# AN INTERDISCIPLINARY ANALYSIS OF POPULAR MUSIC GENRES IN THE RECORDING STUDIO AND BILLBOARD CHARTS

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## ABSTRACT

How do music production techniques play a role in establishing popular music genres? My research illustrates how genres exhibit distinctive sounds and audio production qualities. My findings are based on two case studies: (1) a case study concerning a band known as The Sweet Boys; and (2) a case study involving genre classification in the Western music industry using the Billboard charts. In the Sweet Boys case study, I present evidence of the interconnectedness between genre classification, sociology, music theory, and audio production. In the Billboard case study, I highlight that the use of music information retrieval systems (MIRs) leads to artist saturation, blurred genre boundaries, and the reproduction of gender inequities. I conclude with interviews from professionals working with MIRs. Interviewees support the need to improve genre-based MIRs with the addition of audio features that successfully convey distinct sonic aesthetics of audio production techniques used in Western popular music.

## PREFACE

The paper, *Lethbridge Lament - Exploring musical genres through experiential learning in the studio*, was written and virtually presented with Amandine Pras at the Audio Engineering Society International Conference on Audio Education on July 24th, 2021. My work presented in Chapter 3: Case Study #1: The Sweet Boys contributed to corresponding sections of this paper which is available online[1].

[1] Link to *Lethbridge Lament - Exploring musical genres through experiential learning in the studio* via the Audio Engineering Society Journal: https://www.aes.org/e-lib/browse.cfm?elib=21221.

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# CHAPTER 1: INTRODUCTION

## 1.1 SIGNIFICANCE

My thesis examines the connections between sociology, music theory, audio production techniques and popular musical genre corpora used in the Western music industry. My findings aim to help increase the reliability of algorithms in genre-based Music Information Retrieval systems (MIRs), and they also highlight the gender and race-based inequities that are still prevalent within the Western music industry. First, while audio production techniques are rarely accounted for in MIRs, I have observed that they are considered in what I refer to as Manual Auditory Classification systems (MACs). These systems have been developed and implemented by radio broadcasters and other music industry professionals to categorize musical pieces into genres and subgenres. Throughout this thesis, I argue that MACs' approaches in relation to audio production techniques should be intergraded into MIRs. The Sweet Boys case study identifies aspects from the fields of sociology, music theory analysis, and audio production techniques in the recording studio and their connections to genre classification. My Billboard case study outlines the limitations of relying on genre-based MIRs to create popular music datasets. I also interviewed three professionals who work with MIRs as cultural intermediaries between the popular music industry and the consumers. These interviews provided insights into how genre-based MIRs are developed and used in streaming platforms. They also supported the findings of both of my case studies and the need to add audio production techniques in MIR to improve genre-based classification systems.

My research has significance both economically and scholastically in the fields of computer science, the sociology of music, audio engineering, and music business in terms of future developments in online streaming platforms. MIRs computerized genre classification

algorithms have become intertwined into our daily routines through various music streaming platforms like Spotify, Deezer, Apple Music, and Google Play. As these types of companies continue to develop and grow, the economic benefits of research on this topic are immeasurable. My research fills gaps in MIRs scholarship and the industry by helping to reveal the degree to which audio production techniques can improve genre classification systems' reliability. Adding audio production techniques to genre classification will also be invaluable to the field of audio engineering. Indeed, technical recording and production decisions made in the studio determine the overall sonic aesthetic of a song, but they have received scant attention in both musical genre classification and production literature relating to genre (Schreiber, 2015; Strum, 2012; Thompson, 2019; Wilmering et al., 2020). Therefore, this thesis outlines the interconnections between audio engineering practices and popular music genre classification. To begin this process, I designed a multidisciplinary theoretical framework based on the literature review of three areas: the sociology of music, popular music corpora and datasets, and audio production techniques. For the sociology of music area, I specifically focused on musical genres and cultural intermediaries in the Western music industry. The second area, popular music corpora and datasets, concentrates on the classification of music genres to inform my analysis of the Billboard charts. The last area, which applies to my Sweet Boys case study, outlines audio professionals' experiential knowledge relating to the audio production choices that they make in the recording studio to meet different stylistic goals. My multidisciplinary framework is used in my Sweet Boys and Billboard case studies to observe cultural intermediaries, analyze music genre classifications, and reveal the use of audio production techniques in the Western music industry.

Second, I highlight gender and race-based inequities within the Billboard charts. Popular music datasets, like the Billboard charts, track consumer consumption information to determine

the most popular songs within the music industry. Among others, these charts dictate what does or does not get played on certain radio stations; they inform companies of artists' and producers' awards; and they create a capsule of society's popular tastes at any given time. My second case study questions the feedback loop produced by such datasets. Specifically, I designed Billboard6:2019, a popular music corpus spanning from 2015 to 2018 that consists of six hundred and three songs from the genres of Pop, Rock, Rap/Hip-Hop, Country, Dance/Electronic, and Latin Billboard charts, to analyze the overlaps between the genre charts caused by song and artist saturation. There is a gender disparity that is prevalent throughout the Western music industry that is reflected in the Billboard charts with only 2% of the music producers between 2012 and 2017 identifying as women (Smith et al., 2018). Movements within the music industry in the 1990s and early 2000s, which focused on the 'rise of women' and racial inclusion, were not reflected with women or Black artists' success in the Billboard charts (Lafrance et al., 2017). This article also found that "black male artists have more chart success than both black and white female artists." (Lafrance et al., 2017, p. 522). These studies draw connections to how factors outside of the music industry, like the social or political climate, can affect popular music charts. In this way, the gender and race disparities within the Western music industry are reflective of issues and changes within a society. These issues are also evident in education institutions. For example, the majority of the participants were white men, including the band members and their videographer, even though all of the students who participated in the Sweet Boys residency were women and gender non-conforming people. The exclusion of women and gender non-conforming people was also evident in my Billboard case study which analyzed the distribution of genders found within the Billboard6:2019 corpus. The case study also highlights blurred genre boundaries and definitions as well as the competitive nature between popular music charts. Women MIR professionals are also underrepresented within the industry.

