Spring 5-6-2022

Production As Analysis In Commercial Music Recordings

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PRODUCTION AS ANALYSIS IN COMMERCIAL MUSIC RECORDINGS

By
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A PRODUCTION PAPER

Submitted in partial fulfillment of the requirements for the degree of
Master of Music in Commercial Music
in the School of Music
of the College of Music and Performing Arts
Belmont University

NASHVILLE, TENNESSEE

May 2022

Submitted by Simeon Pate Church in partial fulfillment of the requirements for the degree of Master of Music in Commercial Music.

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Acknowledgements

My deepest thanks to my committee, Mr. Keith V. Mason, Dr. Bruce Dudley and Dr. Virginia Lamothe for challenging, guiding and supporting me through the creation of this thesis.

To my mother and father, my siblings, Ezra, Ephraim, Asahel, Adriel, Aijalon and Keturah who have inspired me in my love of music and my pursuit of its meaning.

Most of all, to my life partner and best friend Maria Crawford who has supported and encouraged me throughout this degree and thesis. Your presence in my life makes each season of life brighter.

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Introduction

Since the 1960s, scholarship of popular music in the fields of musicology and music theory has blossomed (Kajanová 2013). The inclusion of the social sciences and humanities in music analysis has allowed for new methodologies in commercial music analysis. Although new methodologies have been developed around popular song analysis, they are notably absent in the field of music production (Blake 2012, 1). In this thesis, I will assert that music production is an under-explored facet of commercial music that offers abundant opportunities for analysis.

In Chapter One, I begin by arguing that the original goal of recording was to create a transparent recreation of sound. However, the effects of mediation through the recording and production process, can never be eliminated. Instead, producers began to incorporate the effects of recording mediation into the very identity of the music. I will defend the importance of considering production because of its dominance in commercial music today. I will also argue that recorded music is the preeminent version of commercial music today. Artists spend copious amounts of time "producing" their recordings. The intentionality within this stage of creation should give weight to the importance of production and the recorded form in commercial music analysis. More than time and intentionality, the ubiquity of the highly-produced musical form makes analysis of production necessary. I will suggest that the primary areas of production mediation are timbre and space. Next, I will argue that analysis of production is not only valid but sorely needed because classical tools of analysis are limited in their applicability to commercial music. I will provide examples of the limitations of harmony and notation in the context of commercial music and suggest the inclusive potential of timbre. All of these assertions about commercial music today are exemplified in the recording project that accompanies this paper. I will utilize examples from these recordings to support the claim that production as analysis is essential in the consideration of commercial music recordings.

In Chapter Two, I will demonstrate how timbre can be more precisely defined. I will show that there are two major understandings that can be use when discussing timbre. The first is an acoustics-based definition that has the strength of precision but can be cumbersome and presents conflict between acoustic measurement and human perception. The second is an adjective-based association that captures timbre perception as it occurs over time and is easily applied yet suffers from a lack of specificity. I will suggest that both an acoustics-based definition and an adjective-based definition have correlations that can be mapped together. Sound elements from the accompanying recording project are defined through both understandings. Doing so minimizes the shortcomings of each understanding and suggests a path toward a greater overall understanding and utilization of timbre as a tool for analysis.

In Chapter Three, I will talk about the use of spatial placement as a means of accomplishing more than simply creating a cohesive listening experience. I will define space in its placement within the stereo field as well as the representation of sound objects in the space that is created by the music. I will demonstrate the importance of examining the causal relationship between space and timbre. I will illustrate how space and timbre are used to create surrealist experiences that defy physics to purposefully effect the sound rather than simply mediate though the accompanying recording project and a recent song by the artist Soccer Mommy,

In Chapter Four, I will highlight a few of the vast areas of study that could be pursued in greater depth if production is utilized as the new starting point for the analysis of commercial music recordings. Lastly, I will reflect on my experience creating the music recording project and how the concepts in this thesis affected my approach to producing the music and directed the choices that I made.

Chapter One

"A New Component to the Musical Totality"

The Pursuit of Fidelity

The act of recording is, by nature, an act of mediation. From the beginning of recording history, the goal was to minimize the effects of mediation and maximize fidelity. However, the approach taken in the accompanying recording project—as well as in most commercial recordings today—is to embrace the mediating effects of recording not only passively, but actively. In each track, recording mediation is utilized as a vital part of the music totality.

On December 2, 1889, Thomas Edison recorded Johannes Brahms playing two musical excerpts. The Edison wax cylinder, although innovative for its time, captured more static noise than music (Audio Example 1.1). Edison's intention was clear, but his technology was lacking. From Edison and his wax cylinder to the massive audio innovations created during World War II through the 1960s, the goal of recording was fidelity (Burgess 2014, 56). The closer a recording could be to the acoustic experience of live music, the better.

Despite this pursuit of fidelity leading to the precision of recording technology today, mediation is unavoidable. While there are now binaural recording devices that simulate human perception, a sound mediated through a microphone will never be able to perfectly mimic the non-mediated experience.

The 2.5-micron thick ribbon of aluminum that acts as the vibrating element of the famous Royer R-121 microphone, like countless mics, is stunningly more “accurate” than human hearing. While the human ear is extremely sensitive to sound intensity, it is highly biased to frequency (Heil and Matysiak 2020, 21). Figure 1.1 shows the human threshold of hearing. The threshold of hearing is described as 0dB or the quietest sound the human ear can perceive. dB, or decibel, is a relative unit of measurement. Here, dB refers to sound pressure level (dB SPL) where a +6dB increase equates to a doubling of pressure. Pressure refers to how the human ear perceives loudness. However, pressure does not equate directly to perceived loudness of sound. Figure 1.1 demonstrates this bias of perception in Hertz. Hertz (abbreviated Hz) is a unit of sound frequency in which one Hertz is equal to one cycle of a sound wave. Hertz is experienced as pitch. A doubling of Hertz correlates to an octave in pitch. While 0dB is defined as the quietest audible sound, this is only true for pitches around 3.5kHz. The lower end of human audibility is significantly less sensitive. As shown in Figure 1.1, a pitch at 20Hz would need to be produced at an intensity of 70dB to be audible. That is more than an elevenfold difference in sound-pressure level.

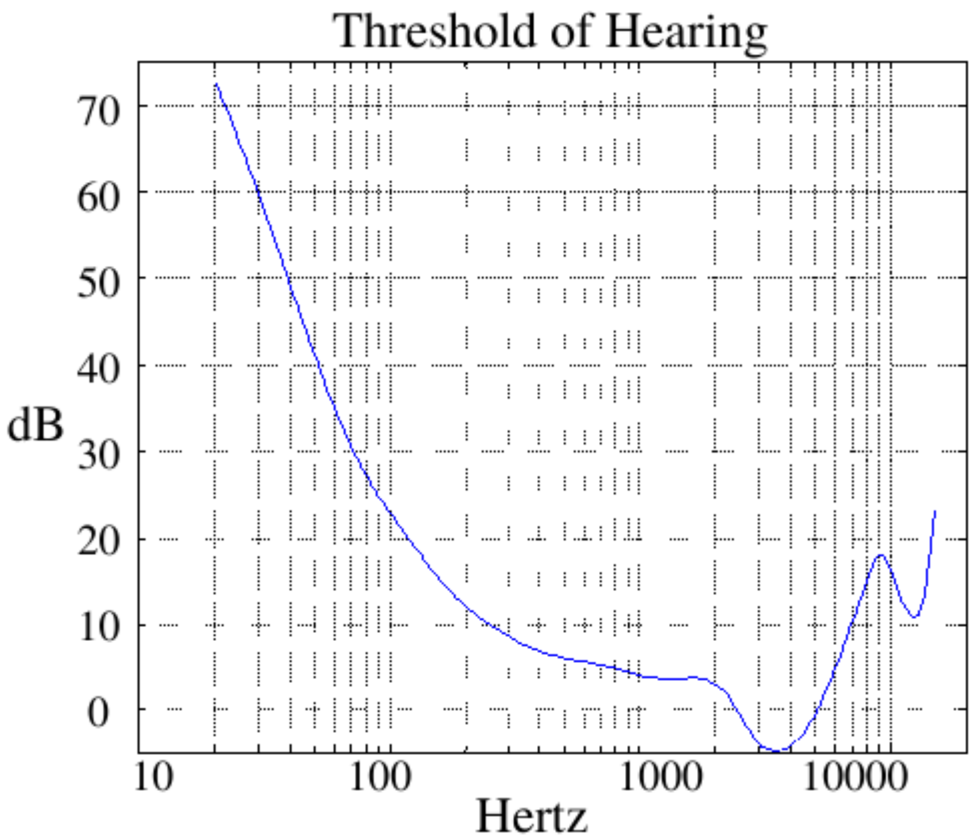


Figure 1.1. Human Threshold of Hearing

Figure 1.2 shows the frequency response of the Royer R-121. Unlike the human ear, it is able to faithfully capture audio at the same SPL across the frequency spectrum. At a bias gradient of less than +/- 5dB, the effect of a sound passing through this microphone before reaching the human ear versus hearing the sound in person has become close to imperceptible.

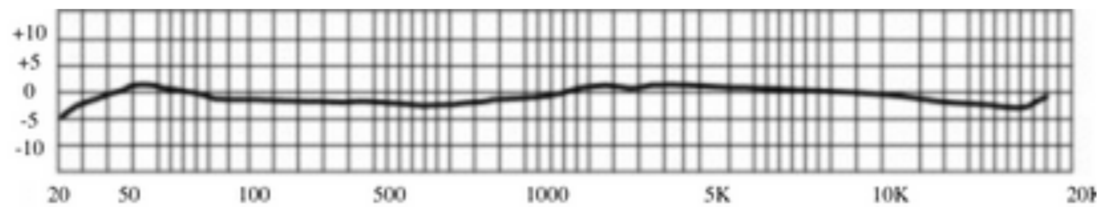


Figure 1.2. Frequency Response of the Royer-121

However, fidelity of frequency response does not translate directly to perception of timbre. This is because of space. Figure 1.2 assumes that all frequencies are originating at a consistent distance from the point of sound capture. The R-121, like all ribbon-based microphones and many condenser and dynamic microphones, exhibits bass proximity effect. Bass proximity effect is an acoustic phenomenon in which the closer the sound source is to the microphone, the greater the diaphragm's response to low-end frequencies. The lead vocals of both "seven" and "james joyce" were recorded using a Rode NT1. The NT1 is an affordable, extremely transparent condenser microphone. Despite being recorded with the same microphone, these two vocals—both of which are minimally affected by equalization—sound distinct. The lead vocal of "seven" is much more bass forward and slightly less crisp in sibilance. Thelead vocal of "james joyce" is clear and balanced in frequency. The difference between these two vocals is the distance from the microphone and the space in which they were recorded. "seven" was recorded in a small attic that was acoustically muffled and the vocal was performed within two inches of the microphone. This results in the bass proximity affect. The lead vocal for "james joyce" was performed in a larger acoustically-treated room at a distance of six to eight inches from the microphone.

This interplay between space and timbre is possibly the greatest barrier to "fidelity" in recorded sound. Space drastically affects the way timbre is perceived. The sound of a violin in a practice room versus a concert hall or a cathedral is, as a matter of perception, three very distinct sounds or timbres. That same violin is also distinct in sound when standing in two locations within a given space, such as when standing beside the player versus at the far end of a cavernous hall. Add to this the locational bias of an extremely faithful mic like the R-121 and the concept of “fidelity” starts to become elusive. Sometimes these spaces are heard as desirable and an audio engineer will attempt to capture them, while other times they present very deleterious acoustic properties that the engineer will attempt to eliminate. The engineer will use microphone placement to accomplish this. Either they will place the capture device close to the sound source to minimize the acoustic characteristics of the space or they will place the device far away to include the sound of the space. However, by doing so, they affect the source’s timbre because of its causal relationship with space. Additionally, an intentional choice has been made regarding the experience that is being mediated from the sound capture to the listener.

