

Substantive Consumption

Exploring Relational Connections to Digital Musical Entanglements

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Submitted to the Jake Kerr Faculty of Graduate Studies, Emily Carr University of Art + Design

In Partial Fulfillment of the Requirements for the Degree of Master of Design, Interaction, 2022

August 31, 2022

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Abstract

This body of work sets out to explore ways to enact relational and substantive notions of care towards the system of digital music consumption.

The things we actively care for in the world are predominantly what shapes the nature of our existence within it. But when parts of the things we love the most have explicitly harmful implications on a multitude of scales, it becomes both more difficult and more important than ever to care for the entirety of something, rather than just the parts that are familiar and personally meaningful. In order to consider the full extents of music as a complex system rather than just as a thing we love, we can explore the extents of its assemblage as an entanglement of human characteristics that have become both intentionally and unintentionally embedded within it. As the world becomes more digitized, our daily interactions become more predominately cloud-based and algorithmically mediated. Our consumption of music is no exception. Within digital networks the scale of human and environmental entanglement can often feel insurmountable and ineffable, while at the same time remaining largely abstracted and hidden from our every day experience. This research will seek to quantify and begin to understand the extents of these entanglements. Music is more conveniently accessed and consumed than ever, but what have we sacrificed to attain this level of convenience, and what are some of the consequences of doing so? There is a growing need to confront the consequences of the modern methods to which it is consumed. Through primarily critical, exploratory, and reflective design methods, this work will try to re-frame some of our notions of the digital world. This re-framing will be done in an attempt to gain a greater sense of literacy, and relationality to digital infrastructure, in a hope to prepare ourselves for a world that is only growing more digitally focused.

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Before I begin, I would like to recognize that the entirety of this research, design work, and writing has taken place on the Unceded Territories of the Coast Salish People's, Specifically the xʷməθkʷəy'əm (Musqueam), Skwxwú7mesh (Squamish), and səliwətaʔ (Tseil-Waututh) Nations. As well as the Sqilxʷ/syilx (Okanagan) peoples. I do this acknowledgement as a means to show the love I have for the land I am lucky enough to live and work on, as well as the respect and appreciation I have towards its ancestral caretakers, both past and present. Some of the work I will discuss in this writing exhibit place-based qualities that are only possible at specific locations. Because of this it is very important to appreciate the caretakers of the land that is now caring for me, as well as maintain a commitment to substantive notions of care towards the land on which I reside.

Key Terms

Substantive:

Having a firm basis in reality and therefore having important or considerable meaning. Something of substantial reality.

Relational:

Understanding something not just in itself, but also within its societal context and relation to other things. Relationality can be understood at scales of local or planetary dimensionality.

Entanglement:

The assemblage of positive and negative individual aspects that make up a large concept or system.

Anthropocene:

The time period in which humans have been the dominant influence on the environment. To think in an anthropocentric way is to prioritize humanity over nature within their entanglements.

Preface / About Me

Before this work is internalized by someone else it is important that I explain a little bit about myself and about where the positionality of this work is located. My name is Sam Stretch. I started this body of work when I was 22 years old and at the time of writing this I am now 24. I am deeply passionate about three things in the world: The people I love, the environment and Music. In my lifetime I have witnessed a massive change in the way people interact with music due to a rapid shift to digitally based mediums. I would describe my relationship with digital technology to be one of cautious optimism. I am by no means a Luddite, however, I always try to first and foremost engage critically with digital technologies that I adopt into my life. A shortcoming of this criticality that I have found is in my relationship to digital technologies that make it easier for me to access and engage with the things I love. As a result, this research attempts to cut through my personal biases towards digital music entanglements. For long enough I have passively engaged with music and have taken for granted the convenience that digital consumption has allowed me. This work is first and foremost a personal exploration for me to identify harm in the thing that I love most, and to re-engage a critical and reflective exploration of digital music entanglements. In doing so I hope to open the door for others to do the same. To step away from our everyday digital engagement, and re-frame our relationship with music to better understand the entirety of our digital entanglements.

Part I: Research and Theory

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1.1 Monsters

How do we understand the existence of monsters within our world?

Within their literary and mythical depictions, monsters are commonly understood as evil entities in a morally binary sense. They are painted in an evil light and in a stark opposition to humanity. In truth; monsters are not inherently evil but can be better understood as assemblages of both good and evil human characteristics that we project onto them. Anna Tsing describes the idea of a monster in the case of a jellyfish; a beautiful but also deadly creature with the ability to completely consume marine ecosystems. Under normal conditions, the jellyfish exists harmoniously within marine ecology, but warming sea temperatures, large scale fish farming, and ocean pollution have created the conditions that have allowed jellyfish to rapidly expand and colonize what is left of their ecosystem. Some jellyfish are able to consume 10 times their weight in a single day and, in some cases, grow to over 450 pounds, which is large enough to capsize boats and all but decimate many aquatic food chains (Tsing et al., 2017). These cases of expansion highlighted within the jellyfish what we determined to be monstrous characteristics, However, the monster in this case was not an enemy of humanity, but one enabled by it. *"In all our heedless entanglements with more-than-human life, we humans too are monsters."* (Tsing et al., 2017). As humans, we rationalize ecological entanglements without conceding the fact that we too live within the world and are almost always central to any entanglement. Mythologically, we would describe the Jellyfish as being our horrific creation, one that has begun enacting it's revenge on us for our part in creating such a monstrosity, however; the true evil comes not from what we see in our creation, but in our neglect towards caring for that which we have created or enabled. As is the Jellyfish we too are of this world and exist within the same ecosystem they do. In all of our attempts to rationalize our creative efforts to better our world and solve the problems that face us, we often forget that we are not exempt from the consequences and entanglements that emerge from those interventions as they live in the world in unexpected ways.

Bruno Latour's understanding of monsters begins with an examination of Mary Shelley's Frankenstein. What did Frankenstein's monster do to humanity that can be considered as "monstrous?" It was not born of evil but was taught to be evil as a response to humanity's anger at it's existence.

The “monster” itself became a monster as a result of its creator abandoning it, horrified at his own creation (Latour, 2011). In analyzing both Latour and Tsing’s works together we can define monsters in some capacity. Monsters can be partially understood as complex assemblages that allude to the anthropocentric actions of modernity and its entanglements with the natural world. But, to truly understand these entanglements means enacting a substantive notion of care towards that which we have enabled to exist. This begins simply by repositioning our understanding of the Anthropocene to one that does not prioritize our own existence over our environmental entanglements. Patricia Reed, in *What is Care at Planetary Dimensions?*, best describes the importance of caring for the unfamiliar or impersonal in the modern world, describing how with 7 billion humans on the planet, as well as all of our entanglements with environmental assemblages, the standard focus on intimate interpersonal relations is no longer sufficient (Reed, 2019). We easily identify explicitly threatening outcomes and symptoms of issues regarding our existence and ways of life, but the cause is often left unidentified or at the very least disputed. These can be things that we create, whether intentionally or not, and once they are seen as harmful we attempt to fix, cure, or solve their effects before we ever attempt to understand how they came to be. How does our understanding of monsters change if we study them as complex assemblages, all the while conceding that we too are of this world, and are central to any ecological entanglements we have with our monsters? As much as we, as humans, exist as agents of commerce, science, art, and technology, we are also nature.

In the digital sphere, the monsters we create are not as easily identifiable. The multitudes of our entanglements extend to environmental, economic, and interpersonal implications. What even further complicates this issue is the pervasiveness of digital economies in the late 20th and early 21st centuries. A perceived trend of pandemic/post-pandemic society is a mass digitization of our world and our interpersonal interactions. People looked to the digital world as a means to maintain connections with one another while isolated. Societal monsters within the digital sphere are hard to identify and even harder to examine because in doing so we begin critiquing something that gives us meaning, value, or something that we might even love. What happens when these entanglements become deeply embedded within societal assemblages that are critically important to us, and we are forced to identify monstrosity within the things we love the most?

1.2 Tangibility of Digital Media

I have observed a growing tangent of people in and around my life that have an end of history viewpoint on the world: that while we will keep advancing technologically, we don't seem to imagine other societies coming after us. Part of this is a natural human arrogance and reverence towards the complex sociological systems that people have created, but another part is general climate dread and the belief that one way or another we will be the last humans to inhabit the earth. Either way, someone or something will come after, and the idea that some of the most important relics and artifacts of our age existing purely digitally can be frightening. There is something oddly comforting to me about envisioning a post human world, where whatever life forms come next interact with the remnants of our society, but I wonder how that interaction changes when many cultural and societal artifacts primarily exist in digital mediums? There is an interesting relationship considering objects and their ability to exhibit a sense of embodied meaning. Do our society's notions of care become lessened by our shift towards digital methods of interaction? Does this change the way we might be remembered in a post-human world? As music begins to have less of a physical presence in its consumption, these aspects are partially concerning, but at the same time it feels strange to be concerned by it. Maybe, the idea of remembrance and societal permanence in itself is so entrenched in modernity that it does not matter what artifacts remain, as the state of the world itself will reflect our true legacy. Considering what we should be remembered for might be a benign argument, but if any of the positive societal contributions humans have made throughout history deserve a perceived sense of permanence, shouldn't one of them be music? Or should the only proof of modernity be the scorched earth we leave behind? Perhaps deservedly so.

