, music can be read through a ludic lens since play and musical performance both hinges on this paradox of constitutive rules and transgressions, a recursive logic in which play is not a discrete entity, but is always creating through play (Moseley 2016, 16).

Glimpsing hip-hop’s production practice benefits from a ludomusical reading in negotiating form. The sound of hip-hop style and songs arises from a negotiation between digital actors, studio materiality, cognitive choices and affectual impressions that are informed by social and cultural influence. In groups of musicians particularly, moments of social spontaneity become relevant within their collective musical negotiation. While many musicians, from jazz improvisers to hip-hop producers, can only attest vaguely to their immersive flow, in which musical satisfaction is discovered, a ludomusical reading can dissect the various actors and conditions that bring about the individually and culturally specific sonic emergence. Through assessing the playful elements within music, we can expand music scholarship into complex contextual emergence and imagine new musical epistemologies, beyond the static of the score’s linear logic.

Music is played but, historically, the ludic elements have been ignored since play is hard to decipher from historical evidence. On the other hand, ludic investigation makes for a productive study of music’s entangled emergence that can read into a variety of primary source and cultural conditions. There are important epistemological

ramifications stemming from ludomusicality. Moseley writes, “Musical play and playful music take shape in the spaces that open up between sign and sound, instruction and execution, the probable and the implausible, the permissible and the imaginable” (Moseley 2016, 16). Play creates a space similar to the liminality of performance art, in which the distance between performance, prescription, subject and object collapses, and we are left with a field for potential meaning-making and affect. A ludomusical reading explores the moment of constitution as a specific, self-referencing moment of emergence, as opposed to music as a reified object that assumes cultural and hierarchical boundaries.

These sets of opportunities and performative instabilities shows a complex “doing” and relating to sound that is presemiotic since play is inherently constitutive in its stacked referential capacity. It is imaginative and is based on “… possibilities afforded by the subjunctive mood. The phenomenological characteristics of play have less to do with intention and emotion than with entrainment and affect” (Moseley 2016, 17). Play describes the experiential confines of music that surrounds embodied affect. “As a performative mode, play preempts and subverts questions predicated on linguistic concerns with communication, meaning, truth, and sincerity” (ibid). Sounds certainly exist within the process of signification, but the ludic orientation makes our experience with sound constitutive and lies in the realm of presemiotic.

In this way we see that a ludomusical reading illuminates the magic circle as a paradoxically constitutive and socioculturally conditioned. Regardless, the conditions that encapsulate sonic play are temporally specific and are based on the enmeshment of various actors as opposed to a one-directional relation to rules and hierarchical top-down logic of form.

In the same epistemological vein, musical trends are not historically cemented as a linear progression from formal evolution. Rather, ludomusicality connects various time periods through the shared interplay of elements. Moseley writes:

> From a ludomusicological perspective, all these forms of play forge connections that enable us to historicize the new and to renovate the old via techniques of projection and retrojection… But by interrogating the qualia of historical events and attempting to reconstruct their ludomusical logic, they offer the

> tantalizing prospect…of bringing the future of the past within range of twenty-first-century sensoria (Moseley 2016, 65-66).

A ludic perspective adds depth to the historical delineations of musicological analyses by assessing the nonformal elements available in musical archaeologies. Moseley's vision to retroactively apply contemporary ideas of ludomusical logic places the past in conversation with the present and allows new imaginative genealogies to open up in regard to contemporary sensation. For example, Frédéric Chopin's pieces opened up new harmonies that can be seen as playing with harmonics and quarter tones, resulting in a new sensorial experience for the listener in this time period (59). Moseley uses this example to show how Chopin's compositional approach effectively played within the confines of the keyboard to weave harmony, counterpoint and thus, create novel, affectual possibility. Moseley's text shows how there are many ludic aspects with which one can draw creative connections and color the cracks in historical narratives to inject musical contemporaneity into disparate time periods and styles. We play with music on a large gradient of composition and experience, ranging from the traditional instrument, to the keyboard and computer keyboard, even including the game controller. Play's performative and unstable nature destabilizes epistemological assumptions concerning music as an object or a discrete language. Including the nonhuman influence of technology such as the keyboard opens up a discussion on music's emergence and experiential potential. Its diverse relation between subject, object, sociality and cognition makes it an affective field for presemiotic sensation and opens up new historical and subjective connections that fly between genres and connects a variety of cultures.

Popular hip-hop for instance, in its repetitive loops and tropic subject matter can be musically unconvincing, lacking the perceived organicism of politically-fueled lyricism or the musical sophistication stemming from complex melodic layers and overlying form. With a ludomusical reading, however, we can understand how the sounds are treated through playful experimentation through cognitive ideas, material conditions and the physicality of sensorial satisfaction. This is not to confirm tastes or value music or argue that Sheck Wes's "Mo Bamba" is equitable to Beethoven's Fifth Symphony. Rather, ludomusicality can investigate the musicians' interaction with sound as an experiential web encapsulating technologies, bodies and sounds.

Ludomusical Repetition

We can also turn to minimalism as an example of a musical genre that benefits from new understandings like ludomusicality. Additionally, minimalist music harbors much cultural baggage concerning value that reflects the assumptions that face hip-hop music. Minimalism is characterized as late twentieth century music that utilizes short, repetitive cycles, drones and layers. It can sometimes be called process music as layers are added slowly for affective purpose. Robert Fink's text *Repeating Ourselves: American Minimal Music as Cultural Practice* (2005) presents a robust study of minimalist music as part of a culture of repetition, offering a way to conceive of minimalism that does not lie in its form, but rather the cultural specificity of commodified, media-saturated landscapes. Fink argues against the moral valuation that belies minimalist music as a consequence of the death of classical music or the banality of consumerism. Rather, the author shows how the closed circuits of repetition evoke a pleasurable slow building that emphasizes sensuality amidst the repetitive saturation of advertisements. Using Fink's work, we can understand how ludomusical insight helps to broaden musical discover by highlighting the playful elements of minimalism. As play itself constitutes recursive, self-referential circuits of play, minimalist repetition in sound can mirror an arena for playful writing and receiving of sound. The enclosed circuits of repetition reflect the magic circle of play and the constitutive nature of playing through sound.