The concept of true “fidelity” is at best a thing that can be mimicked. Instead, mediating aspects of recording can be intentionally included into the sonic whole. Artists began to create albums that could no longer be reproduced in live settings. The accompanying recording project takes this approach. Among the first examples of albums to fully embrace recording mediation include Brian Wilson and the Beach Boys’ *Pet Sounds* (1966) and George Martin with the Beatles’ *Sgt. Pepper’s Lonely Hearts Club Band* (1967). Wilson and Martin were ahead of their time, but five decades later their innovative ideas are common practice.

The Recorded Medium

The recording is the preeminent version of a commercial song today. Because of this, production as a parameter of commercial music is unavoidable. Analyses have often drawn upon live performances to discover "intentionality" in areas such as form, harmony and tempo. Analysis is also often focused on social aspects of commercial music. Because of this, live performance is especially intriguing (Inglis 2006, xv). However, the recorded form has cemented its preeminence through the time dedicated to and ubiquity of the recorded form as well as the intentions of the performances of today

Because of the digitization of music and the emergence of home recording, the process of creating a recording has been revolutionized. Previously, musicians would practice their parts incessantly in preparation for a few costly hours in a recording studio. There was often very little time for experimentation and music creators had little understanding of recording technology or its capabilities. Today, with ample time and accessibility to recording technology, musicians have embraced the recording process. The time alone that creators put into the production of their music should cement its centrality. This intentionality transfers into the performance of commercial music. A well-known industry expression is: "play the record." When artists perform live, it is expected and desired that the live show should sound nearly identical to the recorded performance. This standard has become so ubiquitous that most artists perform with stems—or pre-recorded parts that accompany the live performance—as backing tracks. Even artists in genres that have traditionally avoided production and focused on performance, such as country music, now use backing tracks in their live performances to sound more like their recordings (Anderton 2005, 64). However, the most compelling evidence for the preeminence of the recorded form is its ubiquity.

While a quick arbitrary sample of popular commercial music would exemplify the dominance of highly-produced music, the database Hit Songs Deconstructed offers numerous data points for further consideration. In Q1-Q3 of 2021, there were fifty-nine songs that made it into the top 10 of Billboard's Hot 100. Those fifty-nine songs contained 118 credited producers (Hit Songs Deconstructed n.d., 5). The inclusion of multiple producers on single recordings is a long-expanding trend that reinforces the importance of production in commercial music recordings. When looking at sub-genre trends and influences, the most dominant styles since 2017 have been Pop, Hip-hop/Rap, and Trap (Hit Songs Deconstructed n.d., 62). Even more recently, Q2 and Q3 of 2021 have seen large increases in Electropop/Synthpop, Disco and Dance/Club as sub-genres and influences. All of these genres are production-centric.

The success of minimally-produced powerhouses such as Adele could be used as a counterargument to the ubiquity of production-heavy music. All of her songs contain limited sonic effects as well as few sounds that cannot be directly connected to a common sound source. Despite that, her music is still mediated through recording devices. As demonstrated with microphone fidelity and placement, this mediation is unavoidable. As a result, intentional decisions have been made about microphone choice, placement, and the location of her vocals through synthetically-generated reverb. Peter Doyle, a scholar who wrote about echo and reverb from the beginning of recorded music until 1960, stated that "'space' had become part of the larger musical equation, a new component in the musical totality" (Doyle 2005, 5-6). If this was true in 1960, six years before the release of *Pet Sounds*, "space" must be an *essential* component of today's commercial music.

A New Tool for Analysis

Production is an essential tool for analyzing commercial music recordings. This is because many of the classic tools of analysis fail to unlock the intricacies and value in commercial music. When academics first began to consider popular music, there was a general distain from the larger community that was similar to the experiences of music historians who had begun to include social sciences in musicology. Like the historians, theorists desired to validate their pursuits in commercial music. In this endeavor, academics applied the tools of classical music analysis to commercial music. Many did so with careful adaptations, creating vital approaches to using melody, harmony, and rhythm for analysis of commercial music recordings. David Temperley's *The Musical Language of Rock* utilizes these tools in one of the most comprehensive writings to date. Other major contributions came from Smalley, Osborn, Blake, Firth, and Zagorski-Thomas. Despite writing about popular music using traditional tools of analysis, all of these writers have cautiously dipped their feet into timbre and space. Any attempt to analyze commercial music eventually necessitates consideration of production-manipulated parameters. While they defend the application of traditional tools of analysis, they admit to a central incongruency. The traditional tools of analysis assume prerequisite knowledge that the creators and listeners of commercial music often do not possess (Osborn 2017, 133). To ignore production effects is to turn a blind eye to the central point of creator intent in today's commercial music. While there have undoubtedly been choices of harmony, melody, and rhythm in the accompanying recording project, the only intention was functionality. In this way, the recording project follows much commercial music today in which harmony, melody and rhythm are, first and foremost, mediums through which to deliver the music.

The Difficulty of Harmony and Notation

The difficulty of applying harmonic analysis to commercial music has attracted much attention (Osborn 2017, 94). If significance is to be found in commercial music recordings, analysis must take account for the orientation of the form. Commercial music is intended for the consumer, not the musician. While one could argue that musical analysis should draw out what is perceived by the learned musician, the idea of finding meaning in music where it was never intended is problematic. If meaningful analysis of commercial music is to be gained, the questions that are asked should fit the task. Jason Brown spent copious amounts of time applying mathematics and physics to discern the harmonic makeup of the opening chord to “A Hard Day’s Night.” His analysis suggests that there is a G7sus4 played with a Dm7sus4 (Brown 2004, 3). However, in 2001, a reporter asked George Harrison about the chord which he answered, “It is F with a G on top, but you’ll have to ask Paul about the bass note to get the proper story” (Pedler 2003, 478). Harrison had no interest in the specificity of the chord but showed interest in the chord based on something else: a story. Whatever the story was, Brown was looking for meaning in a place in which it was clearly not intended. While interesting, harmonic analysis rarely meets commercial music where it exists. When this music was in the head of its creator, it may have had a relationship with harmony if only to be a conduit for the musician’s ideas. Once it entered the studio, intentions around harmony likely became less important. When the recording is played in bedrooms and bars, the listener—the intended recipient—will likely never notice the harmony at all. However, they may very well notice the effects of production.

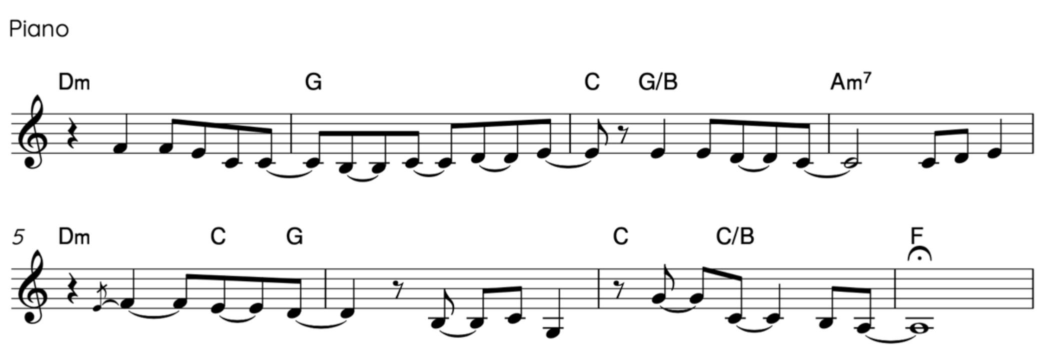
In the 2018 research of Arthurs, Beston, and Timmers, the difficulty of harmonic analysis and the universality of timbre—a central effect of production—is exemplified. Arthurs et al. studied the perception of chords of different qualities and timbres in a diverse population of subjects from musical novices to studied musicians. Their findings suggest that the general perception of chord quality is most affected by exposure and study of music while timbre is least affected (Arthurs et. al. 2018, 665). Conversely, harmony exhibits the limitations of prerequisite knowledge pointed out by Osborn. The accompanying recording project with this paper contains five songs centered around very intimate yet universal human experiences and emotions. The lyrics wrestle with universal concepts of fear, love, faith, and self-worth. The emotions being conveyed should be accessible to all. Because of this, timbre has been prioritized over harmony, melody, and even rhythm.

Compared to harmony, the application of notation has received even less interest or criticism in its application to commercial music (Temperely 2018, 9). At first glance, the modern musical notation system fits commercial music rather well. Looking at the notated charts included in this thesis provides a fair representation of the general applicability of notation. Commercial music mostly fits within the standard practices of western music. However, it suffers from the same shortcoming as harmony—it is looking at a parameter that was never considered by the creators, let alone the listeners. The vast majority of music has never been notated at all. The idea that music can be a physically visual object is inherently contrary to the aural nature of music.

Notation fails to capture some of the most salient aspects of commercial music recordings. The chart for “seven” suggests extreme musical simplicity. In regards to notational, melodic, and harmonic perimeters, this is an accurate assessment. However, the recording presents more than the notation suggests. The difference between notation of Western classical music and commercial music is that notation in commercial music is a representation created after the fact while in the Western classical music tradition, it is the very source from which a musician derives the music. The fact that notation is limited in its application to commercial music should be unsurprising. The salient parts of commercial music that are often left behind are the production-based effects that are so central to the music (Temperely 2018, 10).

Example 1.1 contains the first eight measures of “seven.” The notation also includes the demarcation of piano as the instrument. Musicians who have knowledge pertaining to reading music will be able to understand this excerpt simply by looking at the notation.

Example 1.1. Measures 1-8 of “seven”



Example 1.2 contains the first six measures of "james joyce." It has no prescribed instrument.

Example 1.2. Measures 1-6 of "james joyce"

Without having heard the recording, the mental recreation of the sound is suspect. This is because with common practice notation, sound quality is dependent on the concept of defined sound generation. Assume that Example 1.2 had assigned specific instruments for each part. It specifies certain drum machines sounds to be used and even labels the type of synth that should enter at measure three. Despite extreme specificity, the unique production effects applied to both drum machine and synth make them completely singular. No amount of pre-knowledge would prepare the listener well enough for them to recreate the sounds in their mind. In fact, the listing of the exact synth—in this case a modeled sample from a Nord A1—would likely be misleading. Notation has a limited ability to communicate the production effects that are core characteristics of commercial music.

Notation then, just like harmony, is reliant on a vast catalog of pre-knowledge that emerges from musicians' experiences rather than from the notated representation of the music alone. Like harmony, overreliance on notation will lead to unintended—if not inaccurate—analyses because this pre-knowledge is not possessed by the intended listener nor consider in the creation of the song.

Charts for each track of the accompanying recording project can be found in the Appendix. However, like most commercial music today, these were synthesized after the recordings were finished. The creator of the music and this thesis often found himself surprised by rhythms, melodies or harmonies that he himself had previously created when putting them in notation form. As exemplified in Examples 1.1 and 1.2, notation lacked the ability to give any good impression of the timbre or space of each sound. Every unique and specific texture had to be reduced to notes that only convey duration and relation to the surrounding notes. While a musician should be able to recreate these songs in structure from these charts, the most compelling parts of each track would be left behind. Without a method of including the production elements that define these recordings, harmony, melody, and rhythm must make way for other parameters of analysis.