Personal Digital Tangibility

Do digital keepsakes hold the same embodied memories and stories as physical objects? The 2021 Radiant Pavilion Exhibition in Melbourne, (Khoo et. al, 2021) included a series of artifacts from various artists and designers titled *Data Heirlooms*. These various objects are essentially physical vessels that are meant to embody people's personal memories that would otherwise only exist digitally. The group show was meant as a response to the mass digitization of social interactions within a

pandemic/post-pandemic world. It is natural to feel a sense of uneasiness about the digitization of our memories, considering our digital ecology to be one of innovation and obsolescence. Being able to have tangible connections to digital entanglements is crucial to maintaining a relational connection to our everyday interactions. The digital world is becoming less tied to physical objects and artifacts. Apart from personal devices, digital media is commonly observed to have very little connection to the tangible world. The recent upsurge of digital infrastructures such as cryptocurrencies, NFTs, and the Metaverse, has put digital world building on a trajectory of immense growth. Because of this, it is often difficult for people to recognize physical consequences of their digital consumption, as well as tangible connections of digital artifacts. For younger generations that have and will only know the digital media age, how will we store memories and keepsakes if much of the things keeping track of these memories exclusively occur digitally?

Corporate Digital Tangibility

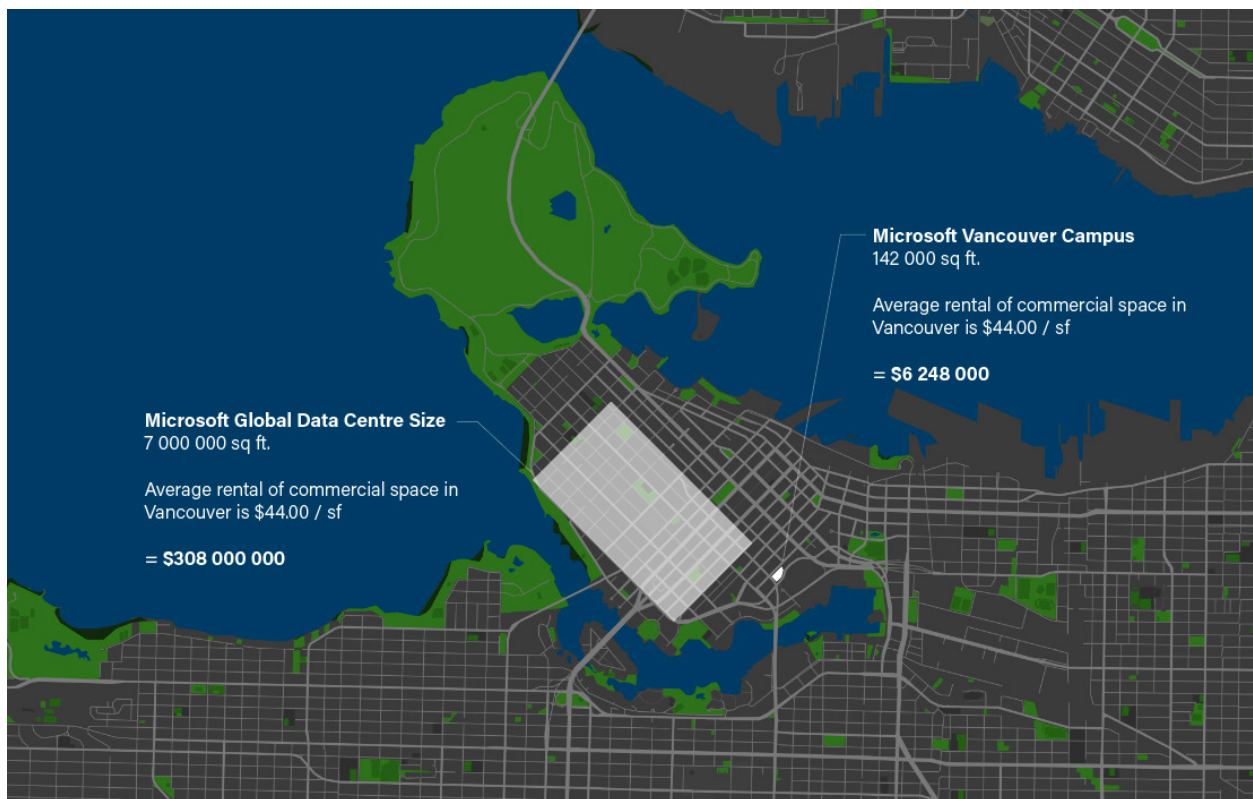
Blackboxing:

"An expression from the sociology of science that refers to the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become." (Latour, 2000).

Latour's definition of Blackboxing from his book *Pandora's Hope: Essays on the Reality of Science Studies* is a possible way to consider the seemingly ineffable nature of tech infrastructures. Modern tech products often do not generate a level of inquiry to how they function, as long as they function correctly. Modern tech companies like Microsoft have headquarters in affluent and socially desirable cities like Vancouver and Seattle, but their physical locations are much more far reaching than that. Data centres, the physical tether of all cloud-based operations are not located in affluent areas, and therefore these locations are largely not part of the company's narrative. These massive structures exist in areas where land and energy, the two most important resources to data centres,

are as cheap as possible. Studies show that globally, data centres use more energy than the entire United Kingdom and have a comparable carbon footprint to the global aviation industry (Trueman, 2019). The following graphic is a size and cost comparison of Microsoft's Vancouver campus to that of its collective global data centres.

Figure 01: Microsoft Data Center Size and Cost Comparison



Raw data from (Trueman, 2019)

1.3 Embedded Meaning Within Music

In the 1980s ambient artist William Basinski produced a series of recordings that documented different sonic experiments from various places and objects, as well as radio feedback frequencies. The project was never used for anything specific and was eventually put into storage. Decades later when Basinski went to digitize some of his recordings, he noticed how the magnetic tape would deteriorate every time it passed the tape head of the digital recorder. As it deteriorated, interesting new sounds and flaws in the recording would appear. He repeated this process for extended periods of time and further produced the music into what he later titled the Disintegration Loops (2001). Basinski completed the piece on the morning of the September 11th, 2001 (9/11) attacks on the World Trade Center in New York. He later dedicated the album to the victims of 9/11 and used stills from his footage of the fallout as the album artwork. Inside the album's liner notes reads *"the events gave new meaning to the musical pieces created by catastrophic decay in my studio a few weeks before."* (William Basinski, 2001).

Personally, this piece of music is very important to me. Not because of the ephemeral and angelic composition, and not because of its fateful connection to the events of September 11, 2001 - I was only three years old and have no specific memory of it happening. I have a connection to this piece of music because I understand and empathize with the embedded stories within the music itself. I grew up with a collection of magnetic tapes and, like Basinski, have heard and noted how they deteriorate over time. The idea that this deterioration itself is what creates the foundation for a composition is something that I have found a lot of personal meaning in. Had I not known this, I am sure I would still enjoy listening to the music, however, my entire relationship with the piece would be different. The embedded stories and meaning that come from music are a large part of how we connect and interact with it. Does the nature of the interaction change the embedded meaning of that which we interact with? Does the convenience of technology change our perception of media? Albert Borgmann describes an inherent loss of meaning within modern technology due to a growing separation between the 'means' and 'ends' of a particular action. A device that performs a task for a user provides the user with their desired outcome, but simultaneously shields the process

of generating said outcome from them. This abstraction can be understood as a symptom of our entanglements with technology. A user is not largely concerned with the technological function of a watch, only that it provides them with the correct time. The function is only taken into consideration when the outcome is incorrect. With regards to a changing notion of meaning due to technology, Borgmann goes on to consider the act of getting water. When retrieving water from a well, the user is actively engaged in the process and understands at least in a general sense how the well works and where the water is coming from. When they turn on a faucet they are only aware of the existence of water, and not the process to which it is being delivered to them (Tijmes et al., 2001). Within the context of digital networks this relationship is, for most non-experts, even more abstracted, as there is a seemingly greater separation between action and function, hidden deep within circuitry, programming, and complex global networking. If this abstraction can be understood as evidence of our inability to perceive and understand our digital entanglements, how might an increased literacy of their technological, social, and economic aspects impact our ability to engage with digital music in a more meaningful and active way?