Minimalist music seems to warmly embrace tonality through harmonic stasis and repetitive threads of processual layering. This seems to contrast with western art music as minimalism is seen as non-teleological while western art music is typically portrayed as being goal-oriented. Fink writes that, "…coherent, perceptible teleology has been seen as an essential feature of high art music since the early nineteenth century" (31-32). Outlined here is the divide between western music as constructing teleological *plaisir*, a pleasurable sense of climax and conclusion, that stands in contrast to the repetition and harmonic stasis of the minimalist *jouissance*, or an extreme libidinal pleasure, an overstimulation of repetitive pleasure (Fink 2005, 37). Between the two, western art music is typically written about as giving a feeling of "going somewhere" that minimalist music seems to oppose in its repetitive iterations. With this classical context,

we can see how minimalism provides a jarring effect of uncomfortable repetition as opposed to the expected semiotic coherence and harmonic drive. As a consequence, western art music's dedication to semiotic coherence seems to confine music to the cerebral realm and rejects the implications of irrational ludic elements. However, as Moseley included, Chopin's exploitation of pitch, shows a ludic relation to even art music in its sensuous joy of tonal play. Ludomusicality allows new readings that musicology can benefit from, as seen in the limitations of semiotic musical coherence and the anxieties that arise from minimalism's lack of formal complexity.

There is often a sense of morality attached to minimalism since the formal musical elements are considered too simplistic for proper analysis. Fink writes that minimalism's simplicity, and lack of coherent development, has been considered a symptom of society. It seems that the heights of romantic narrative that western art music reached is mourned though minimalism as it peddles the machinic and mundane metropolis. Similarly, contemporary popular music and specifically hip-hop music is a victim to these judgements, particular due to its repetitive nature and its place within a large music industry that churns out copies of performances and short, simple songs for mass consumption. However, the ludomusical reading of music assesses new music's ontology beyond its formal elements.

Fink questions why minimalism is considered non-teleological when there are circuits of tension and release present in minimalist music. Using the compositions of John Cage and Steve Reich, alongside Giorgio Mordero and Donna Summers's disco song "Love to Love You Baby," Fink explores how minimalism is far from static. The music of Reich and Cage show a slow build of linear harmonic, progressions (50). With this, the rhythmic and harmonic pulses show a slow building that is heard in many forms of electronic music, beats and mixes, such as disco. Instead of repetition and harmonic stasis, Fink sees scaled circuits of tension and release. In this regard, Fink sees a recombined sense of teleology. This benefits from a ludic perspective that considers the negotiated balance of form and improvisation. The magic circle of musical flow can be seen within the processual logic of minimalism, in which sonic satisfaction is playfully negotiated through recombination and exploration of tension and release.

With this, the slow process of minimalism highlights the experience of perception as listeners grapple with sonic gestalt. Our experience of temporality is played with in the long cyclical stretches of minimalist circuits. Minimalism's repetition is not as a superficial compositional form but shows an ambiguous and therefore highly subjective reading its unfurling "rhythmic strata" (Haskins 2006, 148). This interpretation is also open to a ludomusical reading as sound certainly plays with our senses.

Working off of Roger Caillois categorization of games, Roger Moseley's *Keys to Play* draws parallels between ilinx, the dizziness inducing form of play, and music. The sense of playful vertigo that makes a rollercoaster enjoyable becomes aurally palpable in music throughout history. Frenzied notes quickly spun from ancient Greek wind instruments disorient the listener, effectively, "short circuiting the representational strategies of symbolic signification" (30). Similarly, the Scherzo is "overtly ludic" with its speed and repetition, as tempos change quickly, and unexpected sensations bring rise to feelings of irrational humor (31). György Ligeti, the post-war modern composer associated more with avant-garde sonic dread than play, uses "complex metrical layering" that disorients the listener rhythmically (ibid). Debussy's *Jeux*, provides erotic subtext and aural foreplay as the music shows "oscillation, undulation repetition and variation" (32). Encased in repetition, rhythm, and promoting jarring bodily affect, the dizzying effects of musical ilinx spans histories and envelopes the magic circle of "unbridled power" that separates delirium from the daily.

Minimalism's repetition is often subscribed to a primal erotic power, that can also be indicative of a penchant for aural play similar to the above examples. Fink's text shies away from these romantic readings as the author promises to, "explore the many different ways that our repetitive subjectivity is constituted, over and over, within the multiple, complex webs of material culture we weave" (6). This focus on a culture of repetition allow us a ludomusical reading regardless in which the particular cultural and social environment is part and parcel to the musical negotiation of form, transgression, sonic construction and environmental play.