The use of notation and harmony, while valid, captures a highly-limited amount of the intended meaning in commercial music recordings. This has often been circumnavigated by only considering commercial music recordings that have irregularities in the areas of melody, harmony, and rhythm. However, sticking to the old tools of analysis will stunt the scope of meaningful contributions to commercial music. Commercial music must be considered through the ears of the people who made it and the ears of its intended audience and not the of the storied composers of the Classical Period. Production and its means of mediation must move to the forefront of the analytical toolbox.

Chapter Two

Defining Timbre for Analysis

Timbre is both an acoustic phenomenon as well as a perceptual experience. The acoustic understanding is through the concept of the overtone series and rudimentary physics of acoustic properties. The experiential understanding is through the association of descriptive adjectives—often in metaphorical adjectives—to capture a timbral experience. Each understand has strengths and weakness. Correlating these two understandings will create a "timbral lens" for the analysis of timbre where each understanding helps minimize the shortcomings of the other (Osborn 2017, 93).

In the track "okay," the acoustic understanding would describe the lead vocal as having strong fundamental pitches while lacking overtone resonances. The overtone resonance that is present is dissonant, or not within the standard distribution of overtones of a perfectly cycling sound wave. The experiential understanding would use adjectives such as muffled, flat, distorted, and dark. When these two approaches to quantifying timbre are defined, a correlation can be drawn between them. Correlating acoustic and experiential understanding can offer a more comprehensive understanding of timbre that allows for better quantification while, ensuring a shared terminology.

This is a point of departure from current writings which almost exclusively apply Denis Smalley's *ecological theory of perception*. Smalley theorized that human perception of timbre is related to evolutionary instincts to identify the sound's source

(Smalley 2007). This is what he calls *source-bonding*. When hearing a sound, the perception of it and its meaning is based on the previous acoustic experiences of the listener. The sound is related to these past experiences in attempts to identify the sound's source and in that process, meaning is conferred to the timbral experience. While this is currently the prevailing theory for studying timbre, this thesis departs from it for two reasons. First, the lens of source-bonding does little to explain the words and experiences used to describe timbre in any musical context. While it might explain human perception, it does little in terms of experience. Second, the ecological theory of perception does not answer how individual listeners can certify their perceived experiences of timbre. In the accompany recording project, none of the intending meaning in timbre comes from a perceived evolutionary link. Instead, the timbres were chosen based on the creator's personal emotional experience with the sounds. Plastic recorders used in two of the recordings evoke timbral associations with childhood and naivety, not evolutionary survival. The goal of the timbral choice is not to identify the source but rather to convey emotional meaning. Thus, the creator's approach to timbre is intended to be more applicable to these experienced emotions which can be found in all commercial music recordings.

Why Timbre?

The electric guitar is perhaps the best argument for better defining timbre in commercial music. As presented by Temperley in *The Musical Language of Rock,* the electric guitar, with its full arrangement of effects, makes considering timbre extremely necessary (Temperley 2018, 110). The Fender Telecaster, a mainstay in numerous genres today, has a tone knob as a standard element of its construction. The knob functions as a high end roll-off through which turning it down will suppress the higher frequencies, making the tone darker or duller. Within this one knob, there exist hundreds of distinguishable variations of timbre. Considering the numerous pedals that electric guitarists utilize to add reverb, phase, tremolo, chorus, etc., the limitless timbral potential of the instrument becomes apparent.

The necessity of a better understanding of timbre becomes even clearer with a simple comparison. As suggested by Temperley, vocal timbres in cover songs are an excellent source (2018, 109-111). In the iconic early-1990s hit anthem "Friday I'm in Love," Robert Smith presents an emotionally charged protagonist who, despite the lyric "Friday I'm in Love," is forlorn, dejected, and living in a perpetual state of longing and disappointment (The Cure 1991). His vocal timbre suggests a low state of energy. There is hurt in Smith's timbral approach. Compare this to Georgia Hubley of Yo La Tango who covered the song in 2015 (Yo La Tango 2015). There are many differences in arrangement and production; however, listening to the timbre of her vocal presents a new set of emotions with the same lyrics. There is a sweetness and a patience that is not present in Smith's vocal. Hubley does not drive her vocal cords to present tension—instead, her vocal production is consistent and even in tone and force. Her timbre makes the words seem more genuine. The likely existence of thousands of covers of "Friday I'm in Love" would each present their own unique timbral experiences, thus providing an endless number of experiences of only one song.

The vocal timbre of the accompanying recording project is not one of refined singing. As a timbral and aesthetic choice, the vocal approach is catered to each song and not the presentation of traditionally beautiful vocal sound. If Georgia Hubley were to sing any of the songs in this recording project, it would certainly present a different set of timbres and thus a completely unique experience. Considering that all singers possess not only different vocal timbres but also manipulate their vocal timbres as a variable of their emotional expression, it is necessary to develop a deeper understanding of timbre.

Definitions of Timbre through Acoustics

In the acoustic understanding of timbre, sound is understood through physics. Sound is transferred to the ear through compression and rarefaction of air molecules. Because these air molecules are affected by every part of their environment, even the purest of sounds are acoustically complex. However, through the concept of Fourier transform, all sounds can be simplified into simple wave types: Sine, Square, Triangle and Sawtooth (see Figure 2.1). Fourier transform is a mathematical process of superimposing multiple simple wave forms on top of each to create a complex sound wave or reducing a complex sound wave into a number or simple waves (Taylor and Cambell 2001). These four simple wave types can easily be distinguished from each other by the average listener due to their unique overtone structures. Sine waves theoretically have no overtones. Square waves have only odd harmonics or overtones. Triangle waves also only contain odd overtones; however, they fall off in amplitude much more quickly than square waves do. Sawtooth waves contain both even and odd harmonics and as a result are very full in sound. These easily-identified categories suggest that defining timbre through acoustics would be practical and effective. However, acoustics in practice is less than perfect, especially when considering overtones.

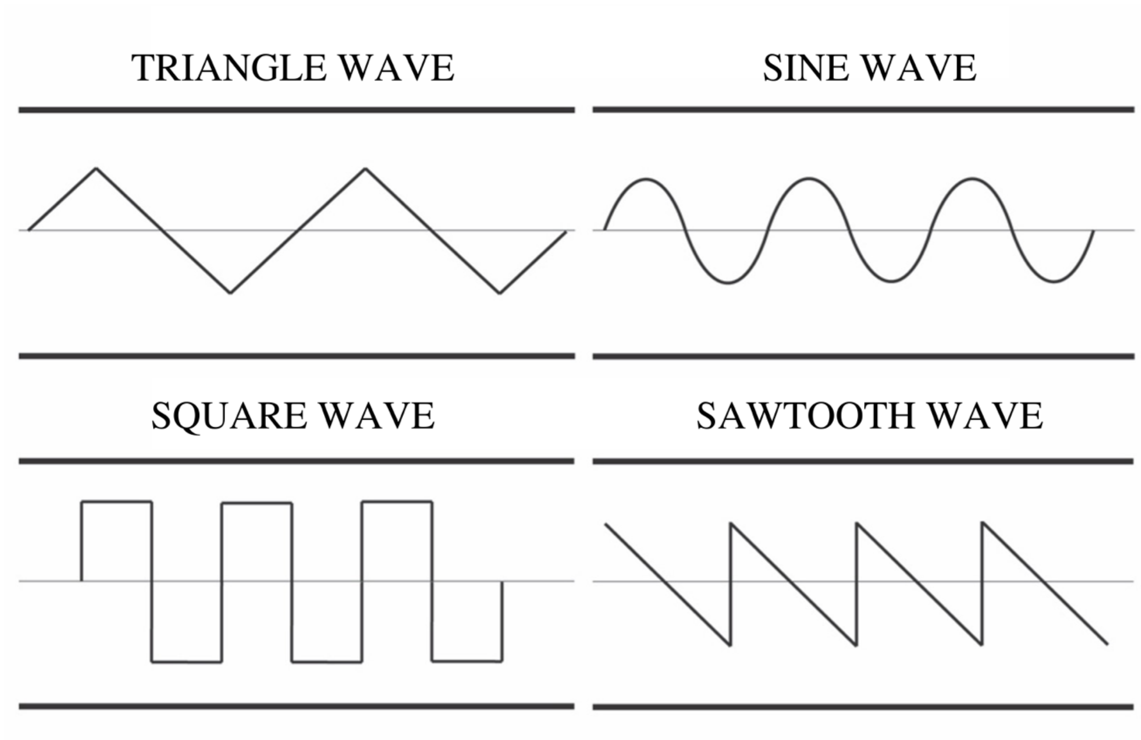


Figure 2.1. The Four Simple Wave Shapes

Of the many complexities of overtone acoustics, three that make the scientific definition of timbre unwieldy are The Fletcher-Munson Curve, stiffness in sound sources, and the sound envelope. The Fletcher-Munson Curve is a representation of how loudly the human ear perceives sound throughout the frequency spectrum when every audible frequency is created at equal amplitude. Stiffness of a sound source is a resonating object's resistance to vibrating in a consistent, cyclical manner over time. A sound envelope is a way of quantifying a singular sound over time utilizing the four parameters of attack, decay, sustain, and release.

As demonstrated in Chapter One, the human ear is not equally sensitive across the frequency spectrum. Figure 1.1 demonstrated the threshold of human hearing. However, not only is hearing biased by frequency—it is also biased by amplitude. This is shown as the Fletcher-Munson Loudness Curve in Figure 2.2. The curve demonstrates that perception becomes less biased as the amplitude of the sound is increased. Human auditory perception is extremely biased to low frequencies at low amplitudes. Therefore, the volume at which a sound is heard affects the perception of timbre.

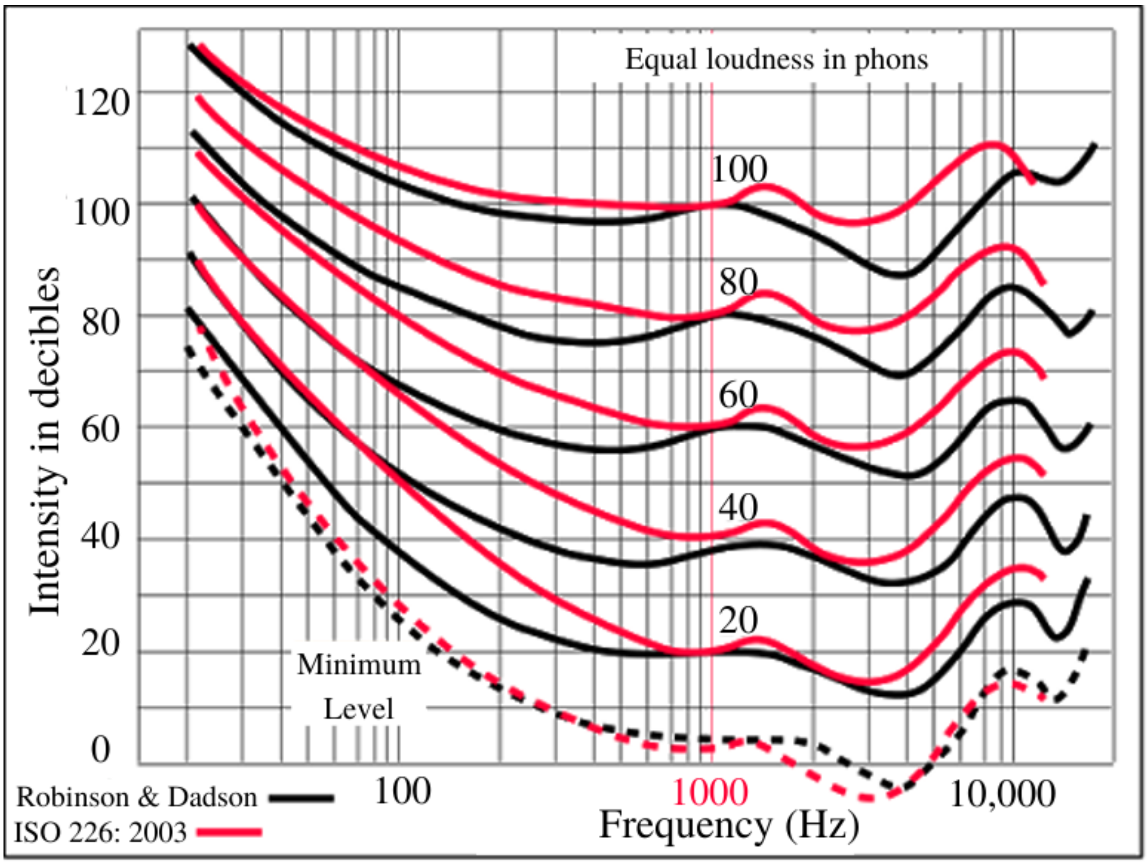


Figure 2.2. The Fletcher-Munson Curve

Exemplifying the Fletcher-Munson curve as an experienced effect is Figure 2.3, which contains a frequency snapshot from :43 seconds in “for starters.” At the instance of the snapshot, there are no transients happening. The frequency spectrum shows the combined sustain of the string-like pad, the piano, and the decaying resonance of the most recent snare hit. In that moment, the timbral balance seems very even.