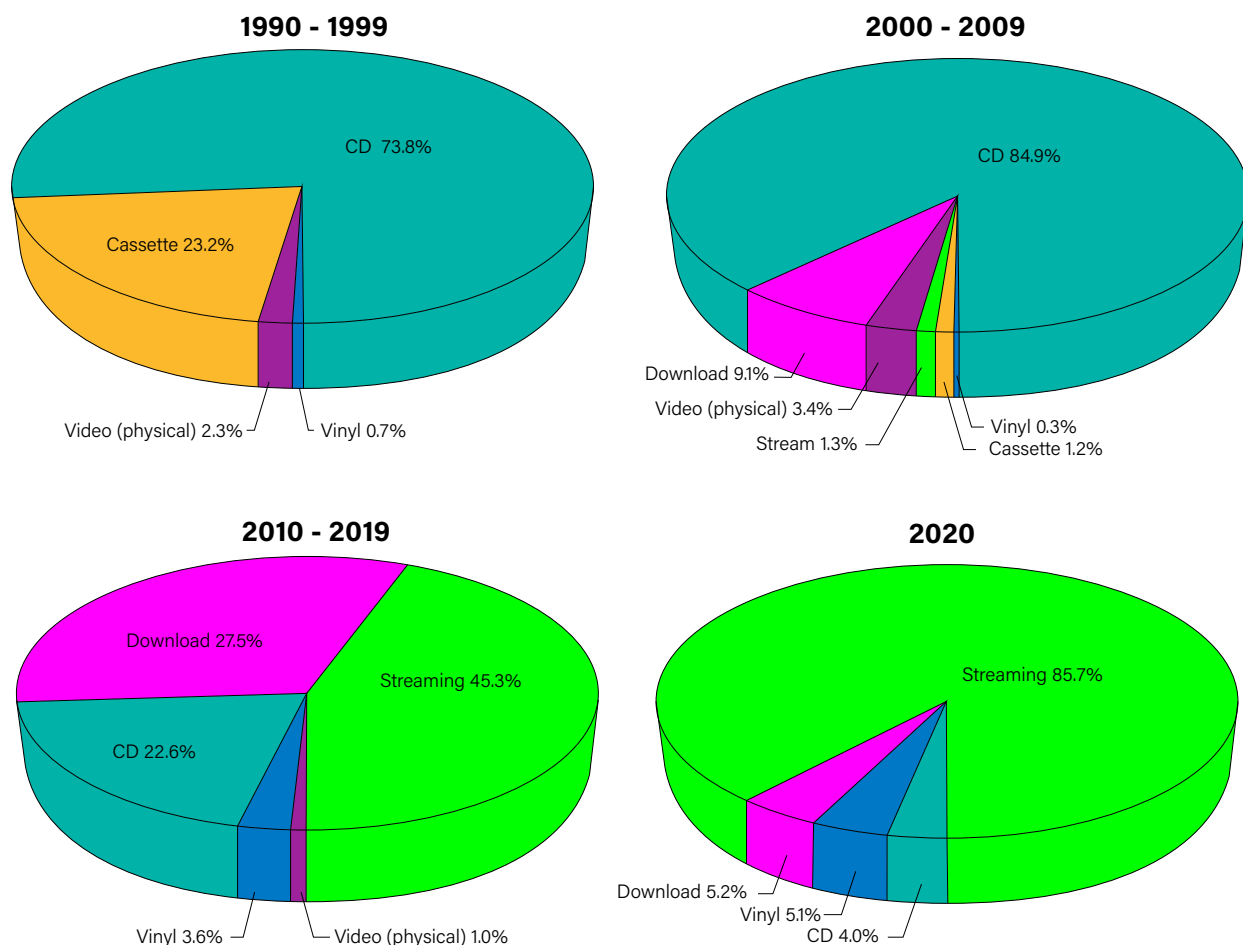
1.4 Music Entanglements

In today's music industry, streaming services have allowed us seemingly endless access to music at flat rate monthly prices, without concern of local device storage, and with an unprecedented level of convenience. Music has become like any other form of digital media; readily available and delivered to consumers with adaptive personalized algorithms. These algorithms track our listening habits and then project our calculated taste in music back to us. If we consider music against the backdrop of monstrous assemblages, we must consider the entirety of music as a system of consumption rather than just our personal connections and biases towards it. This paper will go on to explore modern digital music consumption as being implicated by various environmental, economic, and personal entanglements.

Environmental Entanglements

The evolution of technology within the music industry has not necessarily been adapted in search of a greater listening experience, but rather in search of the most easily producible and conveniently accessed media format. Sales of the Vinyl LP peaked in 1977, the Cassette in 1988, and the CD in 2000. In 2006, the mp3 file officially overtook the CD as the most consumed form of music and ever since, music has become a predominantly digital commodity. In 2016, more music revenue came from streaming subscription services than from MP3 downloads and CDs combined (Bass, 2020). Music is an interesting example for which to analyze digital consumption, because the trajectory of its technological innovation very well illustrates the shift from analog electronic products to digital products and systems. For the most part, the material shift of each era's newest form of media follow a very distinct and steady trend (besides a few outliers that never fully gained traction such as 8-track, SACDs, etc.).

Figure 02: Decade Average Music Revenue per Format (US)



As music becomes more of a cloud-based commodity the ways in which it is interacted with have completely changed. Subscription services such as Apple Music, Spotify, YouTube, and Amazon dominate music revenues and offer a level of convenience, accessibility, and price that is nearly impossible to beat. Music is more easily accessed than before, it gives people the freedom to explore countless genres and eras at the tips of their fingers; however, has this rapid pace of consumption impacted our ability to substantively experience embedded meaning within music? In contrast with other forms of mass consumption and saturation, overconsumption of music is a more difficult phenomenon to quantify as it is seemingly harder for us to recognize problems with having too much of something we love. Even if it does have similar negative impacts environmentally and economically. In a product driven industry, people generally subscribe to the notion that the digital distribution of goods is more environmentally conscious. The less plastic and other harmful, non-biodegradable materials are used in mass producing something, the better. The music industry's modern mode

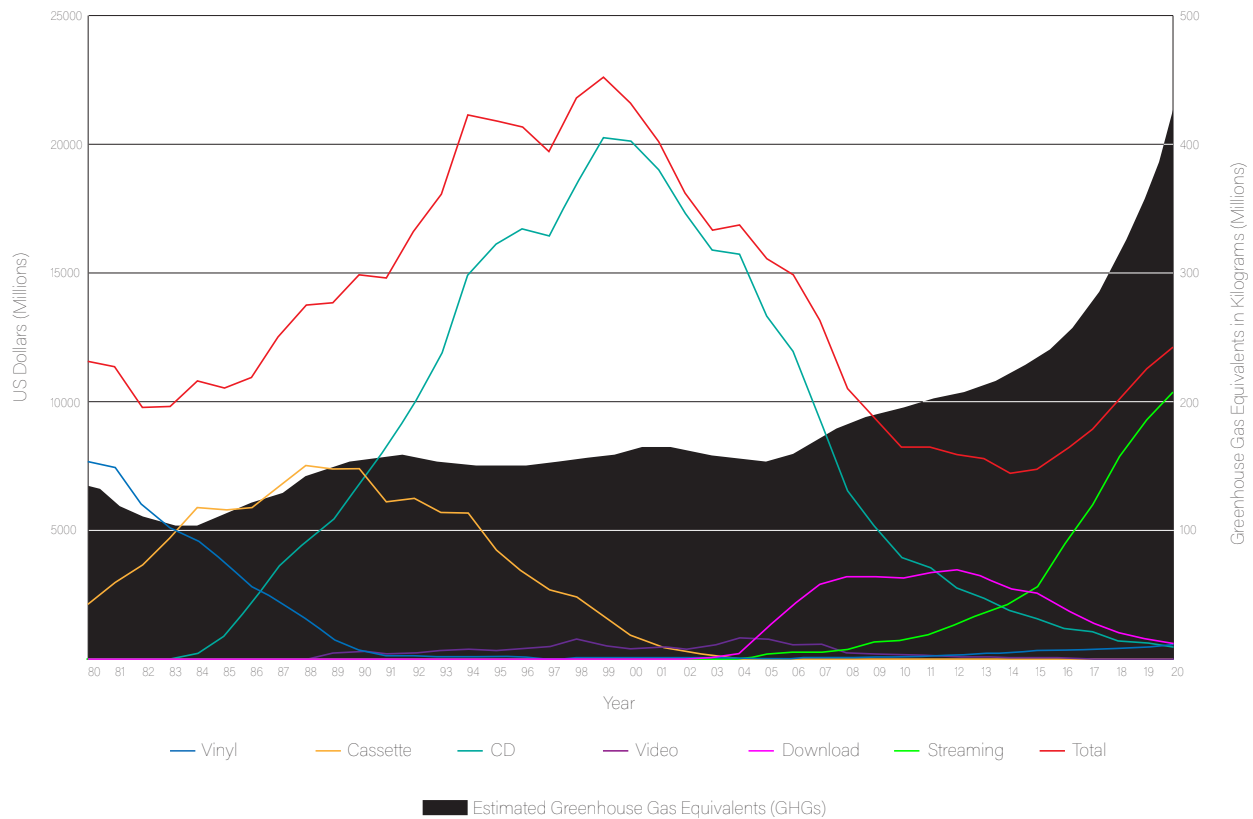
of distribution undeniably uses less plastic compared to other mediums such as Compact Discs, cassette tapes, or vinyl, but that does very little to reflect its true environmental impact. A study by Dr. Matt Brennan of the University of Glasgow and Dr. Kyle Devine of the University of Oslo (2019), explores a comparison of the music industry's environmental impact across its historical mediums.

"From the plastics perspective, in 1977 (the US sales peak of the LP) the recording industry used 58 million kilograms of plastic. In 1988 (the peak of cassette sales) the industry used 56 million kilograms of plastic. And in 2000 (the peak of CD sales) the industry used 61 million kilograms of plastic. Then, when downloading and streaming take over, the amount of plastics used by the US recording industry drops dramatically, down to around 8 million kilograms by 2016." (Brennan & Devine, 2019)

Out of context, this quote would confirm how digital media is thought to be immaterial and therefore have less of an environmental impact compared to its physical counterpart, however; we know this to be untrue. Brennan and Devine go on to produce a more accurate comparison of the true environmental impacts of the music industry across various eras and mediums.