The 1970s Disco, art music minimalism, and hip hop can appear as linked in their ludomusicality. Fink's focus on repetition as teleological mutation shows a complex ludic environment in which musicians play with form, harmonic stasis and resolve. Hip-hop's

ludomusical environment, as seen in the first chapter, is saturated with electronic technologies. Hip hop works through cutting, juxtaposing and recombining samples and loops, playing with sonic materials amidst the interaction of electronic technologies and digitally pedaled sounds. Furthering our ludomusical opportunities, the next text provides further explorations of ludomusicality in particularly electronic music. In Kodwo Eshun's work *More brilliant than the Sun, Adventures in Sonic Fiction* (1998) the author writes his manifesto on the connections between electronic music, futurism, time-travel and black noise grappling with the posthuman. Eshun writes that Disco is audibly where the twenty-first century begins "Disco remains the moment when Black Music falls from the grace of gospel tradition into the metronomic assembly line" (-006). Marking the shift from gospel tradition as classical music in its literary (albeit oral) history into the realm of electronica, we can draw connections to Fink's new aesthetic terrain that also comprises the specificity of ludomusical conditions. The aesthetic shift to electronic music brought about the attention to nonhuman actors and the striking effects that it had on musical aesthetics. For Eshun, this shift has only stimulated sensation further. He writes, "Sonically speaking, the posthuman era is not one of disembodiment but the exact reverse: it's a hyperembodiment (-002) Eshun describes this as a "Sensational infection". As we have seen in the history of the DAW and the behavior of twenty-first century media, our senses are recklessly implicated by new media. Eshun writes how the breakbeat in DJ culture, hip-hop beat production and sampling created an aesthetic of textures, describing it as "Textural strata" and seemingly foreshadowing the musicological movement to understanding minimalism as an invitation for playing with sensation and the material conditions of music making (4). We see the strata in the DAW as visual icons and we hear it in the loops that align perfectly with each repetition and further engrains themselves in bodies as we consciously and non-consciously feel through the sonic strata, and its pulsing invitations. Concerning how we grapple with textural strata, Eshun writes, "…there's often a lot of sounds where the percussion is too distributed, too motile, too mobile for the ear to grasp as a solid sound. And once the ear stops grasping this as solid sound, the sound very quickly travels to the skin instead - and the skin starts to hear for you (Eshun 1998, 181). Eshun's interpretations aids a

ludomuscial one, as music in the electronic digital cultures has become constitutive by inhabiting the skin and referring musical meaning to playing with our embodied affect.

As the music relays layers and loops of aural texture, they travel through the skin making proprioceptive relations. Repetition or harmonic stasis is not a superficial form, but within our society of electronic media, they play to the intensity of sensation and bares itself as the ludic mobilization of nonhuman actors within our musical stages.

While Zuberi writes on sampling in the context of diasporic disruption and recombination, he cites Simon Reynolds hauntology of the sample. Decontextualized voices and instruments are transformed through recombination. Looping turns "vivisected portions of human passion into treadmills of posthumous productivity" (Reynolds 2006,31 as cited by Zuberi) We can go further than this and see these aural loops as treadmills of post*human* productivity as they operate with only minimal human provocation. Modularity, recombination, polyrhythms, texture and strata are all characteristics of, not only minimalism, but a wider culture of repetition. In our connected and disparate world of temporalities and cultures, human and nonhuman, the posthuman loops are the ones obviously at play as they propel circuits of perfect time and playfully imaginative sonorities. It reminds us of our constant play with media and our very human sensorial and cognitive capacities. Repetition of drum patters, short harmonic blocks or drones of tonal comfort are more than their formal elements. Perception is challenged, tickled and intimate subjectivities are birthed in loops of self-enclosed understandings.

In hip-hop music particularly, the drum beats are layered into a dense chorus of textural variety. "The drumchoir complexifies the beat into distributed Polyrhythmachines, webbed networks of poly'counter'contra'cross' staggered rhythms that function like the dispersed architecture of artificial life by generating emergent consciousness "005. Instead, their emergence moves more quickly than the intention of human cognition as polyrhythms emerge effortlessly through the electronic machinic action. Our skin senses complexities as networks of polyrhythms, contrasted and layered rhythms collide into our bodies. The posthuman treadmills of sonic repetition provide playfully aural sense of vertigo as listeners grapple with interpretation and sensation. The culture of repetition within the twenty-first century is one of not only

corporate sameness, but the way new media plays with our senses. In digital music, we hear the interplay between human involvement and the digital's performance, showing a particular moment in which human and nonhuman actors negotiate and play off each other to create sound.

Overall, minimalism, particularly in its electronic and digital state, can benefit from a ludic analysis because it accounts for the complex entanglement between bodies, social settings, material conditions. Minimalism's non-goal-oriented nature seems in line with the lack of goal within musical play, yet still is teleological in its search for satisfaction, reflecting the paradoxical nature of the magic circle, in which players search for structure and transgression, tension and release. Minimalism can be played in defense of popular music to show how contemporary culture plays with repetition, recombination and sensation. Repetition, recombination, and digital looping all speak to the ludomusicality heard throughout history, although posits the specific contemporary environmental conditions that color ludomusical play in the twenty-first century. We play with machines and doing so we negotiate meaning, sensation and affect and build worlds through this interplay.

Playful Process

In our exploration of ludomusicality as a way to defend minimalist music and, in light of this, hip-hop music as a lush field of sonic experience, we can turn to specific examples of hip-hip production for analysis. The "Deconstructed" videos are perfect candidates for a ludomusical reading, since the focus is on how a song came, citing the interplay between the individual's cognitive and physical endeavors, their material interactions and social encounters. This process holds many happy accidents, and unintentional results, yet shows a similar adherence to hip-hop as producers lay down kicks, claps, hi-hats, basslines and melodies. Through this form, producers search for what sounds good and discover ways to add a novelty by playing with the sonic expectations and affordances. The producers describe their musical process, which is inherently tied to playing and experimenting in the studio and with each other. Therefore, we see that the formal elements of pitch, harmony and rhythm are

overshadowed by the ludomusical interplay between subjunctive moods, social negotiations, and playing in a field of nonhuman actors such as digital tools.