## 1.2 THESIS OVERVIEW

This thesis is structured as follows: Chapter 2 contains a literature review and the theoretical framework used in my research, which draw upon three areas: sociology of music, a review of popular music corpora and datasets, and audio production techniques. The sociology of music section focuses on the music industry as a field, the role of its cultural intermediaries, the position of music genres, and a preliminary exploration of digital sociology related to streaming music services. This section presents the theoretical framework which informs both of my case studies rooted in the music industry, musical genres, cultural intermediaries, and gender disparities. The second section provides a brief history of corpora and a survey of genre-based MIRs corpora and datasets. The third and final section contains a concise history of audio production in the recording studio, with an overview of the techniques currently used by audio professionals, and a focused exploration of the interconnection between the use of dynamic range compressors and musical genres' sonic aesthetics. The information gathered in the literature review chapters and my theoretical framework form the foundations of my case studies, in Chapter 3 and 4, respectively. Chapter 3 reports on my first case study that was carried out with an ethnographic approach during a studio residency with genre-eclectic American band The Sweet Boys at the University of Lethbridge in Fall 2018. Through observations and interviews, this study revealed how audio professionals' and artists' production choices in the recording studio are connected to musical genres. Chapter 4 presents my second case study based on the design and analyses of the Billboard:2019 corpus, which lays the groundwork for a new popular music dataset that has the potential to overcome the limitations of datasets currently use by MIRs professionals to conduct their research. Chapter 5 summarizes my research findings illustrated by quotes from interviews that I conducted with three industry professionals involved in the design

of MIR systems. These interviews offered insights into the current music streaming industry detailing how playlists are populated by MIRs but are still maintained manually, the importance of correctly organized data, i.e.: songs by genre, and the process of how such MIRs algorithms are updated. Finally, I present how future advancements in MIRs, like the inclusion of audio production techniques, could improve consumers' listening experiences on streaming services and therefore benefiting the music industry economically.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 INTRODUCTION

This chapter provides an overview of the concepts that intersect musical genre classification literatures through an interdisciplinary framework. The literature review is divided into three main areas: sociology of music; popular music corpora and datasets; and audio production techniques. The first main area focused on is the sociology of music and draws upon concepts within cultural sociology and digital sociology. The second main area titled popular music corpus analysis includes two parts: a discussion about advancements in relevant musical corpus analysis studies and a survey of corpora, also called datasets, used in genre-based music information retrieval research. Lastly, the audio production techniques section outlines the recording studio process including microphone technology, and the postproduction (mixing and mastering) process including the common use of effects such as reverberation, delay, panning, equalization, and dynamic range compression, which all impact the perception of genres and subgenres. These areas are critically applied to my two case studies. The sociology of music section is applied to both the Sweet Boys and Billboard6:2019 case studies. It also informed my concluding interviews with industry professionals. My Billboard6:2019 case study directly correlates with the second section on popular music corpora. The third section, audio production techniques, is essential to my analysis in the Sweet Boys case study and future research in genre classification in MACs and MIRs.

## 2.2 SOCIOLOGY OF MUSIC

### 2.2.1 MUSIC INDUSTRY AS A FIELD

Recently, music producer and scholar Paul Thompson (2019) has applied Pierre Bourdieu's theories of cultural production and concepts of fields, capital, and habitus to examine the commercial recording studio as a domain or field "where records are produced, outputted, considered, validated or rejected" (Thompson, 2019, p. 92). A field is a cultural space consisting of various positions (groups, organizations, and persons) that are in conflict with one another over limited economic, social, cultural, and symbolic capital (Bourdieu, 1993 [1983]). Economic capital refers to financial standing and is determined through your combination of wealth, income, and debt (Bourdieu, 2011 [1986]). In the Western music industry, corporations and individuals valued at millions of dollars have the highest economical capital. Social capital is based on one's connectedness to others with the more people in higher positions you know the more social capital you have (Bourdieu, 2011 [1986]). In the music industry the higher positions can be related to a person's celebrity status. Bourdieu details three ways that cultural capital is displayed: cultural capital is embodied, objectified, and institutionalized. Embodied cultural capital is a "form of long-lasting dispositions of the mind and body." (Bourdieu, 2011 [1986], p. 82). Cultural capital in the objectified state manifests as cultural or physical goods like books, pictures, machines, etc. (Bourdieu, 2011 [1986]). The key markers of cultural capital in capitalist societies includes your housing, clothing, and car ownership. Social capital can be dependent on one's institutionalized cultural capital, the expertise they have in their field or 'what they know' (Bourdieu, 2011 [1986]). The last form of capital, symbolic, includes the representations of recognition, honor, or prestige through promotions or certifications (Bourdieu, 1993 [1983]). Economic, cultural, social, and symbolic capital are not evenly distributed within society. The

habitus is a system of dispositions created by the summation of one's capital and changes as one navigates the world (Bourdieu, 2009 [1984]). Your habitus shapes your position within a field and how you interact with others within it (Bourdieu, 2009 [1984]).

Thompson's book focuses on popular music industries in the United Kingdom and the United States of America. As a result, the symbolic rules that he describes do not necessarily translate to popular music industries outside of North America, despite how interconnected music industries are by the globalization of internet access to streaming platforms. Today, the global popular music industry is controlled by multinational institutions such as GAFA (Google, Apple, Facebook, and Amazon) and the three major record labels, specifically Universal, Sony, and Warner. However, the cultural landscape of the global music industry is riddled with different social, geographical, political, and technological considerations. For example, because Malian engineers struggle to access advanced audio education, the music of Malian internationally-touring artists are mixed and mastered abroad, facing the risk of these artists losing their authenticity "as foreign mixing engineers are not aware of the meanings and traditions of Malian music practices." (Pras et al., 2019, p. 9). This divide between Malian engineers expressing their unique music culture and the prevalence of Western audio production practices on the global market showcases that the globalization of the music industry is not yet equally reflected in digital audio culture (Pras et al., 2019). There is thus a need to study the ethnomusicology of the recording studio to better understand global digital audio culture (Pras et al., 2019).

My aim is not to study the global music industry in its entirety but to create a foundational framework for research in Western popular music that considers the nature of musical genres. One of the goals of my research is to contribute to an analysis of the role audio professionals'

have in creating musical genres, including their technical audio production choices in a specific production context, in order to reinforce the importance of their roles within the music industry.

### 2.2.2 CULTURAL INTERMEDIARIES IN BORN'S MEDIATION THEORY

The music industry is a field which consists of collectives of people and organizations working together to create products for distribution to consumers. People occupy various positions within the field and associated with these positions within the field are various roles or expected behaviors. These roles exist within what Georgina Born refers to as the "four planes of social mediation" (Born, 2011, p. 376). The first plane is comprised of roles in music production consisting of artists, studio professionals, touring crew, the executive team, etc. The second corresponds to the artists' projected audience and it is made up of social groups surrounding the band members including family, friends, and fans. The third plane consist of the artist's audience demographics like culture, community, gender, and age. Lastly, the fourth plane consists of the institutions that influence the music industry such as the integration of telecommunications, i.e., radio broadcasting, television, printed and online media (blogs), social media like YouTube, and music streaming platforms. Each plane functions with the others as a cohesive unit focusing individually on "musical practice and experience" or "social and institutional conditions" (Born, 2011, p. 378). The first two planes provide a framework for my Sweet Boys case study and the last two planes for my Billboard case study. In the Sweet Boys case study, the first plane includes the band, their videographer, and their producer while the students make up the second plane. Within my Billboard case study, the third plane is reflected in the data collected from popular music listeners, while the fourth plane is the Billboard chart itself, which is an influential institution of Western popular music (and which is central in allocating symbolic and economic forms of capital).

### 2.2.3 THE ROLE OF CULTURAL INTERMEDIARIES IN THE FIELD

The first plane of Born's Mediation Theory consists of people who occupy various roles within the music production process, such as cultural intermediaries. Cultural intermediaries play an important role within cultural fields (such as mainstream popular music) and have varying degrees of influence corresponding to their position and habitus, based on their summated capital (Thompson, 2019). Cultural intermediaries in the popular music industry connect the recording studio, by controlling the actions during recording and postproduction, and the consumers. This domain is included in the Western music industry field, and it accounts for cultural intermediaries as social groups who "understand, utilize, and subsequently alter the domain of commercial popular music" (Thompson, 2019, p. 91). These cultural intermediaries encompass studio professionals who include but are not limited to music producers; audio engineers; art and repertoire personnel of record companies; concert curators; artistic directors; film scoring composers; arrangers; lyricists; music educators; and music critics and journalists.