"It is possible to demonstrate this by translating the production of plastics and the generation of electricity (for storing and transmitting digital audio files) into greenhouse gas equivalents (GHGs)... The research shows GHGs of 140 million kilograms in 1977, 136 million kilograms in 1988, and 157 million in 2000. But by 2016 the generation of GHGs by storing and transmitting digital files for those listening to music online is estimated to be between 200 million kilograms and over 350 million kilograms in the US alone." (Brennan & Devine, 2019)

Figure 03: Estimated GHGs per Streaming Format



Raw data from (Brennan & Devine, 2019), (Bass, 2020)

Economic Entanglements

Mass music streaming not only has tangible implications within the environment, but also within the economic structure and inequality of music revenues. It is no secret that throughout the history of the music industry, artists have been significantly underpaid compared to record labels and other profit controlling entities. While many record labels are only recently providing more favorable contracts to artists, the same cannot be said about music streaming. In 2002, the average royalty payment for an artist's first contract with a major label was around 15%. This figure is now around 27-32%. Now take Spotify for example. Spotify pays artists per stream (approx. \$0.004) rather than bulk sales because of its subscription-based business model (Sisario, 2021). This model creates an immense level of wage disparity among artists, as only the most successful artists on the platform are able to earn a living wage. In addition, the nature of Spotify's algorithm for feeding it's listeners music

is much more favorable to music that is already popular. The algorithms themselves are not designed to just be a response to people's sense of taste, as larger record labels are able to give their most invested-in artists a bump in their algorithmic exposure via certain deals with streaming platforms. Spotify also makes alleged backroom deals with the record labels based on some of their original deal stipulations such as recoupment. Recoupment essentially means that within a record deal, the label fronts the artist an agreed upon sum for them to record an album. When the album is put out for sale, the sum is recouped by the label from the artist's portion of the revenue (Sisario, 2021). In 1998, The alternative rock band Eve 6 released their self-titled album which included the smash hit *Inside Out*. The band and album never fully gained acclaim however the song was and still is incredibly popular. If you have ever even passively listened to a rock radio station sometime between 1998 and today, you have undoubtedly heard this song (commonly referred to as the "heart in a blender song"). Popularity aside, the band never recouped on the contract meaning the label now has control over all the streaming profits. The song over the years has become incredibly popular and now has over 300 million streams on Spotify however the band alleges they earn nothing (Sisario, 2021). Streaming platforms are not necessarily the equally accessed meritocracy that they are presented to be.

Another issue with music becoming an entirely digital commodity is that it is now entrenched within the existing power structures and inequality of tech-based capitalism. In her essay titled *Neo-Feudalism: The End of Capitalism*, political theorist Jodi Dean described modern tech capitalism as "Neo-Feudalism"; where the purveyors of the internet, the tech giants, are the lords of modern life, and all their users who use their products and contribute their personal data are engaging in the modern equivalent of serfdom (Dean, 2020). As users, not only are we the target consumer for the media and devices that tech companies create, but we are also a free labor pool that contributes one of the fastest growing and most valuable resources in the world: user data. User data is collected and processed in order to individually script a user's digital interactions. These companies not only sell us their devices, but they essentially control how we use them. The digital world is rapidly becoming more of a driver of modern society and of people's individual identity and now, music is deeply embedded in this monstrosity of a system. In the search for a greater level of convenience and mass marketability, we conceded one of our greatest mortal creations into arguably the largest monster we've ever created.

Even if the exact effects are unclear, the notion that our current method of music consumption might be harmful should not be surprising. Whether or not this can be combated or changed is an entirely different story considering the scale of the monster we've built, but the question remains, how do we confront the notion that the thing we might love the most in this world, is harmful to it? Returning to our discussion on monsters, can we classify modern music consumption as such? If so, how do we enact care for the unfamiliar parts of music that allude to a level of monstrosity? What are the consequences for not caring for the entirety of music?

1.5 Personal Meaning and Care

What does it mean for music to become part of a largely entangled system of consumption? When we consider the effects that mass digital consumerism have on us and our world, a question arises of how we enact an ethic of care? We clearly care for music. One could argue there are few things within the world that we care for more so, but do we truly care for the whole of music? The system of how we consume music digitally has been geared towards the convenience, and speed of the user's interaction. In order to care for something relationally, we need to consider caring for it in its entirety, providing our attention to both its positive and negative aspects.

Patricia Reed describes the idea of care at planetary scales as well as the concept of "planetary dimensionality" as a way to help rationalize the growing complexity of our world today,

"I'd Like to propose 'planetary dimensionality' since it maintains fidelity to the need for modeling, as best as possible, complex earth-social systems, while introducing nested scales of co-existence within that totality." (Reed, 2019).

With regards to the modern network of information and data sharing, the world can feel both very small and accessible, as well as enormous and ineffable. The digitization of the world creates a changing scale to which we live our lives and consume media and content. This fluidity makes it much more difficult for people to have substantive notions of care towards things at both local and planetary scales. We can rationalize and be sympathetic towards other struggles at a global scale, but to understand care through our actions is not always self-evident (Reed, 2019). The complexity of our interrelations has never been more overwhelming than in the digitized world, and the idea of enacting care at a planetary scale is crucial to caring for the entirety of music. Music is largely a human-centric system and is therefore crucially interrelated to the nested scales of humanity which Reed describes. Trying to rationalize care for the totality of music is much more overwhelming than looking into its interrelated systems as entanglements. We naturally care for the parts of music we love and hold dear to ourselves, but as Reed describes, it is just as important to care for the aspects of music that are impersonal and unfamiliar. These are largely the parts that have explicit implications

environmentally and societally. This makes caring for them in the same way we care for its more obvious and personally meaningful aspects a more challenging but equally important practice. *"We ought to care these entities are cared for"* (Reed, 2019). The things that we care for and pursue collectively are what shape the world. Our monsters have both positive and negative aspects of us embodied within them, and learning to care for both is more important than ever.

Part II: Design Outcomes and Explorations

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2.3	Untitled Frequency Visualization		Image Decay Function
2.4	Juke Box Speculative Project	2.7	Design Reflection

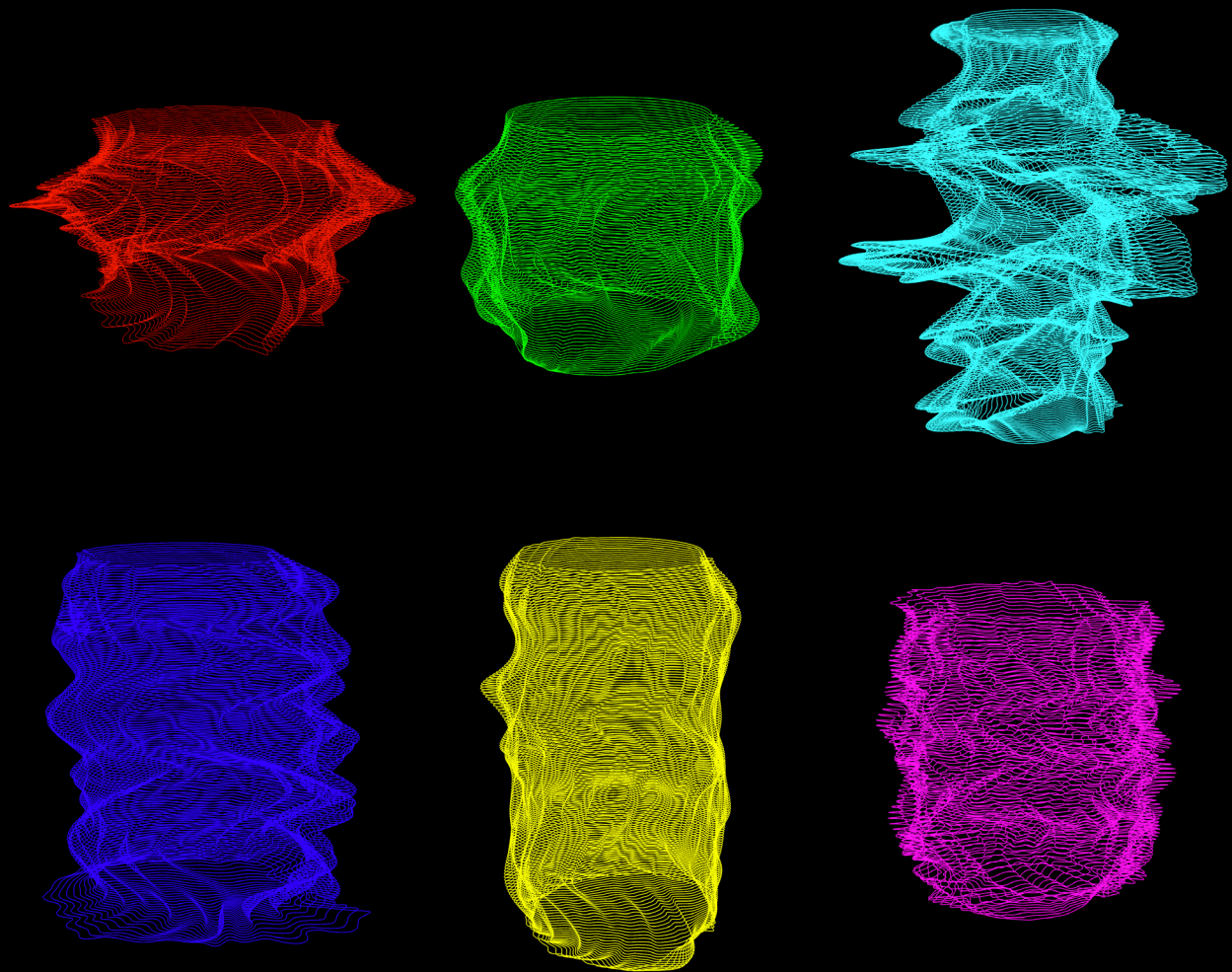


Figure 04: Sound Vessel Iterations

2.1 Introduction

The following sections chronicle various design works I have pursued in exploration of our entanglements within the modern frameworks of music. They encompass several propositional design experiments that are meant to explore aspects of these entanglements, and create opportunities for re-framing and reflection. A primary goal of these projects is to explore different ideas nested within the entanglements as a means to understand and reflect on some of the environmental and societal implications that this work considers. Providing opportunity for reflection within our complex entanglements is essential to help us achieve relational and substantive connections towards the things we consume and interact with. This work is primarily about asking questions, and is only partially or passively concerned with answering them. Having an actionable notion of care within the entirety of music is challenging and conflicting. Trying to rationalize levels of harm within a thing that we love is a complex process and having moments for reflection is critical to our overall understanding.