There are many moments in the “Deconstructed” video series that show the producers’ process and their interpretations and interactions within the musical setting. Between the artists, technology, and sounds, the producers highlight the serendipity behind the musical process that can be mined for ludic elements. Often, in discovering the famous melodic hooks or chords, the artists describe a playful discovery. Producer 30 Roc describes how he chose the SRX string orchestra plugin to play one introductory note. He describes, “When I pressed play on that, I was like -Damn” (“The Box,” 1:40). Looking over to Dat Boi Squeeze, together they decided it was the perfect start. This shows the playful spontaneity that can be described as ludic due to the bottom-up interaction with various actors in these confines of physical, social or cognitive play. As the producer plays around with sounds or chords with no goal in mind, a particular affordance of the DAW, ludomusicality can be read through the transient physical or social spontaneity. This theme of manifested joy is prevalent in the videos, as the digital audio workstation affords nondestructive experimentation and facilitates more cognitive or physical experiments to be tested, arranged and continuously tested. Even when one can point to how simplistic the rhythms, melodies and harmonies prove, we can see how these songs come to fruition through a complex creative play, where various actors and sounds interact. Also, this terrain of the individual artist working amidst sounds and technologies shows the complexity of potential subjectivities that are negotiated between the artists amidst a playful attitude towards discovery. Particularly the engagement with the posthuman loops saturate the environment and speak to sensation while the looping saturates cognition.

It is a sensorial joy when even a one-pitch orchestra sound that begins “The Box” or the three-note flow underlying “Suge” and the crisp four-notes from “Mo Bamba” is considered hot. The way the producers discuss these almost indescribable moments speaks to the processual value and the complex moment of play in which cognition, social dynamics, digital actors and materiality interact in the dense field of sound. It almost feels as if 30 Roc’s “damn” solidifies the ludomusicality that, in the sound’s fleeting emergence, shows how the musical satisfaction is hard to detangle from its

emergence. The “damn” moment expresses cognitive and physical experimentation and the social confirmation as well as the digital’s action as it presents a virtual sound unexpected that surrounds the musical process. It is hard to decipher what is happening in the moment, other than serendipitous satisfaction. As the producer lays down the four chords of the flute choir that repeats through the song, 30Roc simply mentions wanting to find something that fits the orchestral sound he already put down. There is not much logic here, more a search for complementary textures and instruments. The one note that frames “the Box” is truly minimal as it stands alone as one SRX plugin and pitch, although it is a resounding sonic density to bask in.

The deep and repetitive bassline of “Mo Bamba” shows a minor three-note flow played by Denzel Baptiste made Sheck Wes say “yeah that’s it” (“Mo Bamba” 4:39). The simple and, perhaps, redundant sound is not a hindrance to the musical play, but its repetition seems to set up an arena for playing with the sound and riffing on its ambient texture. The deep growling bass plays alongside the shrill piano notes for a balancing act between the elements. Baptiste goes on to explain that Sheck Wes wanted the bassline “more aggressive.” In physically playing with and increasing the filter cutoff dial, Baptiste describes how this adds more of the high frequencies to the bass and makes the sound more grating, or aggressive. There is a point where Baptiste describes the sound becoming “too crazy,” but Sheck wanted him to keep pushing. In this instance, we see how the physical experiment that the rapper pushes also pushes the boundaries of sound production in the cognitive sense of play. In increasing the filter cutoff, the sound is more demanding and fuller, yet risks clipping and distorting the sound. This shows how the musicians are playing with sound by transgressing the expected boundaries and formal constraints in audio engineering. With this, the sound becomes a player itself that is described as aggressive and shows how the artists play within the subjunctive mood as the desire for their musical experimentation is driven by desire for ambiguously intimate goals of making a song that sounds “hard”. Playing with the bassline exhibits pure sensation and speaks to the building of the rapper’s subjectivity and relationship to the music-making.

Another example of transgressive play this is shown in the construction of the drum layers where David Biral describes using a “pluck sound” from a synthesizer

plugin to behave as a drum. (“Mo bamba” 3’20’’). Although a pitched note, the producers use it as percussion sound on the upbeats, adding a new texture to the rhythmic section. Using sounds or filters against their original purpose shows a playfully creative use of the database of sounds derived from the virtual instruments and the keyboard. In these cognitive and physical experiments, the artists play against established music and production categories. The piano-drum hybrid plays with the ideas of musical expectation as instruments, in their looping, morph between categories of pitched and non-pitched, organic and inorganic. It plays with sonic conceptions as listeners are challenged to grapple with a sound’s origins and our intimate experiences with what we hear. It also expands the kind of tapestry of rhythm as the synthesizer has a more robust sonic spectrum than the characteristic of a percussive instruments like such as the hi-hat. It seems to mesh sounds together by creating a playful tapestry of a variety of drums alongside the tinny piano and the aggressive bass. Ludomusically, the producers explore within the confines of the DAW and the piano keys to create textural strata that speaks to the desire for balance between form and experimentation through the medium of sound. Sound becomes something of a visual medium due to their plasticity and the ease with which artists can move around the keyboard and interface.