Thompson contextualizes Bourdieu's cultural theories within the Western music industry field by acknowledging audio professionals' "knowledge of popular song and an extensive array of musical styles, each with their own symbol system and rules" (Thompson, 2019, p. 71). The recording industry is newer compared to other industries, which causes entrance into the field to be primarily based on connections, shared values, and experiential knowledge rather than being based on knowledge and qualifications (Thompson, 2019, p. 94). Therefore, the cultural intermediaries with the highest social and cultural capital have the highest influence in the industry. Thompson argues that "the domain of record production also holds some of the symbolic rules, traditions and practices of the related domain of musical performance" (Thompson, 2019, p. 71). Consequently, cultural intermediaries who know the rules, traditions

and practices of music performance also acquire and maintain symbolic capital. The collapse and demands of the music industry today have caused one audio professional to occupy multiple positions within the field such as audio engineer, producer, mastering engineer, manager, composer, and performer, thus resulting in constantly shifting roles and expectations within the music industry field (Wilmering et al., 2020).

I examine recording engineers, producers, and industry professionals who develop and maintain MIRs algorithms on streaming platforms as cultural intermediaries between the artists and their future audience and/or audience respectively (Hennion, 1989). In this view, I aim to understand the inherent knowledge and choices made by these cultural intermediaries during the production and postproduction processes; and I further investigate how their knowledge and choices influence musical genre aesthetics.

### 2.2.4 GENRES WITHIN THE MUSIC INDUSTRY

Cultural sociology explains the roles of 'meaning-making' interactions, symbolic forms, and organized productions within a society (Spyllman, 2020). According to Schmutz, "there is agreement among members of a society in the ways they recognize and classify genres" (Schmutz, 2005). Studies in sociology have "generated systems of sociocultural classification for a diverse set of phenomena, including forms of organization, religious belief, fashion, gender, sexuality, art, race, and societies at large" (Lena & Peterson, 2008, p. 697). These studied sociocultural groups use rules and conventions as 'systematic codes' to communicate meaning within a specific field (Swidler, 1986). The communication of such codes apply to the sociology of music as these groups share commonalities that go beyond the produced musical content; e.g. punk is not just a musical genre, it is also a style and an identity (Holt, 2007) (Born, 2011). These codes create genre-based social groups and subcultures, which are distinguished by the

similarities and differences between other subcultures (Hebdige, 2003). The codes of commonalities within subcultures and the differences between them convey a social groups' place within a larger cultural field (Hebdige, 2003). For example, newcomers to the field may use different forms of economic, social, and cultural capital to challenge dominant systematic codes in the music industry. This is clearly illustrated in the lyrics of '*Girl in a Country Song'* by Maddie & Tae where they critique country music's treatment of women within the genre, thus providing a satirical commentary on cultural conventions within the genre. There is thus a need to integrate more of the first and second planes of Born's Mediation Theory as genre forming factors into classification systems.

The work of Jennifer Lena (2008; 2012) theorizes how communities create genres within the music industry through her 'AgSIT' lifecycle model, which all genres travel through in whole or in part. The model is a basis for most twentieth century popular music genres in the United States. Each musical genre occupies a position within the Western music industry field and can change over time. Lena's model consists of the following categories: Avant-garde (Ag), Scene-based (S), Industry-based (I), and Traditionalist (T) (Lena, 2012). The Avant-garde category is "formed when music practitioners come together and share their concerns over the state of music in their field" and have "no more than a dozen active participants" (Lena, 2012, p. 27). Lena provides Iggy and Stooges as an example of early Avant-garde punk music. Scene-based music emerges from the Avant-garde once the genre has gained a "moderately sized group…including artists, fans, scene-focused record companies [independent labels], and supporting small business' people." (Lena, 2012, p. 33). People develop shared habits, values and behaviours which are informed by and create different subcultures surrounding various genres, such as Omnia's 'Pagan folk' aesthetic. Music existing within the larger corporate arena are considered

to exist within the industry-based category. Genres in the Industry category can be identified by their airplay on 'Top 40' radio stations. Therefore, all six of the current Billboard genre charts are considered by Lena to be at the industry-based point in their 'AgSIT' lifecycle. The genres that have gone 'mainstream' or consist of artists that are considered 'sell-outs', move fans to wanting "a version of what the music was like in its Scene-based period" (Lena, 2012, p. 47). The last category in Lena's 'AgSIT' lifecycle model is Traditional. The music within this category have been completely integrated into society over the course of many generations and can be commonly known as folk songs, holiday carols, etc. Musical genres in this category are most likely to have academic papers published with the intent to preserve their authenticity, such as Western classical music.

### 2.2.5 DIGITAL SOCOLOGY AND ONLINE INEQUALITIES IN THE MUSIC INDUSTRY

The digital era has created an ongoing transitional phase that is shifting the music industry's traditional business model to more independent productions and internet-based music sharing (Pras et al., 2013). Thus, music has crept into consumers' everyday lives through an increase of what artists previously considered to be lesser forms of income like advertisement, film score contracts, and the large-scale availability of music through online platforms (Arditi, 2017). Given that music is now primarily consumed through internet-based music sharing and streaming services, it is imperative to examine how online platforms are also involved in the social reproduction of various forms of inequality. In the chapter *Black Cyberfeminism* from *Digital Sociologies (2016*), Tressie Cottom's discussion of digital sociology focuses on how offline inequalities and stereotypes are reinforced and perpetuated through digital media online. With the advent of social media, a new equal rights battle of the twenty-first century has begun

between users and computer algorithms. Two ways that Cottom explores the roots of this battle is through *algorithmic stratification* and *classification situations*. Cottom defines algorithmic stratification as "differently access[ed] to and returns from digitally mediated interactions…" (Cottom, 2016, p. 1-2). This means that two people can use the same search engine and same search phrase, but get different results based on the search engines algorithmic filters. These filters help users to navigate information on social media platforms and are based on the platforms' tagging systems which can cause algorithmic stratification. Algorithmic stratification occurs within streaming platforms, like Spotify, when companies collect information about consumers usage with the aim to give them tailored results. This means that when two users type the same word into their Spotify account's search bar, the results will vary between them. For example, the word 'supernatural' searched using the 'Songs' filter for one user will populate results related to artists and playlists they have listened to that have a song titled *'Supernatural'*. For one user, these results start with AlunaGeorge, Ruby Waters, Upchurch, and Trippie Redd. The other user's first results will be: Trippie Redd, Kesha, Børns, and Ken Ashcorp with the sixth result begin AlunaGeorge. In both instances some artists were not included in the person's results at all. Such results of algorithmic stratification demonstrate just one of the ways that streaming platforms gather and store information about their consumers.