2.2 Music Algorithm Explorations

As a response to my growing frustrations of music becoming enveloped within the seemingly insurmountable force of tech capitalism, I wanted to look at ways in which we might examine if music pieces could begin to lose their human element and become purely data based. The goal of these explorations was to examine music creation through a purely digital lens as a means to see how the methods to something's creation might change its perception and inherent meaning. As Albert Borgmann considers the implications of the abstraction of the means and the ends of an action, these projects are meant to explore the effects of nullifying the human role within the action of music creation. If using the faucet rather than the well to collect water changes your relationship to the water itself, does generative structures of music creation change the relationship to music? (Tijmes et al., 2001).

Computer Generated Piano Scales

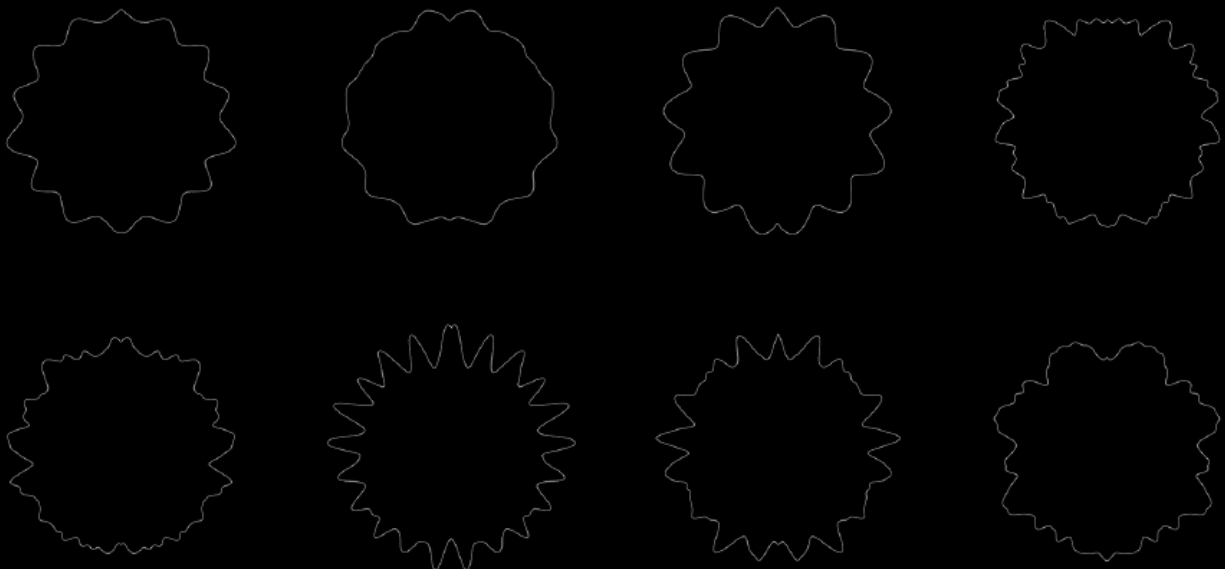
This project is a simple exploration of music related algorithms. Generating a music piece from a written algorithm that plays a random sequence of notes from a standard piano key layout. The resulting piece is, in a way, very interesting. I am in no way responsible for the piece compositionally or musically and yet, by creating the algorithm, I am still somehow responsible for it. This exploration is mainly inspired by listening patterns that we engage in with music that directly impact the nature of interaction, such as shuffle functions and general streaming service algorithms. Modern streaming services use algorithms to study the user's listening habits and then curate their future interactions. These algorithms are meant to be democratic and accurate to what the user would like, however; Spotify for example does not curate musicians' work evenly. As Ben Sisario outlined in an article for the New York Times, the algorithms are not a perfectly equal meritocracy. Artists that are already popular have a massive advantage to getting played, and independent artists have a disadvantage as they often do not have the financial resources to bump their algorithmic exposure (Sisario, 2021). In thinking about how algorithms dominate our digital interactions, this project is meant to consider how they could also dominate music creation. What if music no longer required musicians?

All audio can be found at <https://soundcloud.com/sam-stretch/tracks>

2.3 Untitled Frequency Visualization

This project investigated ways in which sound waves might be looked at as more visual entities. A lot of the research and design exploration looked at how music might be experienced visually as well as sonically. This project looks at how we might use frequency values throughout a music piece to generate visualizations of its compositional sound waves. Showing the visual outputs of frequencies allows for people to contextualize musical properties in a new sense. Music in the simplest sense is a compositional assemblage of vibrations within a space. We hear these vibrations but often don't consider what they might look like or feel like. While this experiment focuses more on look than on feel, there is an opportunity to generate one from the other. A lot of the aspects of music I have explored looked at ways to reposition music as more than a sonically based practice. Seeing things visually or even physically gives us opportunities for new understanding of how sound looks and feels within our environment.

Figure 05: Untitled Frequency Visualization



2.4 Juke Box Speculative Project

Design in a purely modernist sense is often considered to be a relationship of problem solving. In this relationship we can develop a habit of looking to solve or fix before we seek to understand. This more often than not creates a cycle of generating more problems in an attempt to solve one. This cycle has and continues to be very present within the context of modernity and is something that we as designers should want to avoid. While we address problems with new technology, we often lack a sense of care for these technologies. Just as Frankenstein's creation was abandoned and turned into a monster, we continually create technologies that are doomed to obsolescence.

Figure 06: Embedded Obsolescence

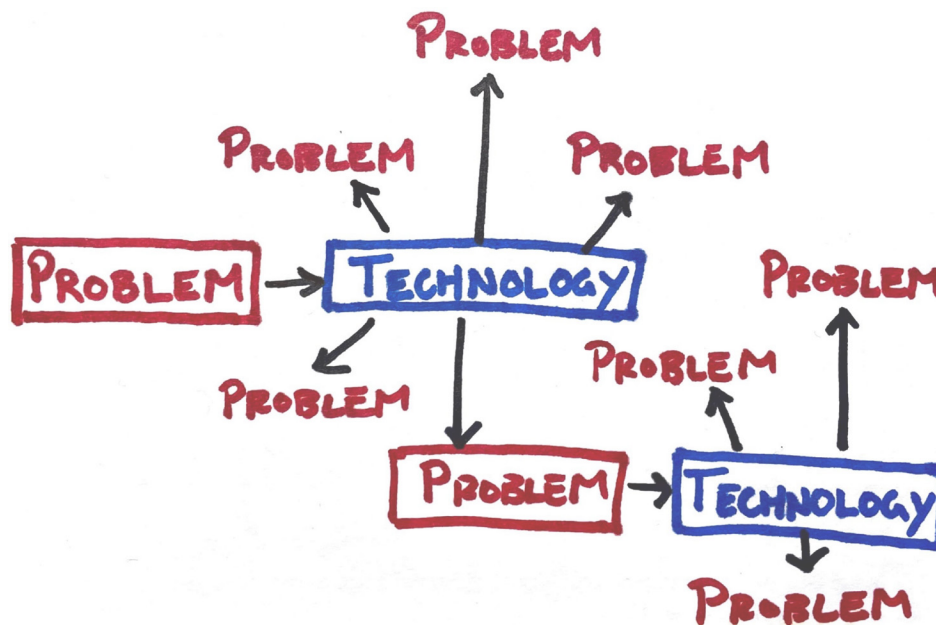
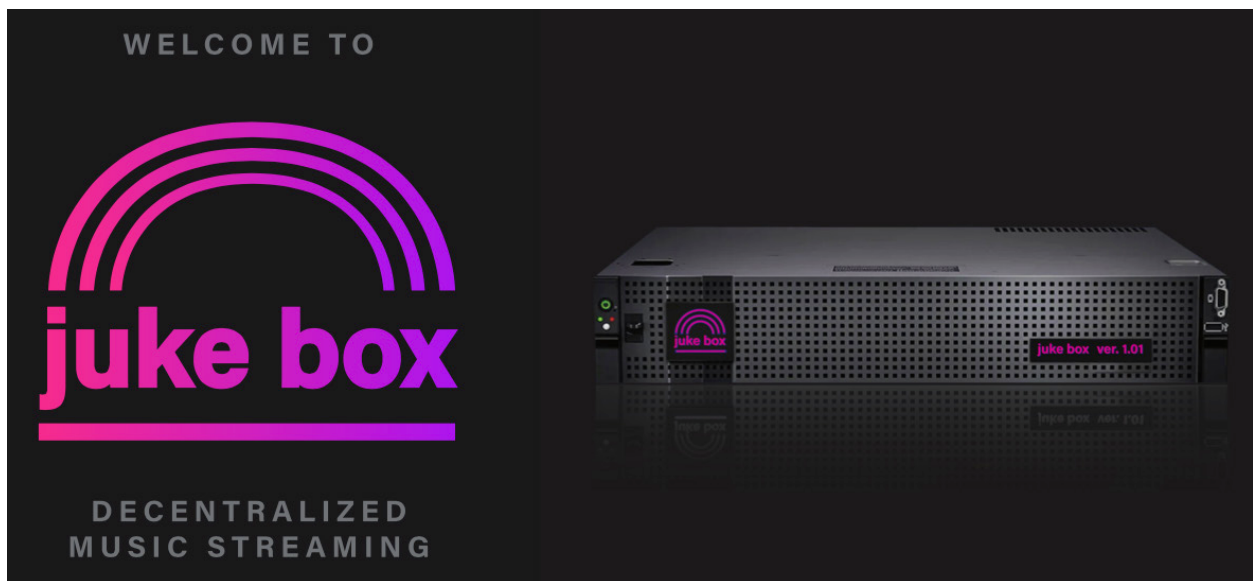


Diagram based on *"Western Melancholy: How to Imagine different Futures in the Real World"*. (Mitrović, 2018)

If we consider the entire system of modern cloud-based music streaming as a monstrous assemblage, the harmful implications are largely a result of the industry and humanity's continual desire for maximized convenience. Is it possible to alter its entanglements to help lessen the impact of its implications while still maintaining a level of convenience that is enough to encourage a collective approval? This project is strictly done as a parody to tech narratives largely presenting

themselves as problem solvers and innovators and as a speculative exploration of how past and present consumption methods might combine. Juke Box is a decentralized music streaming service where “the cloud” exists in a server within your home. Your music, and user data are safely stored in your individual server that can be accessed remotely from your phone. The primary purpose of this project was to take a step back and consider how the lines of inquiry discussed within this research might look in a commercial practice. While this work was largely satirical, it was interesting to consider how some of these ideas would look with a different directive.