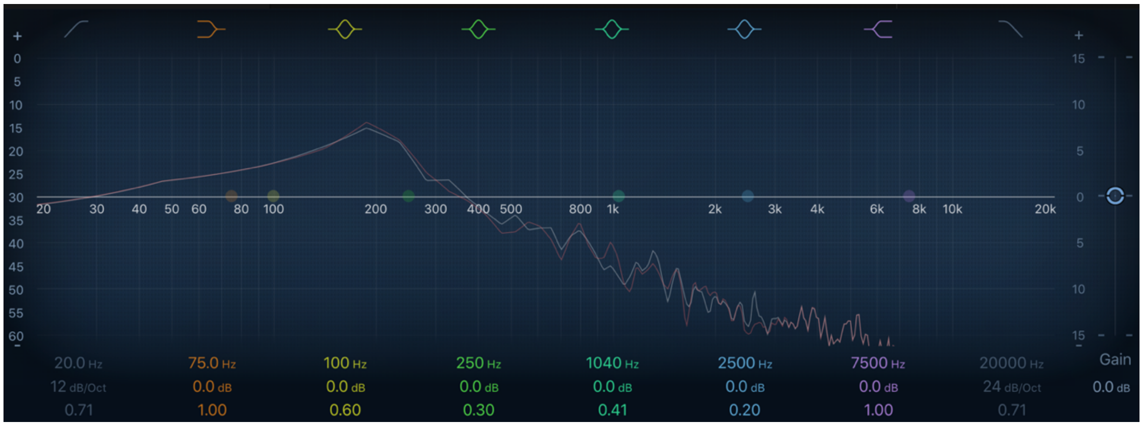


Figure 2.3. A Frequency Spectrum Snapshot from “for starters”

The frequency spectrum in Figure 2.3 show that the amplitude of the lower frequencies is much greater than the middle and high frequencies. The lack of increase in high frequencies in Figure 2.3 as opposed to the Fletcher-Munson curve in Figure 2.2 highlights the fact that this moment, if listened to carefully, appears to be void of some higher frequencies that might make the moment feel like it was brighter, had more air, or was in a larger space. Thus, the bias of the ear creates a disconnect between the acoustic measurement of the sound and of the perception of that sound.

Stiffness is an object’s resistance to vibration. If a string were perfectly elastic, its first harmonic would be located at the exact middle of the string (f2). However, because all physical objects have some resistance to vibration, the actual point of the first harmonic is slightly higher than a perfect division. An extreme example would be a metal bar that might have its first harmonic located as far sharp as f2.76 (Gibson n.d.). In this example, if the note 440Hz (A4) were played, the first overtone would be 1214.4Hz (a sharp D6) instead of 880Hz(A5). Because of the lack of clearly divisible overtones, metal objects tend to be perceived as noise. Even piano strings present this issue in that the overtones are ever so slightly sharp. This phenomenon results in a piano having a deviation of at least 35 cents over its 87 half steps. Thus, stiffness in resonating objects makes defining timbre by overtones unwieldy.

Lastly, the previous two ways of examining timbre both engage with it captured at a single, measurable unit of time. However, the human experience of timbre is heard in time in the same manner as music. Timbre, by the definition of overtones, is not constant but rather is in a state of constant evolution. Auditory perception of sound changes as it decreases in amplitude as all sounds eventually do but sounds also change in sonic makeup as they decay. As previously described, sound impulse is represented in four stages: attack, decay, sustain, release. Attack is the moment of transience in which a sound begins and is for an instant perceived as rhythm rather than pitch. Decay is the settling of the initial impulse of energy to the vibrating element into what is often perceived as pitch. This perception of pitch is called sustain, in which the vibrating object is moving in near cyclical vibration. Release is the vibration of the element once the energy is no longer able to keep the element in cyclical vibration but is still present enough to keep the element in movement. Release is usual accompanied by a return to more dissonant tone production because of these imperfect vibrations. Figure 2.4 shows this process over time. Any given sound contains all stages of vibration in varying lengths. An initial impulse goes from dissonant with more overtones and dissonant intervals to consistent overtones at more consonant intervals to fewer overtones with inconsistent or dissonant intervals. Thus, In the impulse of a single sound, timbre perception shifts throughout the life of that sound. However, acoustic definitions of timbre are only able to describe timbre as overtones at a moment in time.

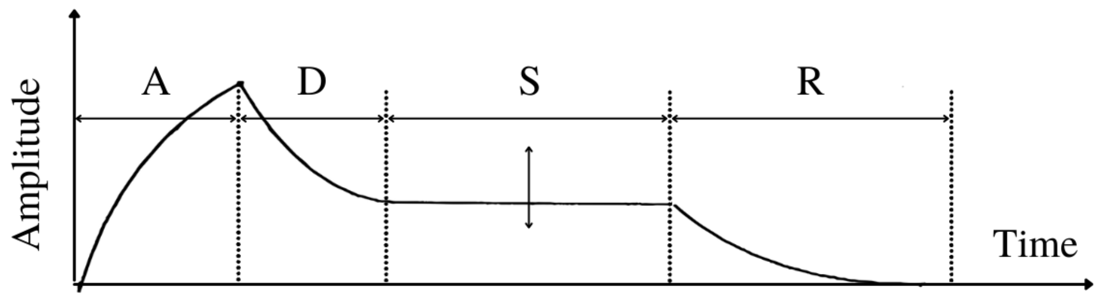


Figure 2.4. ADSR Sound Envelope

One more element must be considered in discussions regarding timbre: the interaction of sound with the environment in which it is created. As with the violin in the cathedral, any given environment might enhance parts of a sound or suck away particular overtones. Because of the effects of space sine wave only contain no overtones in theory. As soon as a sine wave is initiated in an environment, it begins to collect overtones through interactions with the acoustics of that space. Figure 2.5 contains a sine wave of 1kHz. It is generated digitally and so is a singular wave with no overtones. In Figure 2.6, that 1kHz sine wave has been played through studio-quality monitors and recorded in a sound-treated space.

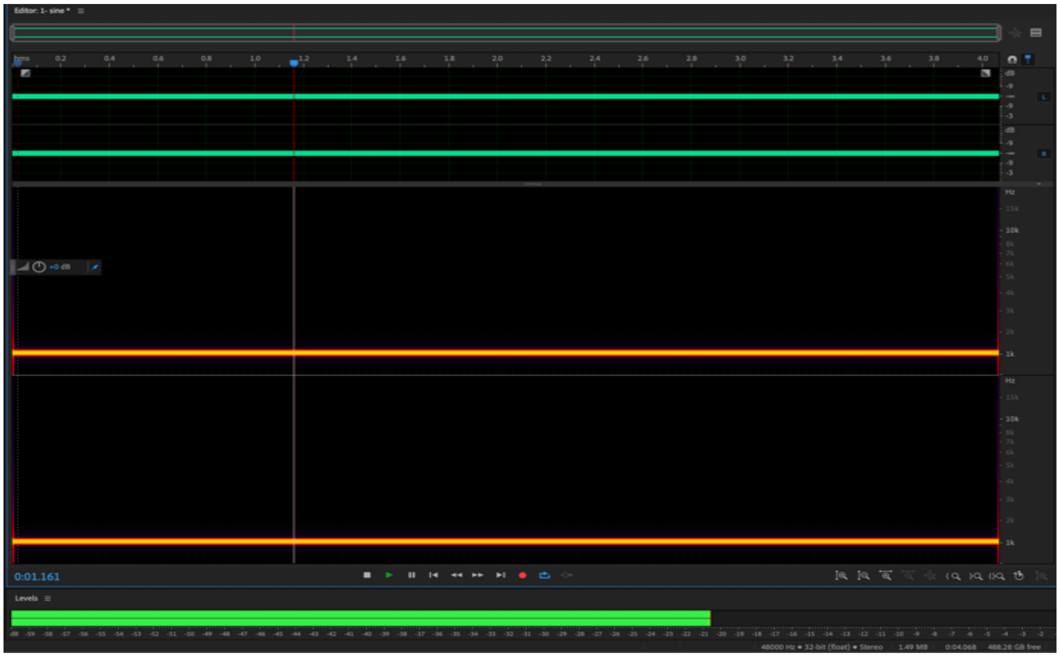


Figure 2.5. Spectrograph of a Sine Wave

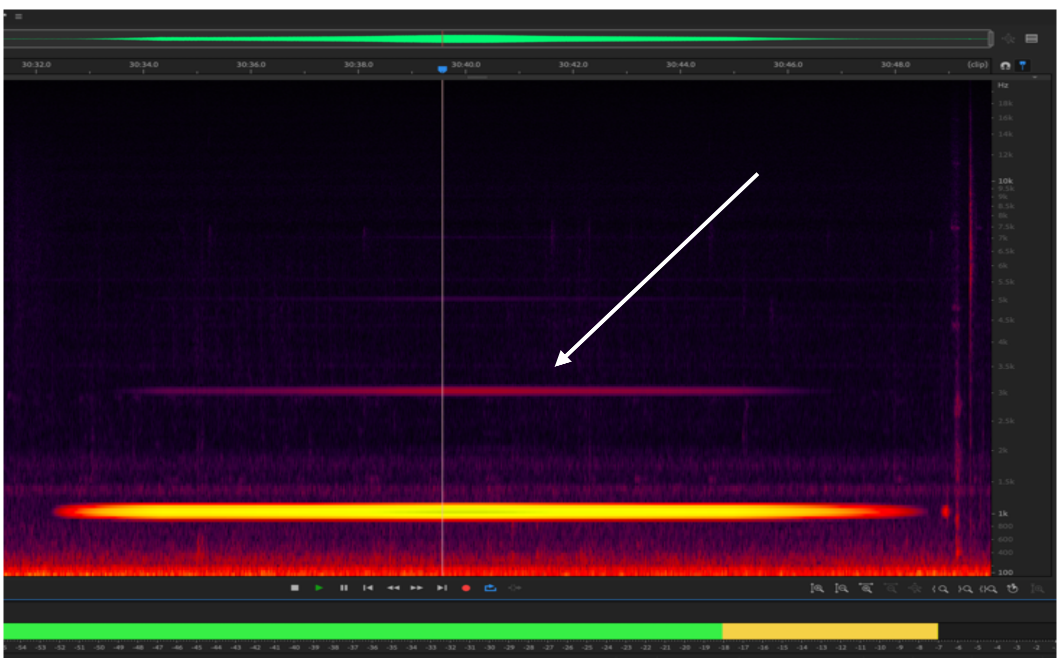


Figure 2.6. Spectrograph of a Localized Recording of a Sine Wave

The spectrograph shows the overtone equivalent to the perfect twelfth, indicated by the white arrow, prominently located at 3kHz. A close look reveals at least two other overtones that have been generated by both the stiffness of the monitor cones and the sympathetic vibrations within the recorded space. All such variables in understanding timbre as overtones make application of this concept complex.