Classification situations are defined as "the way institutions systematically 'sort and slot people into new types of categories with different economic rewards or punishments attached to them'" (Cottom, 2016, p. 14). This system of classification can be expanded to include all categorizable aspects of a person. What one is presented with is based on the information that is digitally collected about them and other users. This is demonstrated in Airoldi, Beraldo, & Gandini's article (2016) which discusses how comsumers' choices directly influences YouTube's

algorithms. This can occur in streaming platforms when the music industry promotes certain tags that match those used for current popular music. For example, the blending and blurring of musical genre boundaries over time, along with artists connecting via the internet, have helped to create subgenres like Pop Country (Huron, 2013). As such, Pop or Country music listeners will start to get Pop Country-trending artist and song results in their algorithmic playlists like Florida Georgia Line or '*One Thing Right'* by Marshmello and Kane Brown. Also, genre specific mashups and covers will be recommended to consumers based on their tastes along with the original artist. An example of this was seen in 2019 with *'Old Town Road'* by Lil Nas X featuring Billy Ray Cyrus and every genre's reedition imaginable was recommended to consumers based on their specific tastes. Obviously, such results mean that a few hand-picked artists are spread to the largest audience possible, whether or not the consumer was getting their desired recommendations. As well, streaming platforms algorithms collect and use listeners' personal data, listening habits, location, and their specific listening data such as the duration a song is played, replayed, or skipped (Spotify, 2020; Spotify 2019). Within online streaming platforms, classification situations can refer to how music information retrieval systems collect and analyze consumers' information in order to filter, slot, and sort people's tastes into different musical genres. This data is also reported externally to third party companies like Billboard and Apple Music (Spotify, 2019). Consumers who then log onto affiliated platforms, by signing in with their Google or Facebook account, will be presented with repeated music from their Spotify to other internet-based services. Thus, the platforms music recommendations for a specific individual are based on this individual's unique demographic and other identifying information.

Globally collected data from streaming platforms used to create the Billboard charts are incorporated into Apple Music and radio stations that promote what is considered 'the most

popular' music (Billboard, 2019). The copious amount of data collected is used by various cultural intermediaries to meet their own music selection needs, such as radio disc jockeys who pick songs to play on air. Commercial radio stations use these charts to stay 'on trend' with what is happening in the industry. In this way, charts like Billboard's create a taste information bias, even if inadvertently, of what the audience perceives to be the 'hottest' popular music. These songs with above average play rate data are filtered into 'trending' playlists on streaming platforms. Platforms' consumer listening data is then fed into other affiliated companies' charts. The resulting feedback loop generates an echo chamber of taste bias in popular music.

Another instance in which computerized algorithms have less than desirable results are when they reproduce problematic offline inequalities at a rapid rate creating oppressive stereotyping. Noble's book, *Algorithms of Oppression* (2018), explores technological redlining or "the power of algorithms in the age of neoliberalism and the ways those digital decisions reinforce oppressive social relationships and enact new modes of racial profiling" by gender, race, and sexuality (Noble, 2018, p. 1). Similarly, streotypes within society and popular music are refelcted and prepetuated in the Billboard charts. Relating to the popular music industry, similar racial and gender disparities have been perpetuated as seen in studies focused on analysing artist's success (Dowd & Blyler, 2002; Dowd et al., 2005; Lafrance et al., 2017).

In this thesis, I explore the problematic feedback loops of the Billboard charts and industry accolades in a society where there are disparities of class, race, and/or gender, among other inequities. The algorithmic digitization of music in streaming platforms has provided consumers with the ability to create infinitely customizable categories. On Spotify these categories are called playlists. This has impacted how we listen to music as more than "a discreet activity" and a pursuit to "organize and collect the music" we consume (Arditi, 2017, p. 628). It

has also allowed consumers and cultural intermediaries, more than ever before, to transform not only the music industry by increasing their control over the way they share and classify music genres popular music (Born & Haworth, 2017). These concepts are foundational to my research due to the nature of MIRs in streaming platforms and the popular music industry's use of the Billboard charts.

## 2.3 THEORETICAL FRAMEWORK

I designed a multidisciplinary theoretical framework based on the literature review of three areas: the sociology of music, popular music corpora and datasets, and audio production techniques. My research surrounding audio production techniques used in the genre-based classification of Western popular music provides insights and expansions of feminist Bourdieusian models like Born's. My theoretical framework draws upon Bourdieu's field theory including considerations provided Lena, Born, Thompson, Cottom, and Noble. My studies apply theories about cultural intermediaries and genre, online music distribution, and gender to address specific limitations in Bourdieu's field theory when it is applied to the music industry.

### 2.3.1 BOURDIEU'S THEORIES AND THE MUSIC INDUSTRY

Bourdieu's field theory is discussed in his translated book *The Field of Cultural Production*. This thesis examines the Western popular music industry as a field. The industry includes a range of genres from Western Classical music to electroacoustic. It also encompasses the Western popular music industry with genres like Pop and Rock. In this way, my work applies Bourdieu's principles of hierarchization to better understand musical genres within the music industry field. The Western popular music industry is characterized by large-scale production for 'mass' audiences, where the struggle is mainly over economic capital (Bourdieu, 1993 [1983]). His autonomous hierarchical principle consists of producers creating restricted 'elite' cultural

products within the restricted field of music production. Within this region of the field, musical genres occupying various positions struggle over economic and symbolic capital while also traveling through Lena's 'AgSIT' genre lifecycle theory. These concepts position my case studies within the Western music industry, in relation to musical genres. In my thesis, the Western Classical music genre is considered autonomous within the wider Western music industry field similar to Bourdieu's consecrated Avant-garde. The opposite being found in bohemian Avant-garde genres, like electroacoustic and other genres in the Avant-garde phase, which reject the pursuit of economic and symbolic capital within the field. These distinguished genre-based field positions inform my case study on The Sweet Boys as I examine how musical genres, both popular and 'unpopular', influenced their audio production choices. Using Lena's music genres' lifecycle theory, I focus on her avant-garde classification as it pertains to The Sweet Boys', an American genre-eclectic band that offers an example of an avant-garde musical group. Thompson's concepts also added to my analysis of The Sweet Boys' use of audio production techniques choices to meet their genre aesthetics and mood goals. My second case study critically examines the Billboard Charts which are considered a leading authority on Western popular music, therefore align with Lena's institutional area within the 'AgSIT' model.