Figure 07: Juke Box Product Pitch



2.5 Place-Based Field Recording

In a theoretical sense, looking at music as assembled entanglements with tangible implications in the world is a far-reaching and complex space to design into. I started by considering how music itself could begin to explore some of the entanglements and help to provide an area for reflection and contemplation of some of its implications. The resulting project consists of a series of music pieces composed from field recordings of various locations around Vancouver, British Columbia. I spent a lot of time wandering around the city and recording the audio of different locations: parks, beaches, busy streets, quiet alleys, etc. In doing so I was able to focus specifically on how we might look at music to be entangled within the world around us, and in this case, explicitly created from it. I then took these recordings and produced music pieces that were specifically tied to their locations. The presentation of the pieces includes a way finding capability to encourage the listener to visit each location and experience the music from where it was recorded. This experience provides an alternative process of consumption, one that is more intentional and actionable. This process also attempts to foster an appreciation of natural beauty in the music produced by recording natural spaces. Each specific music piece was produced in a way that was meant to soundtrack the listener's experience at each location and embed a new sense of meaning within the piece. The intention of this work is to create an alternative relationship to consumption - One that experiments with a method of music consumption that does not cater to convenience, but instead to intentionality, slowness, reflection, and the natural beauty of our everyday world.

This project is meant as a critical engagement of our modern modes of music consumption. Stuart Walker describes the need for sustainable dialogues to refer to substantive notions of personal meaning and the problems with maintaining this meaning within digitally saturated interactions. The idea of personal meaning he proposes goes beyond seeking things that make us happy, as that can often be misconstrued with material gain, but rather the things that are important to us in a spiritual or existential manner (Walker, 2010). Personal meaning within sustainability should refer to people desiring a more environmentally responsible world on a personal and relatable level. Personal interactions within entanglements are essential to understanding how we exhibit care for music.

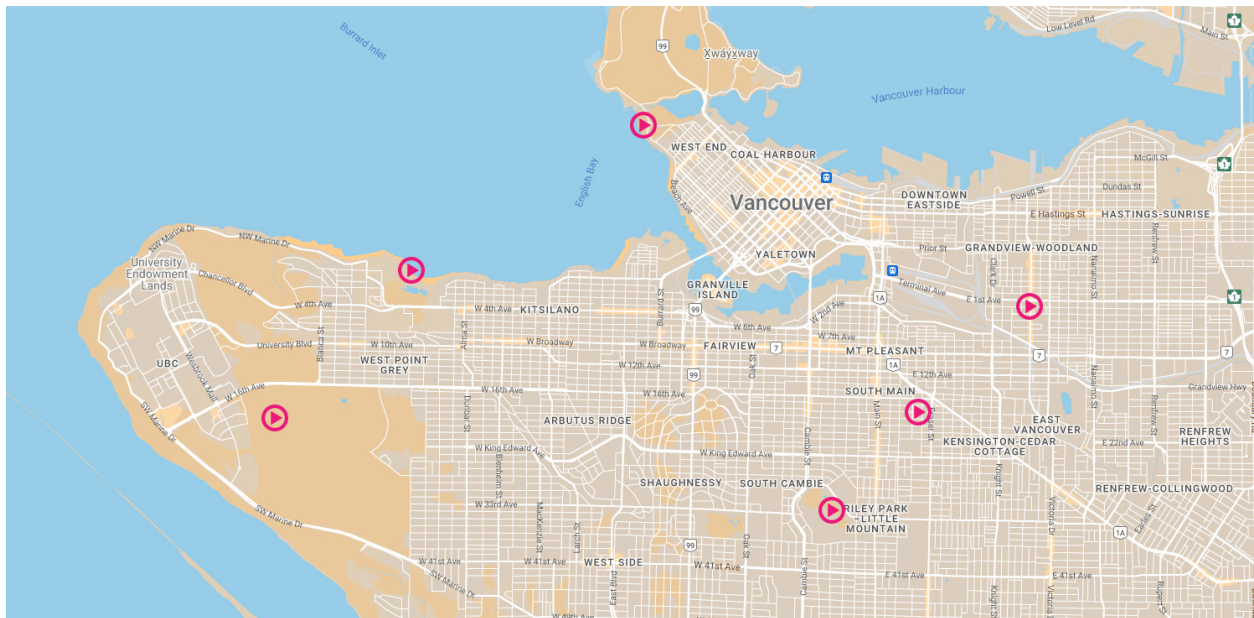
Referring back to Patricia Reed's *What is Care at Planetary Dimensions?* Care is more evident within the things we are familiar with and that have an existing notion of personal meaning, but less evident with the unfamiliar and impersonal (Reed, 2019). Within music we are primarily familiar with just the music itself and maintain our personal meaning within our perceived relationship to it, but this is not the full extent of music. The familiar and personal elements of musical entanglements are essential to maintain as they become the entry point to the discovery of the unfamiliar, impersonal, and harmful implications of the larger system. In our day-to-day lives we are continually met with a barrage of media, advertisements, and information. This project is ideally able to create a digital interaction that slows this process down considerably and allows us time to reflect on and consider that which we are consuming. Patricia Reed also describes the complex theories of how situated knowledge of specific locations relates to overarching systems at planetary scales.

"On the one hand, human individuals are in this world somewhere, some when, in some body and experience it differently in concrete ways. On the other hand, humans are also embedded in abstract, discursive-historical frameworks that determine conceptual self-understanding and modes of praxis as a result." (Reed, 2019).

Entanglements that occur at global scales cannot be understood by either a situated knowledge or a conceptual one, but by a combination of the two. This project is not meant to tether the entire conceptual understanding of modern music consumption to a physical reality, but to simply relate to the conceptual notions of understanding individual, intentional practices within a larger framework. The intended listener experience at each of the recording locations is meant to create a suspended moment in time where you have an opportunity to contemplate the natural qualities of the location, as well as consider the sonic properties of what you might ordinarily describe as mundane background noise. This relationship is effectively where field recording as a practice can be very powerful. We become so attuned to the sounds within our environments that we rarely consider them to be musical. Gathering and producing these sounds as music creates an altered relationship to sonic environments and attempts to change the way a beholder may perceive a particular space. William Basinski's field recording piece: *The Disintegration Loops* (2001) primarily inspires me because he manages to invoke meaning from the mundane, a relationship that I have

long been trying to consider within digital media consumption. Our digital interactions today often feel very linear; whatever we are going to see next is already queued in a long line of algorithmically organized experiences. This project is intended to question this consumption pattern, specifically as it relates to music.

Figure 08: Place-Based Field Recording Map



From: <http://vancouverfieldrecording.webflow.io>

To me this project was an interesting way to reflect on the entanglements of modern music consumption, and about how we might reposition our sense of care. There are tangible implications when we do not care for the entirety of music, but instead just the parts that are already personally meaningful. As Latour says, *"We confuse the monster for it's creator and blame our sins against Nature upon our creations. But our sin is not that we created technologies but that we failed to love and care for them."* (Latour, 2011). This relationship returns us to the importance of how we enact care for the entirety of music, and the need to take responsibility of both it's beautiful and monstrous characteristics. Reed describes how the importance of caring for the things we love is similarly important if not more important to care for the unfamiliar and the impersonal (Reed, 2019). In the case of music, the unfamiliar aspects are generally the problematic and harmful parts of the entanglement, but to truly care for something in a relational and substantive way is to care for those as well.