With the physicality of play, tinkering and arranging, the bricolage of sounds is certainly a unique affordance of the DAW. The producers layer different drum beats together, creating a seamless rhythm that emerges from various blocks of sound. These drum beats, like the pluck sound or the clap, are sparse in their individual layer, but combined together, they create a web of musical enjoyment. Also, in the composition of the song’s structure, the looped sounds can be moved around as discrete blocks. As Sheck Wes unexpectedly raps almost the entirety of the song, producer Baptiste had only made eight bars, forcing him to copy and paste the sections in real time with Sheck’s oral performance (“Mo Bamba” 6’00’’). As it continues, Baptiste also manages to remove different sections and add them back in to provide variation for the song. The DAW exhibits a plane of nondestructive play, using blocks of sounds as tangible material to think through the musical flow. In playing with the sound blocks like this, the producers play with the process as space. The layers are not built up in the same way of lengthy minimalist pieces, but the optical layers provide a field to engage with sound

that stretches its temporality in the same way that repetitive music stretches temporality through perception and confrontation with repetition. The process is not built only aurally, but in the space of the interface, it allows many layers to be placed in one context many textures and sounds to play with sound building through the subjectivity of world building.

It is the rhythmic beat, sing-able melody and high energy from the rapper that shuttled “Mo Bamba” into a danceable, head-bobbing song for any party. Without the arena for play that the artists riff on, the song may have been received as mundane in the simple construction. Instead, the irrational play with the filters creates sounds that are “clipping” and jarring with the technological capacities. Rapper Sheck Wes hits his flow as the technology helps the producers to perform alongside him, arranging sounds. The producers describe the hook as the “magic moment of the song” where “people go the craziest” (“Mo Bamba” 6’54’’). As the computer unexpectedly freezes, the rapper yells obscenities until the beat continues and he can launch into his high-energy hook that captivates audiences and brings the heat that the artists were searching for. It is an example of the unstable, playful context that has unforeseeable consequences. Producer Baptiste says, “If it weren’t for imperfections nothing would have happened.” Playing with the materiality of the DAW is crucial in creating a performative space in which rationality is excluded in favor of serendipitous moments that are caught between realms of the bodies, ideas and machine. In this instance it seems that the music came about within this ludic context and the precarious sensation that occurs between silence and sound, action, distribution of agency.

The producers of “The Box” have a similar approach to playing around with sounds and their place within meaning-meaning. Dat Boi Squeeze describes how making beats with 30 Roc is full of these serendipitous moments. He says, “When we makin’ beats together, we hear a sound or he plays something he looks back at me” (“The Box” 1’49’’). While this exhibits playful experimentation, it also shows the power of playful negotiation as rules are so clearly transgressed. The Box is famous for the initial adlib that Roddy Ricch performs where the rapper seems to mimic a squeaking hinge. Described as “eeh-er”, this is the first vocalization on the track and the first thing the producers heard from their collaboration with the rapper. Surprised, the producers Dat

Boi Squeeze and 30 Roc seem to discuss the adlib as not being initially desirable. “I don't know if it was our studio speakers or what,” [The Box, 0’07’’] but the adlib came loudly, making the producers look at one another questioningly. However, 30 Roc says once Roddy started his flow, the sound then blended in with the beat and added something special to the song. While at first, it seemed a ridiculous way to begin a song, the “eeh-er” sound resisted an initial interpretation of the rapper’s sincerity inside the musical context. Those in the studio tried not to laugh as Roddy performed his adlib for four bars before beginning his lyrical flow. The producers then copied and pasted the adlib throughout the whole song, adding it to the beat itself and ultimately recognizing the creativity and musical use of it. Although the rapper used the adlib to begin his flow, the sound itself held more weight than the agency of the rapper in that moment, as the initially intrusive sound demanded a reaction from the producers. While it could have been an intimate moment for Roddy’s entrance into the musical space, and merely tolerated by the producers, the sound held a dynamic agency in its performance, evoking impressions that ranged from absurd to musically creative, and evoking tons of memes in its online reactions. Transgressing acceptable sounds that a serious rapper can make, it was certainly humorous for many listeners, it is ludic in that it spurred the creative process, setting up a magic circle of music making in which potentiality reigns and sounds do not fit into expected narratives of how a rap song should sound.

In constructing the beat, the producers describe how they began layering drum sounds, starting with a clap and then adding hi-hats. Producer Dat Boi Squeeze says he, “freaked the hi-hats,” playing an eighth note high hat pattern, adding variety with a 32nd note punches that gives “a little extra to it” and carries the song from the first verse (4’04’’). He describes the persistent and quick hi-hat pattern as helping the “cadence” of the artist, as it pushes the rapper’s flow. Although this producer describes writing the hi-hat line, his conceptualization of the rhythm is one that highlights the interplay of human and nonhuman actors where the sound “helps” the rapper to vocalize fluidly and also prevents the rapper from diverting too much rhythmically from the song. The rapid hi-hats are typical of a trap aesthetic and adds a heightened sense of energy. This way the hi-hat is discussed is ludic in that the instrument seems to perform on its own and affecting the sonic atmosphere. This shows that sounds are not banal necessities to

digital production but are an integral part of the dynamic ludomusicality of hip-hop music and help drive its direction. As the hi-hats flow endlessly and in perfect replication, they truly seem to “help” the rapper as the hi-hats provide a posthuman treadmill of repetition that saturates the hearing skin and gives a temporal energy for the rapper’s collaboration. This perspective from the producer shows that the hi-hat is not simply a part of the song for necessity, but it is an actor within the creative process of the temporally specific and performative moment of the rapper’s improvisation.