With the advent of digital music distribution and online streaming platforms, the Western music industry landscape changed (Pras et al., 2013). The traditional Bourdieusian model still holds true in many regards, as discussed above, but can be expanded to reflect these changes by scholars such as Born. Working within the Western music industry field are various cultural intermediaries whose roles include but are not limited to music producers; audio engineers; concert curators; artistic directors; film scoring composers; arrangers; music educators; music critics; and music journalists. Many of these roles are held by an individual cultural intermediary

and they may occupy many positions within the field. In this way, studying the positioning of a cultural intermediary's blurred roles in the field can be difficult. Therefore, it has become increasingly crucial to distinguish in what capacity one is observing cultural intermediaries in the Western music industry. Born's Mediation Theory expands Bourdieu's model by situating cultural intermediaries along four social planes (Born, 2011). An individual's role fits into one of the planes while their summed capital, or habitus, and taste defines their cultural intermediary position within the field. Born's Mediation Theory, along with Bourdieu's concepts, help to explain professional roles as observed in the Western music industry field. By including these planes in my theoretical model, I can clearly define the roles and positions I analyzed throughout my research. The first two planes of Born's Mediation Theory inform my Sweet Boys case study. The audio professionals surrounding the band and their projected audience of the band (their fanbase) which consist of audience demographics, consumers of popular music, and the institutions that influence the popular music industry. Dr. Amandine Pras was The Sweet Boys' producer and also a professor at the University of Lethbridge. She therefore occupied two different positions within a Bourdieusian field model of the Western music industry, i.e., recording producer and university professor. As well, Pras's two positions are situated in the first and fourth planes. Her position as recording producer during The Sweet Boys' studio residency at the University of Lethbridge is situated in the first plane, focusing on those involved in the production of music. However, her academic position was examined within the fourth plane as postsecondary music programs play an institutional role in music industry. For example, universities make studio residencies possible outside of commercial systems. Born's Mediation Theory also involves Bourdieu's concept of taste, as her second plane consists of people who are considered 'fans' of an artist by continually choosing to support their work through attending shows, buying their most recent productions, or following them on social media. This plane is

connected to my work on the Billboard charts, which rank popular music artists based on such examples of fan support. As well, Cottom's work in digital sociology provided a framework for my Billboard case study by highlighting how bias found within the Western popular music industry is reflected in MIR researcher's datasets.

This expanded framework provides an enhanced lens with which I interpret my data. The cultural intermediary roles examined in my research demonstrate how Lena's 'AgSIT' lifecycle model and Born's Mediation Theory planes relate to field, habitus, and taste within the current music industry.

### 2.3.2 GENDER IN THE MUSIC INDUSTRY

Critiques of Thompson's work note that the music industry is not "gender blind" and that women are still being denied "opportunities to gain knowledge and experience" (Wolfe, 2019, p. 13). Other scholars, like Schmutz and Miller, recognize and bridge the gap in literature revolving around gender, fields, and popular music (Schmutz et al., 2018; Miller, 2016). They highlight the current industry's problematic gender stereotypes that "present continuing challenges for women's full inclusion in the popular music field" (Faupel & Schmutz, 2011, p. 15). Scholars who have analyzed the Billboard charts find that women and racial minority groups have short term success during "long periods of high concentration and low diversity occasionally ruptured by short periods of low concentration and high diversity" compared to men (Dowd et al., 2005, p. 10; Dowd & Blyler, 2002). Such gender issues can be traced back to the 1940s as women entered the mainstream music industry as beauties in glittering gowns with popular Big Bands backing their vocals and 'sister' groups, in part filling war time labour shortages (Dowd et al., 2005). Since, women have navigated the field by dominating the fringe genres to achieve success in the Western music industry. In this way, the Western popular music industry incorporates

subcultures into the mainstream while also being influenced by the society that surrounds it (Lena & Peterson, 2008). As such, women were cast in limited roles through 'girl groups', the 'folk revival', as 'glamour queens', and within punk and new wave scenes alongside the growing popularity of Rock music, dominated mainly by men (Dowd et al., 2005). Women and Black artists in 1960s and 1970s rose to mainstream success due to social justice, advocacy, and civil rights movements (Dowd & Blyler, 2002; Dowd et al., 2005). The advent of MUCH Television (MTV) added another layer of marginalization with artists profiting from the objectification of women by "conforming to stereotypical portrayals – and sometimes subverting them – Madonna, Pat Benatar, Cyndi Lauper, and Janet Jackson" (Dowd et al., 2005, p. 25). Part of MTV's success in the late 1980s and 1990s can be connected with growth of underground feminist, 'riot grrrl', and lesbian communities (Whiteley, 1997). In contrast, the early years of MTV content featured very few videos featuring Black artists and music, focusing on their target audience of mainly White, Rock listeners (Dowd & Blyler, 2002). This contributed to the marginalization of Black artists and Black musical genres like R&B and Hip-Hop. In 1949, Billboard began to chart the jukebox plays and sales of R&B music through two separate charts that were later merged and renamed in the 1990s due to the budding success of Hip-Hop singles and tracks (Lafrance et al., 2017). The chart has since been updated to include new charting technology, but continues to negatively perpetuate genre stereotypes related to gender, as well as race, which correlates with Noble's research on oppression algorithms and society (Billboard, 2013; Noble, 2018). This separation of Black music has mostly hindered their mainstream success and generally included more White than Black artists on the weekly charts (Molanphy, 2014; Lafrance et al., 2017).

Other minority charts, like the '*Hot Latin 100*', face similar segregation issues as the inclusion Billboard charts are not always reflective of racial equality within the Western music

industry. In the post-millennium era, it has become clear "that a more complete understanding of the intricate workings of genre is needed if we hope to be able to make meaningful sense of the relationship between race and Billboard chart success" (Lafrance et al., 2017, p. 536). Linking race and gender reveals more about these disparities within the Billboard charts than analysing them separately. For example, Lafrance, Scheibling, and Burns (2017) examined the frequency of gender and race of hits across sales and airplay on Billboard charts. They determined that "black and white males dominated all females by a narrower margin on the sales charts than they did on the airplay charts; and second, all females did better on the sales charts than they did on the airplay charts" (Lafrance et al., 2017, p. 534).

Gender issues are also prevalent in the Western music industry through various cultural intermediary roles like popular music critics and producers. In the article *Gender and Critical Evaluation in Popular Music*, the authors outlined the gender bias that occurs in musical critiques by conducting a detailed analysis of fifty-three critical reviews on Taylor Swift's original album *1989* and its cover by Ryan Adams (Schmutz et. al., 2018). Their findings revealed that critics focused more on Swift's gender and sexuality relating to popular music aesthetics. In contrast, critics intellectually described Ryan Adam's version as more emotional and authentic (Schmutz et. al., 2018). A similar gender bias occurs in the audio production domain, where an analysis of 300 Billboard charting songs consisting of six hundred fifty-one producers showed "a full 95.7% or two hundred eighty-seven did not feature a single female producer" from 2012 to 2017 (Smith et al., 2018, p. 8). On a smaller scale, Diana Miller investigated Toronto's heavy metal and folk music scenes and reported that "field and habitus sustain each other" and are as "Bourdieu theorized…textured by gender." (Miller, 2016, p. 350). Such findings inform my research

surrounding popular music and account for the obstacles that past and current music industry professionals are faced with.

Corpora and datasets of popular music, which are primarily based on economic success and symbolic distinctions (e.g., awards), present researchers with many challenges and digitally reproduce bias through limited or unrepresented genders, ethnic groups, genre diversity, and other marginalized groups working in the Western music industry. This is because classification systems set symbolic boundaries that differentiate the elite from the rest and are interconnected with social boundaries and cultures (Schmutz, 2009; Bourdieu, 2009 [1984]). Vaughn Schmutz concludes that while "musical hierarchies shift, social boundaries based on gender are reproduced" with men receiving more media attention than women within the music industry field (Schmutz, 2009, p. 299).