2.6 Graduate Exhibition Works

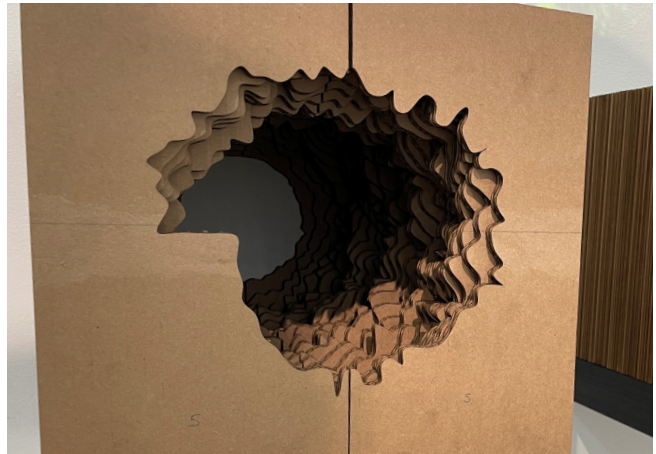
The majority of this work engaging with sound and field recording led to a grad exhibition aimed at exploring these music pieces as forms of data; both visually and physically. Our capacity to understand digital music consumption is not geared toward its consequences, but rather the things that it allows us to do. Listening data algorithms have allowed for machine learning to approximate our tastes in music and then feed them back to us as if we were discovering it ourselves. This may not seem inherently harmful, however, in doing so we remove a sense of agency from our interactions with music. All this is to primarily say that we are generating more data than ever before and doing so with little to no acknowledgment of how this affects the physical world around us. This exhibition was meant to extract the data from music pieces and display different ways to create an alternate relationship to listening. The field recordings were initially created in order to cater a musical experience at their specific locations. In order to exhibit this project in one location, the relationship between the recording and the place had to become fractured. This fracturing allowed for the work to focus on deconstructing the recordings themselves as assemblages of musical data. This data was then processed to create both digital and physical artifacts to be displayed for the exhibition. The physical aspect consisted of three-dimensional artifacts created from the sound data, while the digital focused on reflecting on this sense of fracturing between the music and the natural spaces they originated from.

Sound Vessels

Can we regain a sense of tactility within a music industry that is now almost entirely digital? Does creating a physical interaction change our relationship to that which we consume? This project explored a three-dimensional and tactile understanding of the previous field recording work, to attempt to regain a tactility that is related to the music itself. In order to do so I looked at generating models constructed from the waveform of the recordings. For each recording I took the waveform and used it to construct a three-dimensional artifact or vessel that is physically and sonically unique to the sound data of that recording. The prior sound visualization exercise showed the waveform data for every fraction of a second of the recording. This work was intended to show how the entirety of

a recording can be visualized at once in a physical artifact. A vinyl LP records sound data in a spiral motion, from outside to inside. These artifacts consider the same spiral layout but arranges them into layers. As the song goes on, the artifact is extruded into a three-dimensional form. While this is not a playable form of music like an LP, it regains some sense of tactility within digital music by exhibiting musical data in a physical form.

Figure 09: Various Sound Vessels

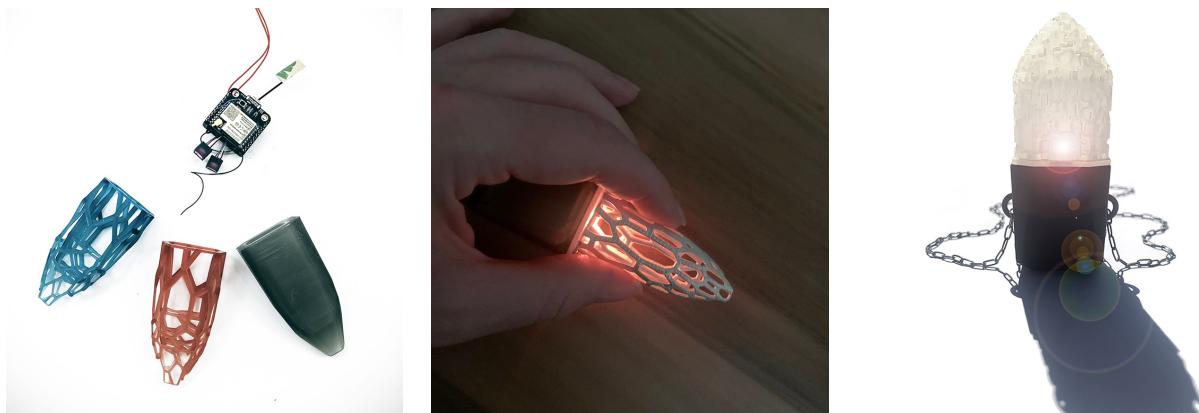


Top Left: 3D Printed Study Model
Top Right: Grad Exhibition Sound Models (Negatives)
Bottom: Grad Exhibition Sound Models (Positives)

3D Printed Work Case Studies

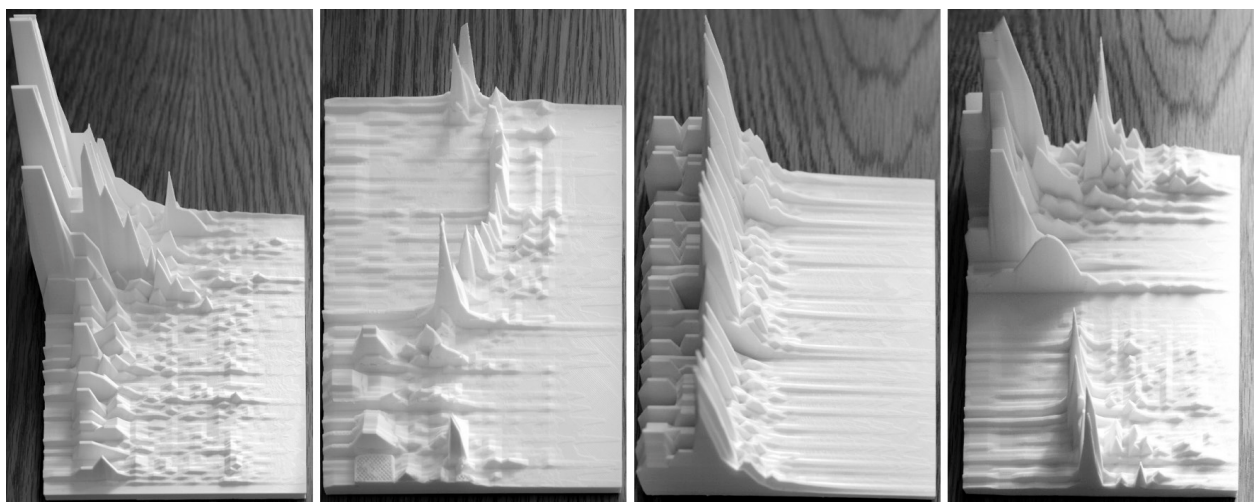
The sound vessel iterations were heavily inspired by two works. The data Heirlooms works from the 2021 Radiant pavilion exhibition in Melbourne. These works create physical vessels that were meant to embody memories and keepsakes that otherwise exist as purely digital entities. My own work attempts a similar relationship in the sense of how it considers what creating a sense of digital tangibility can offer to our notions of personal meaning and care within expansive digital frameworks. The other is John Locke's work creating 3D printed waveform artifacts of various points of David Bowie's song, *Young Americans*.

Figure 10: Data Heirlooms



Three artifacts from Emma Luke & Chuhan Khoo, Data Heirlooms (Khoo et. al., 2021)

Figure 11: “Young Americans” David Bowie 3D Waveform - John Locke

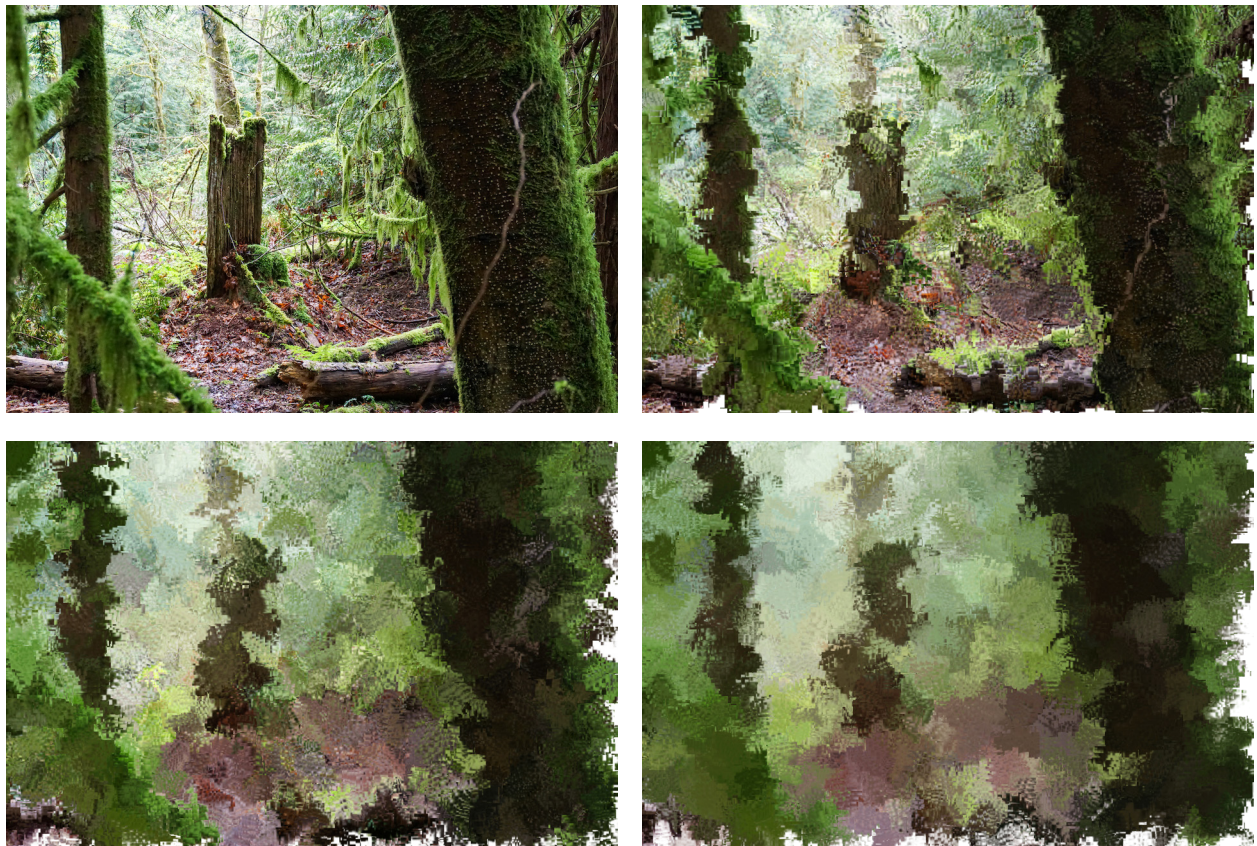


(Locke, 2015)

Image Decay Function

Since the primary focus of the field recording work was how it was intended to be experienced in each location, the focus of the exhibition had to be slightly altered. In addition to the physical sound vessels, the primary visual element of this work was to project a large image of each of the field recording locations and create a function that distorts the image based on the waveform data of the song. The more data the song is generating at a certain time, the faster the image will distort, as the song continually plays the distortion continues until the environment where it was recording is rendered virtually unrecognizable. The aim here is to visualize a relationship of distortion and decay generated from continual streaming and to visualize musical data in a different way from the physical vessels.