The acoustic definition of timbre provides a concrete understanding that can be communicated and perceived. With a rudimentary understanding of acoustics, timbre can be defined by very exact and measurable parameters. However, the capture of timbre in a single moment proves to be an unsatisfying representation of the experience of timbre. The time element is extremely difficult to convey in any meaningful way. Time, however, is part of the less specific yet more comprehensive definition though the use of adjectives.

Definitions of Timbre Through Adjectives and Experience

The desire to capture a timbral experience that is constantly in evolution leads to the second way of understanding timbre: experience-based description. Adjectives can capture a comprehensive experience rather than a moment, as is accomplished by definitions in physics. Listening to “Machine Gun” by Jimi Hendrix recorded live at the Fillmore East, one is immediately filled with adjectives that fit the opening guitar timbre (Hendrix, Cox, Miles 1969-1970). It is round and warm with metallic resonance in the background. As the solo begins, it adds timbres of bite without harshness as well as feedback loops that sound clean like the sine-shaped waves of vibrating glass. However, someone who just read the above description and listened to the recording might come up with different, even contrasting adjectives.

While there have been limited studies on timbre and cognition, such studies provide assurance that even though individuals might choose different adjectives in isolation, when given a multiple-choice selection, participants usually agree on associating adjectives with timbre. A 2020 study by Harin Lee and Daniel Müllensiefen demonstrated participants' clear ability to identify heard timbres uniformly despite differences in musical training (Lee and Müllensiefen 2020). While this does not address all issues of language, it verifies that the average listener perceives timbre in an acoustically and emotionally predictable way. Zachary Wallmark et al. in the 2018 study "Embodied Listening and Timbre" expands the strength of perception. In giving the participants sound clips and asking them to rate them on a scale of least to most "noisy" or "abrasive," Wallmark found a natural ability. By monitoring the participants' brain activity while conducting the experiment, they also found correlating brain stimulation areas when hearing particular timbres (Wallmark et. al. 2018, 332).

Relating Timbre Perceptions

Auditory experiences of timbre are correlated in brain function and perception. A common use of adjectives is possible. While individual perception limits precision to some extent, integrating descriptive adjectives with acoustic definitions offers a possible road map where correlation will act as a check on misunderstanding. Figure 2.7 contains axes that are spectrums of experiential perception.

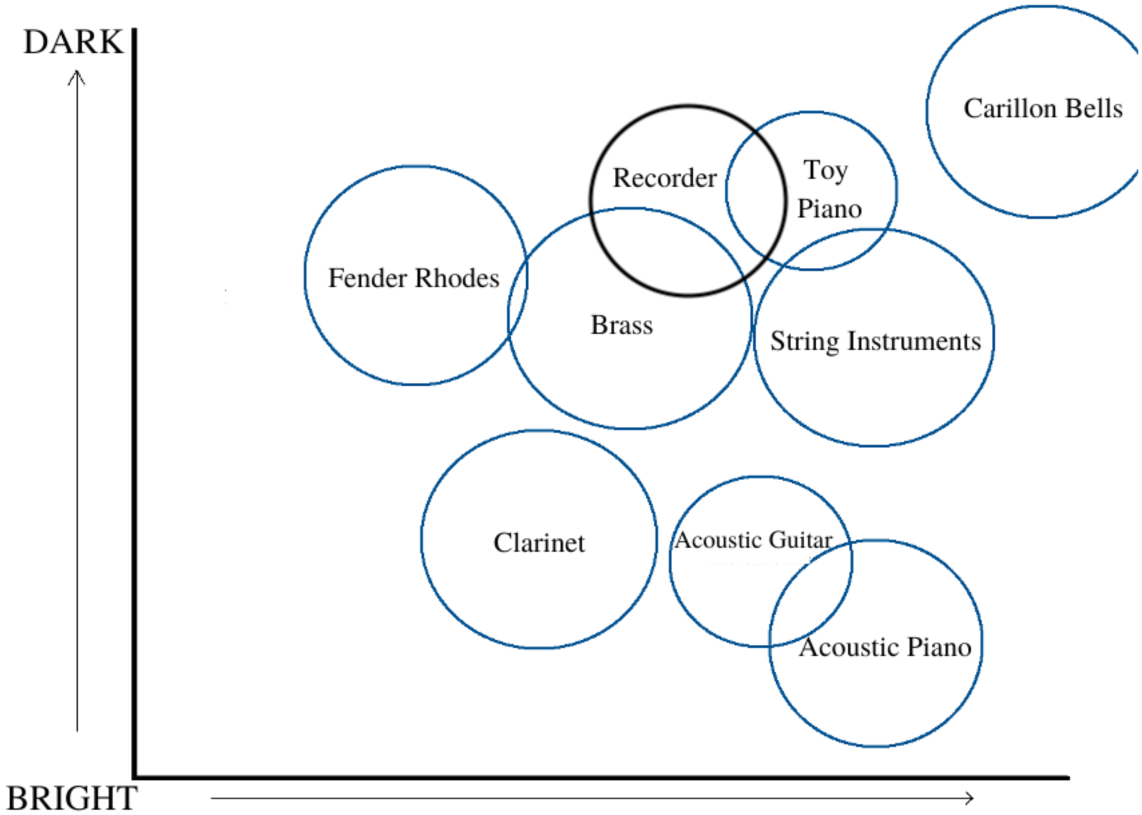


Figure 2.7. Instrument Timbres as Defined by Experiential Perception

The Y axis is represented by the spectrum “bright” to “dark.” This spectrum is meant to correlate with the elasticity of an object, ranging from perfect harmonic division to extreme deviation or noise. The X axis represents the spectrum from thin to thick and correlates to the addition of harmonics. The circles are to suggest the variety of related timbres of that sound source.

In “boomerang love,” a recorder choir begins at 4:26 throughout the outro of the song. Indistinct and emotionally flowing, there is little attention given to rhythm, pitch, or traditional performance. All of the attention is on timbre. The general placement of the recorders is close to brass as they share the conical bore which creates even and odd harmonics. The overblowing of the recorders often releases further dissonant and thick overtones. Figure 2.8 presents a correlated relationship to Figure 2.7 utilizing varying descriptors. In Figure 2.8, the axes are defined by the acoustic definition of timbre. The Y axis represents the spectrum of measurement from consonant harmonics of the overtone series to harmonic dissonance, or deviation from the overtone series. The X axis represents the spectrum of measurement from no harmonics to all harmonics at even amplitude. The plotted points are some of the most common adjectives used when describing timbre. These words are considered subjective, but by placing them in a two-dimensional space defined by the acoustics of harmonics (Figure 2.8) and associated with sound sources (instruments) (Figure 2.7), there are points of reference through which subjectivity can be checked.

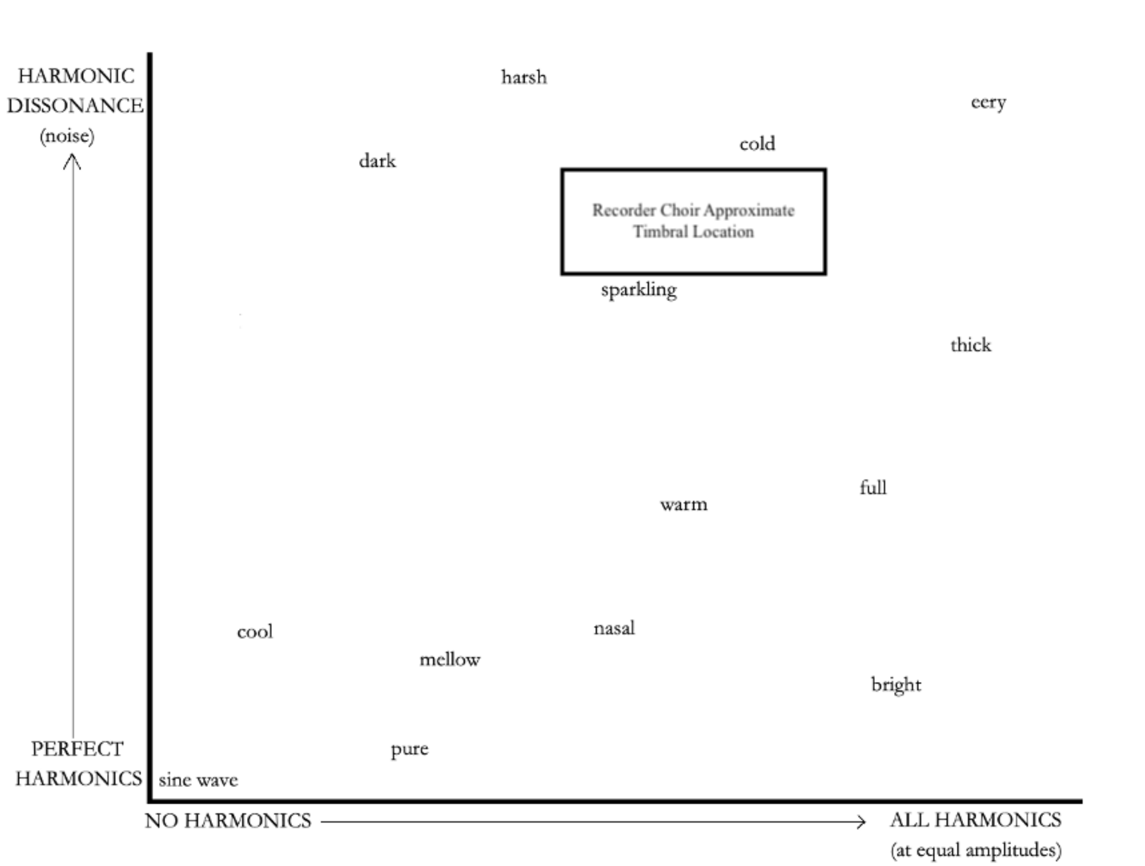


Figure 2.8. Experiential Adjectives as Defined by Acoustics

The recorder choir at the end of “boomerang love” (4:26) is placed within the harmonic spectrum in Figure 2.8 just as it was in Figure 2.7. It serves as a musical corollary fitted within each understanding of timbre. The acoustic overtones of recorders place the sounds emitted by them with adjectives that range from sparkling and harsh, to dark and cold. A sound associated with such adjectives such as a toy piano should admit similar acoustic overtones with a slightly higher degree of dissonance. At 4:42 in “boomerang love,” there is a moment in which a toy piano plays the melodic movement. In Figure 2.7, the toy piano is shown to have greater overtone complexity and dissonance than recorders do.