Such reproductions of gendered bias are found in the Billboard's *Top 5* of 2018 with solo lead singers having a 2:1 ratio of women versus men (Olivet, 2019). In 2018, we could observe a decrease of women being represented with fifteen songs out of forty singers, compared to seventeen songs out of forty in 2017 (Olivet, 2018; Olivet, 2019). Women, as soloists, in duets with other women, or with men as singing partners, accounted for 28.8% of charting artists within the top five in 2018 (Olivet, 2019). This type of gender bias as well as other social biases are found in musical award presentations such as the *Grammy Awards* (Grammys), *Juno Awards* (Junos), and *iHeartRadio's Much Music Video Awards* knowns as the MMVAs (Watson, 2019; Owens, 2020; Junos, 2020; Goulart, 2019). Within the Grammys, from 2013 to 2020 women were nominated at a rate 42% for 'Best New Artist', but only 7.6% of the nominees were women for 'Album of the Year' (Watson, 2019). The gap only widened further for awards aimed at audio professionals averaging only 2.3% women nominated for 'Producer of the Year' from 2013 to

2020 (Watson, 2019). There is also racism within the music industry with "black artists getting shut out at the Grammys [and] that the top honors historically elude them" (Owens, 2020). Most Black artists win Grammys in categories that are considered to be 'Black music', such as Rap or R&B with artists like Ray Charles winning a 'general field' award posthumously in 2005 (Owens, 2020). Change is happening slowly, as for the first time in 2018 there were not any white men nominated for 'Album of the Year' at the 60th *Grammy Awards* (Owens, 2020). In the following year, statistical analyses show that there were more women were nominees and winners in other 'general field' categories as well. There is also a disparity of genre presentation within these award academies. Most of the awards 'general field' categories are controlled by the Pop genre with genres like Rock and Latin highlighted by their own award categories if a category for them exists at all. There are instances when an artist from an outlying genre does win a more general category, but these artists are usually considered 'classic powerhouses' like Queens of the Stone Age or The Rolling Stones, due to the band's age and spotlight singles on radio stations (Owens, 2020). These trends within award presentations that claim to recognize the best in the industry realistically provide a very skewed view.

In Canada, the most predominant award presentations are the Junos, the MMVAs and the *Polaris Awards*. Results from these award presentations show similar trends to those of their United States counter parts. Overall, categories that are dominated by women are social image-based, such as 'Artist For Change' or 'Fan Favorite' awards (Junos, 2020). Women are still greatly outnumbered by men in audio production award categories. Though Indigenous artists are still underrepresented a few 'general field' awards have been given to A Tribe Called Red since their breakthrough in 2014, most recently winning 'Group of the Year' in 2018 (Junos, 2020). The Junos present awards for various genres creating a less dense saturation of the industry's

most popular genres, but there is lack of diversity with the same genre ‘powerhouses’ of more established artists continually dominating each year.

My research remains cognisant of such gender, race, and genre diversity challenges when creating and analysis the Billboard6:2019 corpus, addressing these issues in the study’s methodology and results sections. For my thesis, such gender inequality poses a challenge for industry professionals and researchers when working with a popular music corpus such as the Billboard charts. My Billboard6:2019 case study examines the artist saturation and gender distribution revealing imbalanced representation of artists that ‘dominate the chart’ while also reflecting a gender disparity that is prevalent throughout the Western music industry. This inequality is also prevalent when I was searching for women and nonbinary persons to interview.

## 2.4 POPULAR MUSIC CORPUS AND DATASET ANALYSIS

### 2.4.1 A BRIEF HISTORY OF CORPORA AND DATASETS

The use of a music corpus or dataset as a means of analyzing large groups of musical audio recordings or musical symbolic representations is relatively new. A dataset is defined as "a collection of separate sets of information that is treated as a single unit by a computer" (Cambridge University Press, 2021). Prior to computerized classification systems, like MIRs requiring datasets, researchers used notated scores and listened to recorded collections of music to analyze corpora using MACs.

Early corpus studies, due to limited computerized technology, focused on the formation and analysis of music corpora, not musical datasets. There are no documented studies prior to the twentieth century that used this form of research data until Knud Jeppesen's work in 1927, *The Style of Palestrina and the Dissonance* (Temperley & VanHandel, 2013). It is one of the first true examples of corpus-based research presenting a compilation of contrapuntal features in Palestrina's music with published observations and results. In the following decades, various other studies based on corpus work were published focusing on topics in musicology, music theory, and musical composition. These studies include works by Helen Budge (1943), Allen McHose (1947), Joseph E. Youngblood (1958), and Joel E. Cohen (1962) (Temperley & VanHandel, 2013). Published research using modern musical corpora can be traced back to Leonard B. Meyer's works in 1956 and 1967 (Temperley & VanHandel, 2013). His works suggested that "listener's musical experiences and responses - in particular, their expectations are shaped by statistical regularities in the music that they hear." (Temperley & VanHandel, 2013, p. 1). Similar works have also served as a sounding board for various research fields including studies on music perception and listeners' expectation. Today, such research has expanded into

corpora studies and user recommendation systems. These studies provide a historical framework for my research surrounding the corpora and datasets available to MIRs industry professionals as well as my own corpus analysis of the Billboard charts. The focus of my Billboard6:209 case study is a popular music corpus, with future possibilities to be used as a computerized MIRs dataset.

There is no standard methodology in place for corpus creation because the computerized categorization of music corpora into datasets is relatively new. As such, there is a "lack of descriptions of the methodology used, i.e. how the corpus was actually annotated, or of the concepts annotated, i.e. what is actually described, presents problems with respect to the sustainability, usability, and sharing of corpora." (Peeters & Fort, 2012, p. 1). Their research aims to prevent corpus study newcomers from repeating the failings of pervious research while providing what has somewhat become standard methodologies for corpus or dataset creation through their observations in other academic publications. The two most common methodologies used for corpus creation are objective oriented or repurposed appropriation. The objective oriented methodology is used when musical corpora are created to meet the specific research and/or categorization objective(s) of a study. Examples of this methodology are found in studies conducted by Bertin-Mahieux, Ellis, Whitman, and Lamere (2011); London, Polak, and Jacoby (2017); Weiß, Mauch, Dixon, and Müller (2019); and Tzanetakis and Cook (2002). Generally, studies that have used this type of methodology are not so concerned with the formed corpora or dataset's content because the questions explored are focused more on the results after an analysis is performed. Individuals, research labs, and companies like Isophonics, SALAMI 3, and Billboard use unstandardized methodologies without solid creation requirements for each corpus or dataset's needs. As well, the methodologies used do not need to be thoroughly documented outside of a peer-reviewed academic setting. The reuse of a musical corpora and datasets is