The producers of “Mo Bamba” describe their drum sounds in a similar way. In either song, it is clear that each drum sound is valued as its own actor. In the early stages of “Mo Bamba,” Take A Daytrip describes how, in their collaboration with 16yrold, the producer “emailed us a clap he liked using” (2’48). This, along with the careful layering and manipulation of individual drum patterns shows how the sounds are valued as individual sonic entities as opposed to being considered minor facets within the larger, coherent drum patterns. Individually, these drum sounds are painted in the beat and played sparsely, but layered together, they provide the famously complex and energetic drum pattern typical to trap music. The attention to non-pitched, percussive timbre is valued as much as the melodic motion, as the drums become individual characters within the musical play. The producers build their beats by placing sparse, drum beats on different planes that can be played separately, but are then mixed together to form a new, whole sound. This shows the porous nature of the musical magic circle, where things enter in and out of a musical conversation, but together, form the musical object itself.

The ludomusical reading speaks to the distributed agencies and conditions that are specific to the artists’ mindsets and treatment of sonorities. We see this in play in the hip-hop production process as the various drum elements grab the producers’ attention in the balance of dynamics. Some sounds need to be mixed down or up to mesh, while sometimes their attack or release needs tweaking to fit with the other sounds. On a larger scale of the musical strata, we see this in the balance between bassline and melody, or adlib and rap, juxtaposing sensation alongside the play between human and nonhuman voices.

In “Mo Bamba” we hear the technology holding the music hostage as the bassline threatens listeners with going overboard and tearing the speakers open. There is an aural dance between Sheck Wes having space amidst the bass and the drums coming in and out to support the feelings of tension and release. “Mo Bamba” is an impressively simple song, comparable to a nursery rhyme, but it makes people “go the craziest” due to heat from Sheck’s flow, the sense of vertigo from the looping drum patterns alongside another plane of sound where the booming, gritty bass and the tinny piano line provide two extremes of frenetic sensation. In true minimalist fashion, the song begins with Sheck Wes’s deep baritone voice singing on one pitch, “I got hoes callin’” as he stretches “hoes” that feels like forever amidst the expectations of a rap song. When the beat crashes and the technology decides to perform again, the dynamics have shifted and anxiety is released as Sheck Wes begins the powerful chorus declaiming “I’m Sheck Wes and I’m gettin’ really rich.” Listeners feel the rhythmic balance between “I got hoes callin” and Donna Summer’s “I love to love you baby” as the music sets up tension from Summer’s “I” or Sheck Wes’s “hoes” and the subsequent release to the next pitch. Beneath this are more strata of textural arrangements as the bassline performs a three-note dance jumping between tonic and dominant, while the piano melody sets up tension in its shrill, high tone of cyclical movement with the haunting, phrygian scale. Overall, “Mo Bamba” is a simple song with high energy. This energy can be read more productivey using a ludomusical lense that sees an interplay between tension and release as well as the contrasting textures that play within the song.

In the video for Dababy’s song “Suge,” producer Jetsonmade plays around with finding an attractive loop for his new beat. The producer opens the VST synthesizer, “purity”, which shows different synthesizer effects that sound straight from the physical synthesizers produced in the 1980s. He pulls up a sound that he likes because it is simple and “dry” (1:42). Jetsonmade describes aiming for a “pluck sound” as he played a simple piano loop that everyone in the studio agreed “sounds like *Jaws*”. The producer describes that usually you need to make a lot of layers to “get that affect” but here he managed to do it with only one sound. Presumably, this affect Jetsonmade describes refers to the foreboding nature of the *Jaws* theme that gains its power from

thick orchestration. On the other hand, Jetsonmade describes his own style as “jolly-type” beats because they are not as heavy or densly orchestrated as some trap styles. While some electronic artists go for a thick texture and hardcore sounds, this producer likes to build up songs that are simpler and gain their power from the contrast between a simple, effective beat and the hardness from the rapper’s flow. We can find ludomusicality in Jetsonmade’s descriptions as they seem ludic in their associative nature. His three-note loop sounds like Jaws, but it is almost nothing like Jaws except for the half-step and anxious minimal loop. The way he plays with finding an appropriate loop is based on a subjective desire for an attitude or cultural memory that he teases out of the piano. His three-note loop sounds like jaws because there is a tension that is expressed as he plays between two chromatic notes. However, the theme from Jaws has only two notes and is heavy from the giant ensemble of numerous bass, cellos, tubas that play in unison. Regardless, the melodic loop in “Suge” has an affective impact that Jetsonmade manages through playing the keys and the blanket of toybox rhythmic textures that contrast each other. It feels ludic in the sparse but affective beat that the producer confirms through his playful associations with cultural references. It seems this producer plays with sound as much as it plays with him. While he mixes contrasting sounds, such as Jaws-type or jolly-type, or plays with overbearing dryness in the drums, Jetsonmade’s style can be seen as ludomusical. With this, the sounds play with the producer and elicit memories of Jaws and amidst light jolly-type beats.

Within these instances of playing with sound and discovering novel sonic qualities, the artists’ language around the music is equally playful and evocative. As we have seen, the production software works alongside the artists to create and paint sound through a gradation of textures and colors. The sounds themselves, within this playfully open environment, evoke thought processes and aesthetic considerations of music and sound. With these examples, seeing how the music is discussed reveals elements to the complex performances between humans, ideas and materials. The ways that the producers talk about sound is also evocatively playful for those used to more formal descriptions

In discussing music production, cooking metaphors are often used to describe the choices made and the balancing act of music production. For instance, Roddy

Ricch's "eeh-er" adlib was strange at first, but then "blended perfect[ly]" (The Box 0'30). Later, 30 Roc describes how once all the sounds had been placed and looped, they just needed to mix and blend the track (6:00). Take A Daytrip describes the serendipity in collaborating with 16yrold, saying, "We haven't really cooked up with 16yrold yet so let's just do it tonight" (0'46). As "The Box" producers describe using the "Retro Color" filter on their chord progressions, 30 Roc says, "Y'all can have that sauce" (The Box 2'42), showing how filters act as an extra layer for the music that eventually blends into the sounds inconspicuously. The examples of mixing and blending fit into the visuality of musical metaphors, particularly encouraged by the DAW's colorful scheme and spatialization of sound. However, words like "cooking" or adding "sauce" to sounds shows a more experimental approach in which visual metaphors are left behind for more subjective encounters with music that point to a sensuous experience of feeling sound that is constituted with intimate sensation. It shows how the producers play with sounds and digital tools. Describing filters as "sauce" or production as "cooking" is playful in its bald metaphor. It also shows the ludomusicality that becomes more apparent in the DAW as producers are afforded a workstation to tangibly play with sounds, effects and potential arrangements.