Timbre as an acoustically—and experientially—defined parameter of music provides a powerful tool in the analysis of commercial music recordings. It also provides a window of understanding for creators attempting to use it to convey meaning through timbre. With careful definition, the interrelation between acoustics and experiential perception can lend timbral meaning to the recorder choir of “boomerang love.” This interrelation does not suggest meaning in timbre as a development of evolution but rather as a carrier of emotion. Instead of the recorder choir being a shrill warning call—the product of evolutionary survival—it is an element of nostalgia.

Chapter Three

Considering Space in Commercial Recordings

Today, the utilization of space in commercial music recordings goes far beyond creating a coherent, realistic listening experience. Space is a vital consideration in the analysis of commercial music recordings for two reasons. First, space and timbre are inextricably linked within human perception. Second, space is utilized in commercial music recordings to create hyper-realistic or even surrealist environments. These two uses of space can be found in the accompanying recordings. As in all commercial music today, they are incorporated both through intentional choice and practical composition, just like timbre. In "for starters," the protagonist is in his living room playing a piano. As he escapes the chaos of the world by playing the piano, the song ramps up into a soaring string melody inside huge and cavernous space. The player and listener are transported into another world. These surrealist experiences embody the type of central moments of importance for which traditional tools fail to account.

Defining Space

Space, in relation to recorded audio, is created through the stereo field. In a stereo field, two speakers are placed apart from each other with the listener in front and between the two speakers. Whether it be at a concert, through earbuds at the gym, or at home through a TV, stereo imaging has become ubiquitous. Even cell phones that—for a moment—revived mono audio, are now usually equipped with a left and right speaker.

The difference in volume of a sound from the left and right speaker gives the sensation of location. When a sound is louder in the left speaker than the right, the location of the sound is perceived to be in the left part of the stereo field. When a sound has the same amplitude in each speaker, it is perceived as directly in front of the listener.

The term "spatial placement" refers to a sound object's placement within this stereo space. However, by manipulating the stereo field, commercial music recordings achieve the simulation of spaces other than the room in which the music is being played. Zagorski-Thomas, in his article titled, "The stadium in your bedroom: functional staging, authenticity and the audience-led aesthetic in record production," talks about this form of space:

> . . . a wide range of techniques can be identified as addressing this issue of scale, which range from partially realistic recreations of the spatial experience of the concert hall to highly stylised forms of staging which might be characterised as 'acoustic cartoons': representations which exaggerate or distort a single feature in order to conjure up a recognisable experience. (Zagorski-Thomas 2010, 256)

Zagorski-Thomas is talking about how a stereo field can be used to represent spaces other than the one in which the speakers are located. But more than that, the stereo field can be utilized to represent physically impossible spaces. This form of space, where a characterization of sound experience is intended rather than a realistic placement, is "spatial representation." These representations can be "acoustic cartoons"—intentionally unrealistic—or they can go far beyond to the world of surrealism.

The Spatial Field

Spatial placement within a stereo field is a two-dimensional action. However, with today's technology, a stereo system can represent objects in three-dimensional space. The concept of space as a defining element of music became the central focus of electroacoustic composers such as Pierre Schaeffer, Pierre Henry, Karl Stockhausen, Iannis Xenakis, and Edgard Varèse. In the 1950s, Schaeffer and company began utilizing multi-speaker arrays that elevated speakers and even hung them directly above the audience to create three-dimensional space (Holbrook 2019, 21). The use of these arrays were extremely effective in creating multi-dimensional sound objects. Regrettably, this process of spatial placement is not easily transferable. The average listener does not have a space nor the technical gear to recreate the spaces Schaeffer et al. designed. Not only that, music would need to be created to fit these unique speaker arrays. Instead, commercial music found ways to represent space within the soon-to-be ubiquitous stereo field.

Research into binaural perception, or how the human ear locates objects based on the anatomy of the human ear, is what has allowed for simulations of three-dimensional spatial placement through the stereo field. Binaural perception also involves the comparative processing of neurological messages coming from both cochleae. The factors of anatomy including ear shape and the existence of the human head—which works as a filter for sound—as well as the neurological processing that is involved in the localization of sound are both definable and incredibly complex (Avan et al. 2015).

Today, most Digital Audio Workstations, or DAWs, provide applications that allow spatial parameters to be manipulated based on these understandings. DAWs are programs through which analog sound that has been converted to digital sound can be easily manipulated before being returned to the analog realm. Within these programs, binaural panning has become common. With binaural panning, when a sound is moved in a stereo field, the left and right image are affected in more than just the amplitude domain. The two sound images are also being varied in equalization, delay, and other parameters. Because this panning is simulating the masking effects of the human skull and ear shape, it can even simulate sound seeming behind, above, or below the listener. When a sound is emanating from a source behind a listener, they receive mostly secondary reflections of the sounds that have bounced off of whatever is in front of the listener and then returned to their ears. The primary sound waves that are received are muffled by being absorbed by the back of the ear and head before reaching the cochleae. This is the process synthesized in binaural panning.

In the opening of “james joyce,” there are two unique drum machines playing clicky-clack sounds. Listening with a set of headphones, they begin far away and behind the listener. However, through the first three measures of the song, they diverge from one another. One drum machine comes from behind the left ear and the other from behind the right to finally reach the phantom center image as the vocal begins. Not only do these sounds appear as if they come from behind the listener, they also move from far to near. These spatial placements exemplify the power of space in today’s commercial music recordings.

Space representation has always been a variable of recording as previously demonstrated with the violin in the cathedral example described in Chapter One. Since the introduction of equalization and other filtering techniques, space has been manipulated through the affecting of timbre. At the end of “seven,” a piano plays the traditional hymn “Come Thou Fount of Every Blessing.” Comparing the timbre of the piano during this outro compared to the piano throughout the track where the vocal is present, there is a noticeable difference. The production goal of the ending hymn was to bring the listener very close, to place them in the most intimate spot—at the piano bench. To accomplish this, the equalization of the piano during “Come Thou Fount” is affected. The frequencies of 200-500Hz, essential for the feeling of presence, are raised. The higher frequencies that dissipate quickly are rolled off. This gives the feeling that the piano is right in front of the listener, much closer than any wall or other indicator of space. These are the frequencies inhabited by the vocal during the verses. The piano moves into the closer intimate space that was filled by the vocal to command the intimacy of the highly vulnerable lyrics as if to associate with it and become the lyrics.

The Causal Relationship of Space and Timbre

Spatial representation and timbre are inextricably linked in a direct causal relationship. Because of this, one perimeter cannot be altered without causing some effect on the perception of the other. When a spatial representation is manipulated, perception and acoustic experience—in the form of soundwaves—are altered. If this is true, then so is the inverse: when timbre is manipulated, the auditory perception of space is affected. Because of this causal relationship, considering timbre as a perimeter for analysis inevitably includes space.

Audio Examples 3.1 and 3.2 refer to the previous concept of the violin in the cathedral. In both examples, a violin can be heard playing Bach’s Prelude No. 1 in C major from book one of *The Well-Tempered Clavier* in a reverb capture of a Hamburg cathedral. This type of reverb is called convolution reverb in which the unique reverberant qualities of a space are captured by microphones and then processed to create an exact replica of the acoustic space. In Audio Example 3.1, the violin sounds far away at the other end of the cathedral at a great distance from the listener. In Audio Example 3.2, the violin sounds much closer, as if the listener and the violin are very close to each other in the middle of the room. The timbral difference is striking as well. Because of the movement in spatial representation, the auditory experience of timbre has been altered. Placing the violin in the context of Figure 2.7, it has moved from the “mellow” and “warm” area in the harmonic spectra in Audio Example 3.1 toward the “full” or “sparkling” direction heard in Audio Example 3.2. The overtone make up has been affected by the movement between the violin and the listener. An equalization snapshot of the note C4 on the violin is shown for each space. Figure 3.1 is of the distant violin heard in Audio Example 3.1 and Figure 3.2 is of the closer violin in Audio Example 3.2.

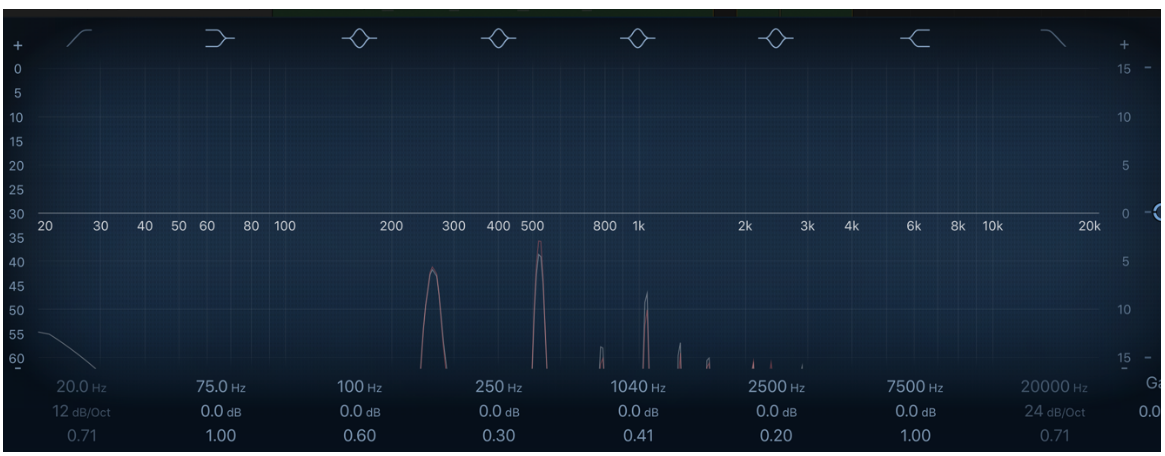


Figure 1.3. An Equalization Snapshot of a Violin Far from its Capture Source

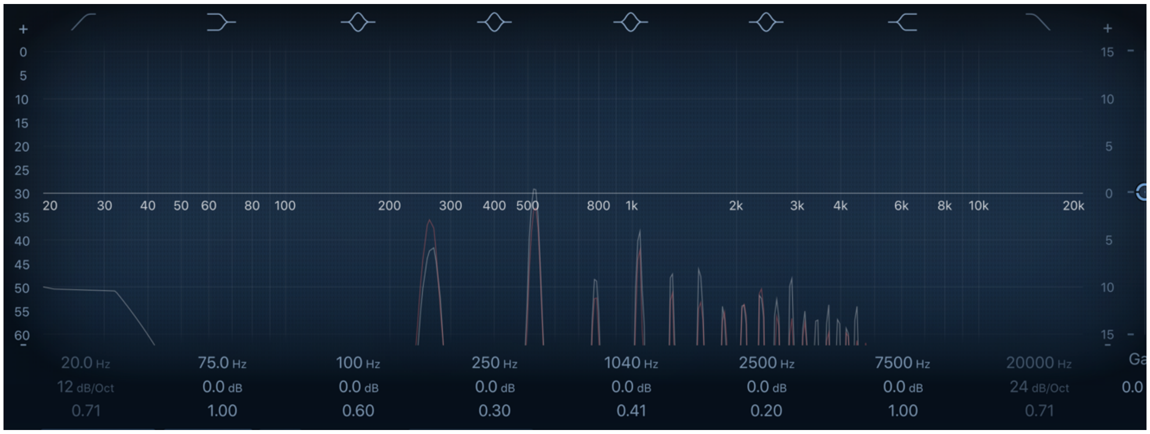


Figure 3.2. An Equalization Snapshot of a Violin Close to its Capture Source

The causal relationship between spatial representation and timbre can be seen in the harmonic make up of these two examples. Because higher frequencies have shorter sustain, they are barely perceivable or missing when listening to the violin from the other side of the hall. Figure 3.2 contains many more overtones, including those more harmonically dissonant tones that are further up the overtone series. The perception of moving from “warm” to “sparkling” is born out by these examples. Any change in the presentation of a sound object in space will result in a change in overtone perception, and thus, timbre.