Figure 12: Forest Image Decay Function after 0, 1, 3, 6 Loops Respectively



All Images and Recordings Found at <http://vancouverfieldrecording.webflow.io>

As mentioned before, this work is heavily inspired by the Disintegration Loops by William Basinski (William Basinski, 2001). Basinski explored musical decay and deterioration based on the physical conditions of recording and production. This work aims to explore physical and environmental decay based on the conditions of music consumption. How can we begin to understand data in a more relational sense? We quantify data as storage, but as storage becomes more cloud focused, our tangible understanding of data is lessened. This project aimed at visualizing data as a tangible substance with the ability to saturate, deteriorate, and blur our digital and physical environments. These design explorations picked up where the field recording work let off and helped to present digital music consumption in ways that allow us to consider the effects and consequences of convenience. Presenting this work alongside the physical vessels of each recording gave new meaning to the field recording pieces, and helped to examine the site-specific conditions of each piece from a singular gallery setting.

Figure 13: Graduate Exhibition at Emily Carr University



The setup for the show ended up being something that was supposed to draw people in to experience the music pieces while visually interacting with the image decay function and the physical models for each recording. I elected to exhibit both the positive and negative models of each recording as both display the physical waveform and contrast with each other in an interesting way. This work was not meant to be a commentary on digital music consumption, nor does it look to explain or solve any of the issues within our world. It purely seeks to explore ways in which music can be thought of as data, and turned into something hardly recognizable. The components of our monsters that require the most care, the parts that we are largely unfamiliar with; those too are often unrecognizable.

Figure 14: Graduate Exhibition at Emily Carr University



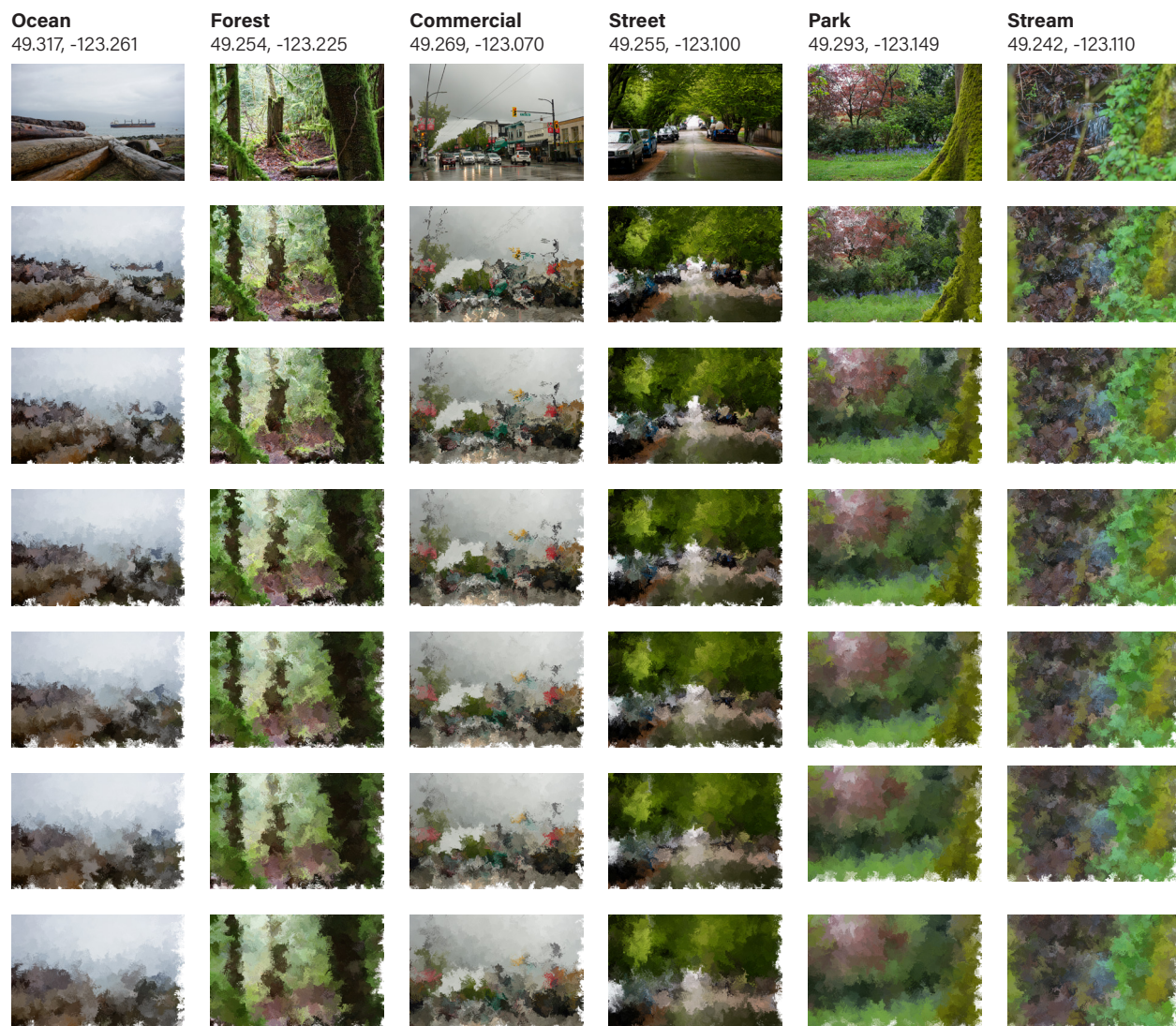
2.7 Design Reflection

These explorations primarily embody four major goals: To understand the dimensions of the problem space. To question the problem space. To open up new ways of thinking about and engaging with entanglements. To engage others and their own understandings of entanglements.

This work seeks to break apart the monotony of digital streaming and breathe life into various parts of musical entanglements. As mentioned before, this work is very personal to me. I worked through these explorations to first and foremost aid my own understanding of entanglements, and to rethink my own involvement within them. To create an opportunity for me to reflect on how music consumption has changed in the digital age and in my life. These explorations are meant to open discussions around music entanglements and their digital and physical implications. Reintroducing a physical element to what has become an otherwise digitally consumed medium helps to create an entry point for discussions centered around our personal relationships to music. These are the primary goals of the critical, exploratory, and reflective nature of my design work. To open the door for others to ask the both the questions that I have asked, and the ones that I have not yet thought of.

I do not have the answers for how to fix or cure the monsters that we have created within music entanglements, but I can instead seek to trouble our implicit understanding and often passive engagement of music in the digital world.

Figure 15: All Decay Functions after 0, 1, 2, 3, 4, 5, 6 Loops



All Images and Recordings Found at <http://vancouverfieldrecording.webflow.io>

Conclusion

I often think of music as mirroring humanity. It has the capacity to exhibit an understanding of the most beautiful and most horrible aspects of our world. In order for us to truly care for our world we must also do the same. This requires us to deeply analyze all aspects of things that we care about. To consider not only the implications of the thing itself, but also the methods to which we interact with it. The methods to which we consume music are as important if not more important than the music itself. In his book, *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds*, Arturo Escobar writes:

"Does it matter whether we write with pencils or on an iPad? Whether we engage in activities collectively in the neighborhood or in the solitude of our individual rooms in nuclear homes? Whether we dance and make music with others or listen to it in silence through our earphones? In what ways do these diverse practices construct different selves and societies? Does it matter?" (Escobar, 2018).

This discussion is essential to consider within our methods of listening to music. We have an inherently relational sense of care and understanding of music itself. It shapes who we are, and provides a mirror through which we can view parts of our world, but we largely do not understand or care for how we consume and interact with it. Escobar asks "does it matter?" in a primarily rhetorical sense because it clearly does. We do not live in a static world. Our behavior and patterns of existence rapidly shift and pivot to reflect different understandings of what it means to live presently. By the same standard, why should our creations be designed statically? A primary symptom of modernity is continual innovation and subsequent abandonment of our monsters. The things we create become casualties to the things we create next. Within digital networks, these casualties are even more hidden, and harder to identify as monsters. When Latour describes black-boxing he describes artifacts that are hidden by their success (Latour, 2000), but in the same way these artifacts are hidden by their failures as they become forgotten. All this is to primarily consider the methods to which we consume and interact with the digital world, and our entanglements within it. To enact a relational sense of care for our monsters is the first step in preventing their creation in the future. Before we seek to create or

fix, we must first seek to understand. This work first and foremost aims to question and provide space for reflection on our entanglements with digital networks. To enact relational and substantive notions of care for the entirety of the things we love, and to recognize the importance of questioning not only the things we think or know to be harmful, but the things we hope are not.

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