Other evocative metaphors are used, showing a culture of hip-hop music production. When considering Sheck Wes as part of the collaboration with Take A Daytrip, 16yrold said he would reach out to the rapper, "only if the beat came out hard" (Mo Bamba, 1'15). Producer 16yrold also laid down the haunting piano loop, describing this melody as "hard," while also referring to the entirety of the beat itself as "hard" as well as "stupid "(1'40). 16rold goes so far as to describe the beat as "ignorant" (1'22). This evocative rhetoric used by the artists seems far from classical music languages, but subversively plays with the fact that musical descriptors have always been metaphors. The evocative rhetoric used by producers can be simply a testament to the unwieldy performativity, where rationalizations have no place amongst the studio's playground. Ludomusicality seems the most prominent reading here as sounds, artists and technology participate in the creation of sonic pleasure.

The producers also seem playful as they anthropomorphize music with descriptions such as "stupid" or "ignorant." As Sheck Wes wanted a harder bass,

producer Denzel Baptiste describes how pushing the filter cutoff to its limit made the sound “too crazy” yet was desirable for the rapper’s aesthetic (5’07). The more evocative phrases such as “ignorant” or “stupid” emphasize the personification of sound and imagines sound as active or materially evident, also seen in the use of words such as “hard” or “hot.” The anthropomorphizing also seems to make transparent the invisibility of the internal experience with the sounds, showing off the listener’s intimate, ludic interactions between sonic qualities and digital tools.

Although “Mo Bamba” is simple in construction and had many technical problems, the song still became incredibly popular. The producers end the video on the phrase, “If it’s hot it’s hot,” pointing to the fact that the process is not dictated by rationality but is inherently performative in its playful instability (Mo Bamba, 6’54). The producers from “The Box” stand by a similar sentiment, stating, “How did a simple beat get to number one? Just let the artist rap” (The Box 3’37). In these instances, it is clear that the novelty of songs comes from a rather complex performance that comprises the serendipitous interactions between producers, artists, sounds, ideas and technology. While the digital materiality plays an important part in music composition and perception, the performance is entangled in the ludomusical interactions between artists and sonic agencies that repetitively involve themselves. The circuitous repetition reminds us of our place within digital culture, as nonhuman treadmills and the sensuality of sonic immersion is offered by the digital and entangled through the assessment of ludomusicality. The lyricism and formal musical elements do not shed as much light as a ludomusical analysis towards subjectivity and the sensuality of sonic repetition.

Outro

As explored through these chapters, digital music is owed a fresh set of scholarly tools and concepts with which to study the contemporary musical context of digital music production. Using the concepts within this thesis transdisciplinarily, we can see how the study of digital music, popular or non, can be analyzed through the lens of media and performance studies. Mainly, as media scholarship is wont to show, the agency of nonhuman elements is crucial in studying the emergence of certain phenomena such as music and can attest to the complex relations that are interacting to produce certain conditions. The concepts used throughout this text move away from the idea that music exists as a discrete object that holds the authority of interpretation. Instead of this top-down approach to musical analysis, this thesis has aimed to show how musical phenomenon is full of actors, both human and nonhuman, that contribute to the performative instability of sound. Outside of the authority of musical form, concepts from media and performance studies help to show how the ecstatic experience of musicality lies in its porous and unstable nature that emerges from the specific conditions of human behavior, technology, sound, and perception.

Chapter One introduces the state of contemporary music through the importance of music production. Most popular genres since the late twentieth-century have relied on the music studio as a tool for not only finalizing songs through recordings, but also provide a space for making music through creative exploration as well. Therefore, contemporary music creation is tied intimately with new technologies and digital tools. This chapter also showed how the affordances of these new music technologies have changed the ontology of music in a significant manner. Instead of composing music through form and written notation, production practice allows users to paint sound and build songs by layering textures transtemporally. This has affected musical reception since the aural focus is now dominated by interpretation of sonic qualities overall. With this, the chapter's cultural examination of the importance of music production within the black community provided a basis to show how many production trends that impacted popular music production stem from the diasporic communities in the U.S. and the Caribbean. Leading to the birth of hip-hop, the importance of music production as a contemporary musical artform provides a new entrance into studying music

performance through the practice of production. Hip hop, although seen by many as a trivial form of popular music, is a notable pioneer in this new musical ontology and creative style. This chapter also laid the groundwork to show that hip-hop creation is performed in the production process and so the process and its actors have become relevant to inquiry.