In “boomerang love,” there is an intentional and striking juxtaposition between the space that the vocal and nylon guitar occupy in versus the space that the piano and synth pad—first heard as an interlude at :58 seconds—occupy. A piano has much thicker low-end resonance than a nylon acoustic guitar. However, affecting the piano and synth with long, heavy reverb makes the piano sound more simplistic in its timbre. Just like the violin in Audio Example 3.1, not all the overtones of the instrument are amplified by the synthesized reverberant space. The goal of the reverb was simply to place them far away in a dream-like atmosphere; however, this also affected the perceived timbre.

Surrealist Spatial Places

Today, commercial music recordings consistently utilize the manipulation of space to create surrealist experiences; that is, spatial experiences that defy real-world physics. Surrealism finds its definition in the fine art of the early twentieth century. The renowned visionary Salvador Dalí was central to the movement where space represented within a picture did not follow the laws of three-dimensional space or physics. Surrealist paintings demonstrate two parameters of surrealism. In Dalí's "Persistence of Memory" the physical constants of objects are reinvented. The clocks, which are solid, three-dimensional objects, are reduced to flat, almost two-dimensional mailable objects bent over corners and hanging on tree limbs. The rules of physics within an object have been defied. Surrealism also alters the physics of object relationships. In M. C. Esher's "Relativity," endless sets of stairs are arranged in orthogonal relationships to each other. Within each of these different plains of orientation, all of the objects obey the expected relationship of gravity to the steps. However, at any turn in the steps, a new center of gravity is established in contradiction to the last. Each part of the painting is natural in its behavior, but its juxtaposition leaves one not knowing which gravitation reality is relative and which absolute.

Nearly all commercial music recordings participate in both concepts of surrealism to some degree. Because parts of a recording are often recorded in different spaces and then experienced in a singular amalgamation, the recording becomes Esher's stairs—a juxtaposition of individually feasible gravitation centers placed in unfeasible relationships. The sounds that are being perceived simultaneously could not be occurring in a singular physical space. It should also be mentioned that each of these individually recorded sounds are affected by pace-altering effects such as reverb, delay, phasing etc. This is like Dalí's two-dimensional clocks, in which individual objects do not follow their naturally-expected physical limitations. In "james joyce," the drums are samples recorded in a studio in Los Angeles while the rest of the track was recorded in a small room in Nashville, TN. The drums are also affected by a gated reverb. Gated reverb is itself acoustically impossible. A gated reverb is where reverb is applied to a sound source that is then abruptly cut off after the initial attack of the sound. This gives the drums the added sonic size of a reverberant space without making them muddy or sustaining their sound. The electric guitar amp sounds as if it is inches away, yet, a vocal that sounds as if it is five to ten feet away is somehow louder. Thus, when listening to "james joyce," conflicting spaces are presented in untenable relationships. All of these different spaces and locations layered together are like Dalí's clocks hanging limply from Escher's stairs—they create a truly surrealist experience that could not be recreated within space and time without mediation through production technologies.

This juxtaposition lends an incredible amount of valuable information when performing an analysis of this music. In "for starters," this incredible juxtaposition is used to present the imagination of the lyricist. Throughout the verses, the vocal and the piano are dry and close (:00-1:15). They sound as if they are in a small intimate space. At :46 seconds, the vocalist sings "The chaos started rising, I never could think straight. But when I started playing, the interruptions went away. I guess that's why I'm still sitting here . . ." From that point (1:15), the synth underneath rises into a soaring string melody within a great hall and the protagonist plays along with the swelling of his imagination.

He is still sitting at his piano, but the surreal juxtaposition of space changes the understanding of the space the piano and the protagonist inhabit. It is at once both the intimate space first revealed and the grand concert hall of the player's imagination.

Surrealist Experiences: Listening to Soccer Mommy's "circle the drain"

The second track of Soccer Mommy's sophomore album "color theory" is one of the most spectacular demonstrations of surrealist spatial experience. While the accompanying recording project demonstrates typical uses of space in commercial music recordings, "circle the drain" reveals the full potential of space. Instead of simply presenting an acoustically impossible space, "circle the drain," creates an experience of the title words. This is executed in impeccable fashion throughout the track. The opening rhythm guitar sounds as if it is submerged underwater. Equalization supresses higher parts of the frequency spectrum and the attack of the sound is muffled and indistinct, caused by a sound compressor. As the counter line and drum machine enter, the rhythm guitar rises from the water, the equalization becomes fuller, and the panning brings the sound to the center of the image. The guitar seems to emerge from the water at the top of verse one and then quickly disappears. The short slapping reverb on Sophie Allison's vocals emulate the sound of a small, reflective, tiled bathroom. The lyrics are an obvious—although effective—repetitive emotion conveyed as "round and around and around and around." At the introduction of this lyric in the chorus, the vocals are drowned in reverb. The repeats of this refrain travel deeper underwater, muffled again with equalization and compression effects, as if getting sucked down the drain. The pivotal moment though, is reserved for the last chorus at 3:35. The chorus arrives for the first time, stripped down. A muted drum machine replaces the large live drums. The click of a cassette player's "play" button is heard and all musical element that were previously part of the chorus begin to swirl through the stereo field. Growing louder and louder, they stutter as if experiencing the speed and gravitational force of getting sucked though the drain to explode back into a full-throated chorus.

Describing this experience of surrealist sonic movement without the parameter of space would be impossible. Any analysis of "circle the drain" would fall woefully short without giving this surrealist spatial experience serious attention. Space as a parameter for analysis creates a window into commercial music recordings that, combined with timbre, presents a compelling source of analysis. If utilized, these parameters yield valuable information that cannot be found through the traditional tools of analysis.

Space, due both to its relationship with timbre and its utilization in commercial music recordings today, is an extremely useful source for analysis. The spatial field can be used to represent real spaces and realistic objects as well as physically impossible spaces and sound objects. Because of this, space has become a part of commercial music recordings, extending beyond simply affecting a sound to fully defining that sound. Throughout the accompanying recording project for this paper, space was considered as a defining element of each track and each sound. The juxtaposition of space in "boomerang love" was a conscious choice to create a paradigm between the vocalist and acoustic guitar and the childhood sounds of toy pianos and recorders. As objects of memory, the large shimmering space they inhabit is essential to their identity and their meaning within the music. The movement of space inside space in "for starters" is essential to convey the progression of the protagonist as he slips into his imagination. Listening for space in this recording project as well as in all commercial music recordings reveals not only locations of sounds, but meaning from the spaces they inhabit.

Chapter Four

Conclusions

The preceding chapters outline an argument for utilizing production as a lens for the analysis of commercial music recordings. Specifically, the parameters of timbre and space are highlighted as a means of discerning intention and meaning within this music. Timbre is essential to understanding intention in the vocals of “seven” versus those of “james joyce.” It is the engine that conveys the irony of the synth lines in “okay.” Space is the primary vehicle in “for starters” and an agent of nostalgia and interpretation in “boomerang love.” The meaning buried in the countless thousands of production choices is a treasure-trove of possible analysis that should not be ignored. Millions of commercial music recordings that were passed over as uninspired—when looked at from the traditional parameters of analysis—await, holding meaning in their unexplored music production.

First, the concept of fidelity is explored to suggest that while some recordings might attempt to avoid imbuing meaning in production, the attempt is futile. As long as the main experience of the song is through recording, meaning will be embedding into production by the mediation of sound through recording technologies. Today, most musicians have embraced this reality, utilizing production as an integral part of their music. Next, some shortcomings of traditional tools of analysis are outlined to reinforce the importance of analysis utilizing production effects.

After these introductory arguments, two central elements of production—timbre and spatial placement—are discussed. To encourage better utilization of timbre in relationship to production, I suggest correlating the two common understandings of timbre: the acoustic understanding and the adjective/experiential understanding. The combination of precision through the acoustic understanding and time inclusivity through adjectives provides a solid basis for analysis.

Next, space is examined. Space is utilized as source of imbued meaning—just like timbre—both intentionally and unintentionally as a byproduct of recording mediation. I suggest that two important manipulations of space are spatial placement itself and spatial representation. Commercial music recordings utilize placement as a way of representing sound objects within three-dimensional space. They utilize spatial representation as abstraction, juxtaposing realities within space to create beautiful, sonically-surrealist experiences that could only be presented through the mediation of recording technology.

Reflections from a Recording Project

The accompanying recording project was created simultaneously and in correlation with the concepts in this thesis. Not only does it serve as a demonstration of the concepts but also as proof of the writer's arguments in the paper. The recording project was intentionally written, produced, and mixed solely by the writer to avoid convolution of meaning embedded within the production of the music. As each step of creating a commercial music recording now includes production, a singular voice in each step best demonstrates the points within this thesis. The following are short reflections on the production of each track as it relates to the concepts of this thesis.

“for starters”

“for starters” was the last track written for this project. It was created out of the idea of encapsulating the project in a cohesive whole. It serves as an introduction to the next three recordings and is the bookend of “seven.” The drum introduction is an intentional implication of monotony. The repetitive rhythm is an overt response to this idea. However, the spatial and timbral application of this idea is the differentiation of space between the kick, high-hat, and snare. The kick is the most significantly muffled and sounds far from the listener. The snare is muffled but closer than the kick. The high-hat is bright and close, incessant and almost annoying in timbre. The snare has a very dead sound. Snare hits are often central to a production’s rhythm texture and treatment of the snare is often specific to genre. In many genres, the snare is placed on the front of the beat to give movement to a song. The snare here is uninspired, not particularly telling of genre and exactly in the pocket. In a nod to Denis Smalley, the goal of the kick’s timbre was to be reminiscent of far-away thunder: mundane yet threatening, powerful yet meaningless, dark yet distant. The brightness of the piano and the strong attack of each chord suggests some pent-up frustration. Since the emotions of the lyric are raw, the piano timbre was made to reflect the voice. This was particularly conceptualized to suggest that the piano is also the voice of the protagonist. Once the lyrics stop, the piano takes over saying the things for which the protagonist does not have words for.

“james joyce”

“james joyce” is about tossing aside the burden of expectation, especially personal expectation. The timbre of the layered synths is particularly comical or insincere. Their timbral goal is to be the voice of self-deprecation. The spatial effect of the doubled vocal panned slightly to the left and right sides of the stereo sound field was chosen to be part of the protagonist's insecurity in the words. The lyrics are a dream of abandoning expectation and also, a portrayal of self-inflicted doubt that the protagonist is already nothing. The panning of a loose double like this causes unexpected phasing dips that result in moments of amplitude loss where there were not actually performed. This is a unique way to highlight doubt in the lyrics beyond the initial vocal performance. The performance of the recorder choir at the end is both a timbre as well as a nostalgic contradiction. The timbre choice evokes something shrill and nearly anti-musical through a sound often associated with childhood. A joke on the lyrics, the recorders squeal and play in mistaken polyphony.

"okay"

"okay" is a more sincere outward-facing song than "james joyce." The song is a conversation where the protagonist is attempting to lift a friend's spirits. The timbres are thick and pounding. However, the timbral approach of nearly all of the song elements allude to something not said in the lyrics. The protagonist is attempting to convince himself of the very words he is telling the friend. This is exemplified by the thudding, slightly aggressive attack of the instruments. Again, the synth in the intro and interlude is ironic. It is reedy and comical. It is the voice of the protagonist in his doubt, even while the lyrics say with certainty that, "it's okay to be okay." In the smallest movement, the vocal is affected with a phaser on the line "paranoid in the head." This gives the vocal a shaking effect. The intent is to lean into the moment of paranoia as the protagonist thinks of the worst-case scenarios for their friend before reassuring themselves, their friend, and every listener that it is all "okay."