common practice in categorization research, such as genre classification. Within and outside of academia, corpora and datasets can be cross-referenced and filtered to meet the creators' objectives resulting in a new corpus or dataset that is repurposed and appropriated. An example of this is a website that presents a list of the greatest love songs, a corpus, using embedded Spotify or YouTube music playlists or datasets. By contrast, academia's use of the repurposed and appropriated methodology ranges from having unique research objectives to the recreation or analysis of previous studies conducted by Hendrik Schreiber (2015), Mitchell Ohriner (2017), Trevor De Clercq and David Temperley (2011), and Yasunori Nishina (2017). When the same corpora or datasets were analysed by researchers, factors like the repetition or saturation of artists and genres revealed the potential of unintentionally skewed results in the previous studies (Strum, 2012). Such studies with saturations or repetitions usually also have unspecified methodological processes. Others outline their methodology more clearly, complete a deep corpus analysis, and/or acknowledge these factors as limitations that can skew their results (Bertin-Mahieux et al., 2011). These studies are focused on producing results that provide proof of larger theoretical concepts such as the studies by Costa, Oliveira, and Silla Jr. (2016); and Tzanetakis and Cook (2002). These studies are examples of when the results were more relevant to the study than having balanced corpus data. Having a clear creation, analysis, and labeling methodology for the musical data used to compile a corpus or dataset is critical to the validity of a study's results. Also, it ensures the longevity and integrity of the corpus' data for future replications. As such, my Billboard case study consists of thoroughly documenting the way Billboard charts are created and my own methodology used to repurpose the Billboard charts to create a corpus. The resulting song and artist saturation in my Billboard6:2019 case study support issues surrounding Western popular music's blurred genre boundaries. My balance popular music corpus could be used by

researchers to conduct future genre-based MIRs algorithmic research like the addition of audio production techniques.

Some musical corpora or datasets are composed of symbol-based music files such scores, spectrograms, or other visual representations. The audio files within a corpus are considered the 'raw' data as termed by Peeters and Forts (2012). After a review of past corpus and dataset analysis studies, the authors inferred that very few MIR research studies have used solely 'raw' data, preferring to include detailed metadata instead. This approach occurred in the past due to unreasonable data file sizes, copyright laws on digital file sharing, and complications due to corpus updates like audio samples' time alignment for reproducibility (Peeters & Fort, 2012). As such, previous MIR research has been focused on the summarization, visualization, hypothesis testing, and discovery-based analyses on topics surrounding tonal scales, melodic structures, harmony, and computerized tool kits (Balen et al., 2015). This does not mean that recent studies have not utilized audio files in their analyses, but instead combine using symbolic musical files and extensive metadata with short samples of musical audio files.

Today, 'raw' data can be assembled without having cumbersome file sizes or file sharing copyright issues by referencing each audio file in the corpus or dataset by publication barcodes as used by MusicBrainz, EchoNest, or Amazon (Peeters & Fort, 2012). This allows samples to be passed easily from researcher to researcher and longer audio files to be procured properly by each researcher only when needed. Using unchanging codes for the 'raw' data as a corpus 'tag' makes it possible for the corpus to be reassembled, thus creating repeatable and expandable results in future studies. Previous MIR research has consisted of solely symbolic musical files. With the turn of the 21st century, implementing this tagging system has been made possible because of information made readily available by the internet. The use of universal identification tags has

allowed MIRs researchers to expand their studies into new areas within the field of modern popular music. It has helped authenticate popular music corpora and datasets by documenting the tags of "exactly the music people listen to or buy, with artistic interpretation and professional sound production" (Peeters & Fort, 2012, p. 4). Their recommendations for corpus organization, including tagging, are incorporated into the Billboard6:2019 corpus to increase its reusability for future researchers.

Over the last twenty years, research studies using modern popular music corpora have analytically addressed countless parameters. Initially, analysis in MIRs followed those of established fields in musicology and music theory, with research objectives focused on "digital representation of pitch, both as low-level audio features and symbolic chord structures" in studies such as Eleanor Selfridge-Field's in 1997 and Meinard Müller's in 2007 (Ohriner, 2017, p. 154). More precisely, research in popular music analyses addressing pitch, melody, and harmony were first documented by De Clercq and Temperley (2011); Burgoyne, Wild, and Fujinaga (2013); and Quinn and White (2015) (Ohriner, 2017). This trend has extended to current literature in MIR corpus studies including traditional musicological analyses using terms related to musical transcription, rhythm, form, and compositional styles/trends as documented by Bertin-Mahieux, Ellis, Whitman, and Lamere (2011); London, Polak, and Jacoby (2017); and Weiß, Mauch, Dixon, and Müller (2019). Since the music industry's upheaval due to online music distribution, like streaming platform services, MIRs research has evolved to include the fields like the sociology of music. This area has paved the way for refined dataset classifications on topics such as genre, mood, timeline compilations, and user-based recommendations outlined in studied by Xu, Zheng, Cai, Min, Gao, Zhu, Xie, and Wong (2018); and Tzanetakis and Cook (2002). As the industry is continuing to rapidly evolve, MIRs research objectives surrounding popular music

must be expanded past traditional music theory and social considerations. The field of audio production is not yet commercially applied to corpus analysis using MIRs. My research aims to fully capture what would be needed in a dataset not only for musicological and sociological studies, but also audio production analysis. The repeated song and artist data in my Billboard6:209 corpus analysis supports issues surrounding Western popular music's blurred genre boundaries which may be related to the lack of audio production techniques used in MIRs algorithms.

### 2.4.2 A BRIEF SURVEY OF GENRE-BASED MIRS CORPORA AND DATASETS

The goal of this brief survey is to identify common genre-based corpora and datasets to determine the requirements a popular music dataset needs to train genre-based MIRs with audio production techniques. Existing studies that do not include Western popular music have insights about the methodologies used when building and analysing musical corpora and datasets such as those made by CompMusic, Universitat Pompeu Fabra, and European Research Council (2014); London, Polak, and Jacoby (2017); and Kroher, Díaz-Báñez, Mora, and Gómez (2016).

During my research, I reviewed a total of twenty-two articles, websites, and blogs and found that the Western popular music genre-based training dataset options available to researchers is very limited. However, I was able to compile an overview of twelve commonly used genre-based corpora and datasets that directly influenced the creation of the Billboard6:2019 corpus documented in Annex Five. I have summarized my findings with a table titled *A Brief Survey of Applicable Corpora* in Annex One. The table consists of the corpus or dataset's name, an overview of its data, the year it was created, and subsequent years each was updated. It also highlights the studies associated with each corpus or dataset. As well, the table notes individual achievements and limitations in relation to the field of MIRs and music corpora research. Lastly,

I included a summary of why, how, or why not each can be used in further training and research in MIRs to detect audio production techniques.