Since many people experience music production through the Digital Audio Workstation, Chapter Two showed us what it means for music to be shuttled through digital technologies and how we can rethink the role of the digital. First, we explored what the digital is and how sound becomes digitized. The digital arena or binary code seems to confine music to a sterile formality. This chapter explored these anxieties, including the idea that the MIDI language quantifies sound and seems to limit musical possibility. However, with a realistic view of the human and nonhuman actors' this chapter showed that digital code's performance within our actions need not be confined to its structure. The digital brings undeterred form and presents sonic realness of timbre, pitch, space and time. We need not condemn the digital to its immobile chains of code when they are, in fact, mobilized by technology and human perception. We experience the digital folding when the DAW glitches during playback and our experience of musical time abruptly stops. Leaning especially on baroque aesthetics as interpreted by Anna Munster, this chapter shows how digital music can be conceived through a baroque conceptualization of aesthetic elements, however contrasting, folded in and amongst each other. This shows that musical essentialisms are irrelevant within the digital's form, and contemporary understandings of digital music can imagine a baroque acceptance of a variety of elements. This chapter showed how we can move beyond strictly musical form through the affordances of digital code, where instruments that demarcate certain cultures, styles or time periods are morphing indiscriminately in and out of our ears and skins.

With these aesthetic conceptualizations in mind, Chapter Three shows how the DAW itself affects our musical sensibilities. By exploring the DAW through concepts such as interface theory, material-metaphorical objects, and the agencies of twenty-first-century media, we gained new appreciation for how the DAW changes our engagement with music as a field of sonic layering and quality. The DAW's interface invites

appreciable manipulation of the time and sound, presenting producers with a field of malleable sounds and temporalities, where artists move through music as a modular field of incredible possibility. The filters that color digitally-produced music such as hip-hop tie sonic production to idealized narratives of color, thickness and warmth. Marianne Van den Boomen writes that these material metaphors are apt to *icontologize* and are capable of decisive action amidst quietly embodied iconography or metaphor. The place where music production happens, the DAW, icontologizes sound to become playable in the plastic, transtemporal arena. The DAW's icons probe sensation as users grasp a monstrous array of sounds and textures, expanding sonic ideas, sensibilities and potentialities through virtual material metaphor. Finally, Mark B. Hansen's work on how new media bypasses our consciousness showed how the performativity of the DAW's nonhuman capability saturates our senses and evades conscious musical perception. Applied to the dizzying possibility in the DAW, it is easy to see how music production as a new ontology of music truly leans on quality and texture of sound as opposed to linear understandings of music as a coherent object.

Chapter Four also explores music in a similar irrational vein through the concept of ludomusicality put forth by Roger Moseley. Ludomusicality has helped to investigate how music is actually played, as an entangled interaction between sonorities, materiality, cultures and the individual artists. Minimalist music, too, shows a repetition that was once deemed trivial but is valued through ludomusical ideas of playing with perception, sound and time. Equally relevant, hip-hop's repetitive style and minimal formal elements invites a ludic reading that can take value in the interactions between people, ideas, sounds and technologies. It invites a ludomusical reading that revels in the complex entanglement of cognition, sensation, sound, materiality and negotiates the rules within the social and cultural conditions. This creative musical interpretation has effects on formal understandings of music, showing that music is not a self-evident object, but is only found in its relatedness to the variety of actors that come together in specific time periods in the medium of sound. Genres, time periods and musical trends are related on a field of adjacencies in which music is subjectively experienced in their entangled emergence. Subjectivities and musical-meaning are played out within the adherence and transgression of cultural and social norms. In this regard, historical

musical delineation seems to lose its hierarchical coherence as ludomusicality places disparate music in dialogue. It opens up music to be not a hierarchically cerebral process, but a complex phenomena that we feel and play out amidst technologies and abstractions, form and chaos.

Overall, we can weave the concepts found in this thesis on a plane of adjacencies, similar to the fluidity of the baroque fold where elements meet and divert. Music and art is constitutive and therefore there is no hierarchy of high art or low art, as well as organic or inorganic. Through avenues of performativity, digital materiality, production and sound. This thesis has zoomed in and out of the entangled performance of human and nonhumans, showing ways to expand our contemporary research on music and assessing how sound unravels, as experienced and propelled by both human and nonhuman agents.

The beauty of musical reception and enjoyment does not arrive solely through the careful symmetry of form and pitch. Taste, affect, danceability and enjoyment are all aspects of music that are hidden from the formality and rationality of classical music theory. The relevance of this thesis lies in this gap between theory and reality. Since hip-hop is a controversial genre full of seemingly meaningless repetition and coarse language, hip-hop provides an avenue to study the anxieties of digital culture and contemporary production practice, productively opening up new ways to think about sound and music performance. Looking at the production process as a particular method of sonic composition, this thesis allows heavily produced music such as hip-hop the purity of performance that art promises. If the DAW or the music studio, can be seen as an instrument in its own right, then production is a viable method of music composition. Music has always been a complex entangled phenomenon. However, our saturation with digital media and technology helps to reveal the phenomenal complexities that are played out between technologies, ideas, and bodies.

With further music research in mind, there is much more to consider culturally and technologically. First, digital music production, although seemingly ubiquitous in internet culture, is not so democratic. The access to a personal computer, and a network connection to download software, is still a privilege. With this, sound design and music production is heavily dominated by men (Bell 2015). Software and hardware

designs are also fields notoriously driven by a tendency for male designers. Further research could contribute to a more robust assessment on the cultural and sociological factors behind music production.

This thesis has also aimed at a sort of defensive at new hip-hop music. This idea of valuation seems to be a potentially productive part of humanities research because it is inherently transdisciplinary and explores many ideas and subjectivities. In valuing music that is not agreeable to western art music, we can raise further questions about academic biases, methodologies, histories, cultures, and theoretical groundings. Hip-hop is important in questioning these biases since it seen as trivial or corporate-driven, so opening up the disciplinary scope of music studies through insight into valuation provides us with the tools to consider many other types of music, digital or non.

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