“boomerang love”

“boomerang love” is about the bravery of loving first and hoping that it will not be in vain. The vocal is even more raw than the mostly unaffected vocals on this project. It is recorded very close to the microphone. Every sibilance, click, and pop of the mouth is left in the recording. The only other sound object in the recording that is close and intimate is the nylon guitar which is placed in the middle of the sound field. All the other spatial representations are of large ambient objects in big spaces floating above and out of reach. Again, recorders are used, but they have moved from a childish, squealing performance in “james joyce” to an ambient dreamy atmosphere supplemented by celeste and toy piano. The recorders are nostalgic but now function in a surrealist swirling of objects—memories orbiting the protagonist like distant constellations. These sounds are thoughts and feelings that the protagonist remembers only as sonic illusions of the past.

“seven”

“seven” is about looking back into memory and finding unexpected feelings. Again, space is represented in multiple levels. The vocals are almost too close for comfort, whispering in the ear of the listener. The lyric is embarrassingly raw, something that must be said softly as if afraid it might become true in its utterance. The close recording of the vocal results in a breathy yet bass-heavy timbre. The pad under the intro and verses creates an ethereal atmosphere. It’s unique in being both expansive and close. The timbre was chosen to reflect the religious nature of the lyrics. The piano, toy piano, and celeste imperfectly synced, each lending their unique timbres to make definition difficult. Not bright, not dark, not shrill, but distinct—united in their singular melodic line. Before the song turns to a piano rendition of “Come Thou Fount,” the sub-bass begins to rumble. A phasing conflict between it and the synth creates a shaking sensation between the two instruments and the stereo phasing of the pad. This is a moment of insecurity before the secure and direct confession of the piano. Clear and present, unaffected by nuanced timbre or spatial placement, the piano now plays as if it is the voice of the protagonist. The melody of the traditional hymn is clear as the piano sings, “Streams of mercy never ceasing call for songs of loudest praise.”

Many Further Avenues of Exploration

This thesis brings about a plethora of unanswered questions and suggests numerous avenues in need of further study. In brief, a number are summarized here the hope that this argument will spark interest in developing and even challenging the ideas presented in order to build more complete theories for commercial music analysis.

The first and obvious area in need of development is in the application of analysis. This paper presents very little analysis. There is the brief analysis of “circle the drain” and there are moments of analysis drawn from the recording project. These points of analysis mostly serve to exemplify how one might apply the concepts. This is also true for most of the relevant work in this field which focuses on theory rather than application. However, the best argument for utilizing timbre and space as tools of analysis is to do so in longer form.

The second area for further investigation and development is the reworking of the ecological theory of perception. Since Denis Smalley proposed the idea of source-bonding, there has been much excellent writing on the topic. However, as noted in Chapter Two, the theory is limited in its application to the commercial music recordings of today. Rather, a theory founded in cognition, psychoacoustics or empirical study would likely find enhanced application to commercial music. Of the empirical variety there are two angles of investigation that might lead to a new theory in this field. The first would be a comparative analyses of creator intentions and their spatial-timbral choices. Since music creators now have an integral hand in the entire process of record production, comparing their stated goals for a song and spatial-timbral aspects of the song would, with a great enough quantity, lead to a theory of perception.

Another area for further investigation is cultural studies. Cultural implications have been avoided in this paper because of its limited scope. However, culture presents a fascinating possible approach to spatial-timbral perception. In this approach, songs could be studied to compare their significance and influence in society with their spatial-timbral characteristics. This would also yield a more applicable theory of perception. Its difficulty would be in limiting scope and subjectivity. Cultural studies inevitably include history, political science, anthropology, and many other interrelated humanities. While these comprehensive approaches often reveal some of the most unique and powerful concepts, they are hard to synthesize into theories because of the difficulty in testing what has been theorized. However, the power of cultural studies would be in explaining the poorly-understood differences in perception from one individual to the next. This could also yield a theory of evolution of spatial-timbral perception regarding how the acoustic phenomena arose and evolved over time.

A third area of exploration would be in the application of production parameters through time. Because music is experienced in time, measuring a parameter such as timbre or space in snapshots has limitations. Music, as a multi-dimensional experience, can be better represented in multi-dimensional arrays. Possibly the greatest shortcoming of the written medium is that it does not cater toward animated or multidimensional representations. With great skill and revision, theorists in music describe multidimensional spaces. These descriptions would be benefited by better visual representation. While there are E-journals actively working on accommodating more types of visual representation, these should become commonplace.

Lastly, a refinement of the relationship between the adjective-experience and acoustical understandings of timbre with higher specificity is needed. This could include research in music cognition and psychoacoustics. While studies in this area have been cited within this thesis, the writer is currently unaware of any large pool of empirical data in human perception of timbre and adjective associations. A wonderful application of the model would be a plug-in for utilization within a DAW. The plug-in would allow for the manipulation of a sound based on either of the two understandings presented, creating a applicable tool while reenforcing the interrelationship of the concepts.

Final Conclusions

This thesis asserts that music production is an under-explored facet of commercial music records that offers abundant opportunities for analysis. The accompanying recording project was created to exemplify that concept. However, even if it was not created for that purpose, each choice would say something about the music, its meaning, and its effect on the listener. Like much commercial music today, most of the harmonic, melodic, and even rhythmic choices within the recording project are rather mundane. While analyzing these parameters might bring about some meaningful analysis, production is where the most compelling analysis will be found. After sixty years of analytical consideration, it is high-time that production moves to the forefront of the analytical toolbox when considering commercial music recordings.

Appendix

Chord Charts

for starters

track no. 1


29
F7
Fm7
I guess that's why I'm still__ sit-ting here...
33
C
37
piano
strings in octaves
F
G
41
Am
G
45
F
C/E
49
G
Dm/F
C/E
53
Dm9
Em/G


57
F9
C
61
piano
F9
C5
65
69

james joyce

track no. 2


CHORUS
27 Am D dead strokes Am D
how would it be if I could be no-thing no-thing at all and I'd ne
31 G C Am
- er have to won-der if I missed it all I could go james joyce yeah the pe-
34 D G C
ople would re-joyce at the gas-ping in-spir-a-tion of a wast-ed life oh
37 Am D G C
I could be no-thing I could be no-thing no- thing oh
41 Am D G C second time to bridge...
I could be no-thing oh I could be no-thing no thing
synth: JX-3P
45 G C G C
VERSE 2
49 G C G C
tooth and nail it's not the lot-te-ry I'm
53 G C Am D7
bet-ting all of the odds on a bro-ken slot ma- chine


57 G C G C
deal-ers_ choice guess I___ got_ yours_ I
61 G Am D
start-ed_ strong but I won't_ last long would you take it back from me__ but
BRIDGE
65 G synth: JX-3P C G C
69 Am D G C
I could be no-thing some days_ don't you wan-na be no-thing too_
73 Am D G C
I could be no-thing some days_ don't you wan-na be no-thing too_
CHORUS
77 Am D G
I could be no-thing no - thing at all__ and you'd ne - ver have to won-der if I
80 C Am D
missed it all I could go___ james joyce_yeah the peo-ple would re-joice at the gasp
83 G C Am D
- ing in-spir-a-tion of a wast-ed life oh I___could be no-thing I__


87 G C Am D
__could be no-thing oh I____could be no-thing I__
91 G C Am drum fill...
__could be no-thing no- thing________ I____could be no-thing I__
95 D C Am D
_ could be no-thing no- thing_ oh__ I____could be no-thing I__
OUTRO
99 G C drums out Am recorder choir D
__could be__ no-thing no thing________
drums back, sparse
103 G C Am D
107 G C Am D
111 G C Am D
115 G C C/B Am

okay

track no. 3


♩ = 260
CHORUS
29
D
G
talk it o - ver
33
D
G
o - ver talk ing a - gain
37
G/F♯
D
G
and a gain
we'll go man - ic
41
D
G
fight it out 'til the bi -
45
G/F♯
rall.
A
♩ = 130
Am
ter
end
we'll talk it
synth: EP Polymoog
49
G
INTERLUDE
Bm
Em
o - ver a - gain
53
D
VERSE 2
G
Bm
Em
D
type cast since a kid
try-na break the mold
58
G
Bm
Em
D
D
you've been play-ing sav - ior a - gain
but you could just be you


62 G Bm Am D
you said that gray is re-ally in now but your not o-ver it
66 G Bm Am D G
we can laugh off this di-sas-ter then we'll do it a-gain it's o-
71 Bm Am D G
-kay it's o - kay its o - kay its
75 Bm Am D G
o - kay it's o - kay it's o-kay
79 Bm Em accel. D
to be o - kay
83 ♩ = 260 CHORUS D
87 G D
talk it o - ver
91 G G/F♯ D
o-ver talk - ing a - gain and a - gain


95 G D
we'll go man - ic
99 G G/F♯ D
fight it out 'til the bi - ter end
103 G D
talk it o - ver we're
107 G G/F♯ D
o - ver talk - ing a - gain and a - gain
111 G D
we'll go man - ic
115 G G/F♯ rall.
fight it out 'til the bi - ter end
♩ = 130
118 A Am
we'll talk it o - ver a - gain

boomerang love

track no. 4


INTERLUDE
piano and wurlitzer
29 C/G D/A
33 C/G
VERSE 1
D/A
It's com-in' on fast
37 C/G
oh so slow
41 D/A
one min-ute your cruis
45 C/G
- ing
then your out of con- trol
49 D/A
we rode all o - ver town
53 C/G
I tagged a - long I did - n't be-long but you took
57 D/A
me like a bro- ther
we lived in a sand


61 C/G
__ box back - yard ba - bies dreams__ gone cra - zy we played
65 D/A
__ pre - tend woah__
INTERLUDE
69 C/G
piano and wurlitzer
D/A
73 C/G
VERSE 3
D/A
I walked out in__
77 C/G
__ the rain for - got__ his
81 D/A
num-ber these things un - rav-
85 C/G
- el your brain_ can I give
89 D/A
__ it a - way walk - in'__
93 C/G
__ high - way__ west way__ I don't know_ why you wan-na be__


97 D/A
me
see-in' a ghost of
last week's cour-i-er
INTERLUDE
101 C/G
piano and wurlitzer
D/A
post
CHORUS
105 C/G
D/A
Em
boom - e- rang
109 G C
love
no-thing wast
113 Am Em
-ed and no-thing lost
boom - e-rang
117 G C
love
you can try
121 Am Em
but you can't out run so take it
125 G C
like a sponge
just boom-e-rang
OUTRO
129 D C/G
piano and wurlitzer
boom-e-rang love


simile
133
D/A
C/G
toy piano and celeste
137
D/A
C/G
piano and wurlitzer
141
D/A
C/G
glockenspiel and celeste
145
D/A
C/G
149
crotale
D/A
recorder choir
C/G
153
D/A
C/G

seven

track no. 5


29
C
C/B
Am7
G(add4)
F
__ me__ I've tried half-a-do-ven__ times__ still__ no__ re - ply
piano
33
very expressive with rubato
p
37
41
45

Recordings

Track 1: for starters

Track 2: james joyce

Track 3: okay

Track 4: boomerang love

Track 5: seven

Sound Examples

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