Having short clips works well for studies which focused on rapid recognition using trained computerized genre classification systems. As such, the Hook! Game Corpus (Balen et al., 2015), the GTZAN dataset (Tzanetakis & Cook, 2002), and GTZAN 2.0 dataset (Strum, 2012) all have audio files less than 45 seconds in length. Sadly, these files are too short for audio researchers to properly analyse which type(s) of audio production techniques are present. Therefore, for 'raw' audio data in a corpus to be used for audio production technique identification it must consist of adequate sample lengths for both gerne-based MACs and MIRs analysis. This will ensure that the data can be used to accurately develop corresponding MIRs audio feature vectors, the computed graphical representations of analyzed identification aspects, i.e., a thin timbre or rhythmic beat in x, y configuration usually over a variable like time. Popular music corpora 'raw' audio data can use record label ID codes to avoid copyright issues while ensuring that results are based on the same audio that consumers have reported listening to regularly. It will also be the same data that can be cross-referenced with the Billboard charts as discussed previously. This consumer reporting and audio matching is made possible by using streaming platforms that statistically track the number of times a song has been played (as seen on Spotify, YouTube, and Apple Music). Using this method of labeling the 'raw' data will ensure that the corpus or dataset can consistently be reproduced once it is published. The Hooked! Game GTZAN dataset use short clips of 'raw' data formatted in mono (Tzanetakis & Cook, 2002). Since most music today is distributed in stereo, stereo 'raw' audio data has become a requirement for datasets to be as close to the end-user's experience as possible. Due to the Hooked! Game and GTZAN dataset's limitations, they cannot not be used to create audio production feature vectors but could be used in future beta testing research. In this way, the Hook! Game Corpus study

confirmed the need for the newly developed MIRs to employ second-order feature vectors to help examine trends in datasets used for genre classifications (Balen et al., 2015).

Studies not focused on Western popular music still offer unique and valuable methodology, dataset management, and analysis insights, i.e., the Style Evolution of Western Classical Music dataset (Weiß et al., 2019); the African Music Database abbreviated to AMD (Nzegwu, 1999); UbuWeb Electronic Music Corpus (Collins, 2015); and the RWC Music Dataset (Japan's AIST & Real World Computing Partnership, 2012). The Style Evolution of Western Classical Music dataset consists only of classical music due to the research objectives being rooted in the evolution of Western classical composers' musical choices over three-hundred-year timeframe (Weiß et al., 2019). However, the study confirmed that feature extractions helped researchers gain insights that were not based on existing musical theory analyses. This is encouraging because it supports the current unknown potential of extracting audio production technique features in Western popular music. The African Music Database does not have Western popular music, but it does help define the type of recording criteria (e.g.: live or studio) used for the Billboard6:2019 dataset and open discussion to future studies for audio production feature vector development (Costa et al., 2016).

The UbuWeb Electronic Music Corpus' symbolic data testing provided methodological information despite lacking popular music data. The gaps and trends in the data revealed the corpus to be more of a historic 'art' electronic focused corpus (Collins, 2015). When Collins revisited this corpus in 2018, he found more current data and published more of his corpus creation methodology (Collins et al., 2018). His methodology informed the creation of the Billboard6:2019 corpus discussed in Chapter 4. In both studies, Collins was able to successfully demonstrate the "possibilities and challenges of [computerized] annotated music analysis" using electronic music (Collins, 2015, p. 122). To varying degrees, aspects of electronic music are

incorporated into most 21st century Western popular music during the composition, instrumentation, mixing, or mastering processes. The RWC Music Dataset was built for a study in popular Japanese music, so it features mostly Eastern musical data (Japan's AIST & Real World Computing Partnership, 2012). Sorting through the dataset for Western music highlighted the need for a corpus to have enough 'raw' data to make viable claims. In contrast, the Million Song Dataset (MSD) boasts having copious amount of 'raw' Western popular music data. Consequently, it has been proven by other studies that more data does not always mean better data. Studies using the MSD genre tags note the standard 'Pop-Rock' tag, reveals that the 'Pop-Rock' genre dominates over 50% of the whole dataset (Balen et al., 2015; Schreiber, 2015; Fink, 2013). Therefore, genre-based training datasets must have a substantial amount of data for each genre. Schreiber's work to improve the MSD's genre annotations led to the beaTunes Genre Dataset (BGD) and the Last.fm Genre Dataset (LFMGD) after extensive tag comparisons and conversions. Both datasets were created from the MSD and therefore have the same dataset issues as the MSD, like imbalanced genre categories. These corpora, along with the GTZAN and RWC Music Dataset, demonstrate the importance of analyzing the training and larger testing data. In the future, it would be interesting to run either the BGD or LFMGD through a MIRs with audio production technique feature vectors to see if the tagged 'Pop-Rock' genre can be separated into distinct Pop and Rock categories. The same would be possible with the R&B/Hip-Hop genre from *A Corpus-Assisted Study of Outkast's "Mainstream"*, which compares Rap flows (Ohriner, 2017). Larger MIRs experiments with audio production technique feature vectors can be conducted to create better specificity with Western popular music genres. For example, the ISMIR2004 dataset's existing genre tags match most of the genres defined by the Billboard charts with a few additions. Similarly, the Latin Music Database (LMD) can be used for the Latin

genre tag (Costa et al., 2016). Both datasets were used in a recent study successfully exploring MIRs with convolutional neural network programming (Costa et al, 2016).

Conducting a research study focused on Western popular music eliminated corpora and datasets that were not outdated by advancements in technology. Digital sales, steaming platforms, and other online media, i.e., like YouTube, are used to track popular music today (Nishina, 2017). Therefore, methodologies which predate these advances are lacking current popular music trends. Such is the case with the Music Audio Benchmark Dataset (Homburg et al., 2005); Rolling Stone 500 (De Clercq & Temperley, 2011); and the RS 5x20 (De Clercq & Temperley, 2011) datasets. The Music Audio Benchmark Dataset uses extremely short samples from one of the original GarageBand software sample packages made in 2005 and not been updated since (Homburg et al., 2005). This worked well for a study in rapid genre recognition but does not for MAC analysis of audio production techniques. The Rolling Stone 500 corpus was compiled in 2004 but a study in 2011 revealed problems of decade bias within the corpus (De Clercq & Temperley, 2011). The Rolling Stone 500 has four songs from the year 2000 or later while other decades consist of over a third of the corpus data (De Clercq & Temperley, 2011). The lack of data from after the year 2000 prevent this corpus from being reflective of current popular music tastes. An edited version of the Rolling Stone 500 called the RS 5x20 dataset was made by De Clercq and Temperley for their study, *A Corpus Analysis of Rock Harmony* (2011). The RS 5x20 corpus evenly distributed that data by having twenty songs from each decade starting at the 1950s. Rather than bring the list up to date, they decided to drop the four songs from the 2000s and later (De Clercq & Temperley, 2011). Consequently, the RS 5x20 dataset ends in the 1990s causing it to also lack current popular music tastes. As such, both studies are unable to accurately reflect the production choices of 21$^{st}$ century audio professionals in Western popular music.

Nishina's corpus, published in 2017, observes the lyrical content of pop songs and was built using the Billboard charts and SONGLYRICS without the use of 'raw' data (Nishina, 2017). The site SONGLYRICS' main purpose is to store lyrical metadata. The site also pulls metadata from other places, including the Billboard's Hot 100 website (Nishina, 2017). Nishina's Billboard corpus consists of 100 songs from 1950 to 2011, totaling to 1000 songs. This repurposed Billboard corpus revealed the Billboard charts' gender bias with men making up the majority of Pop artists represented over multiple decades (Nishina, 2017). This is the closest comparable corpus or dataset to the Billboard6:2019 corpus but it is not as genre diverse. Nishina's study provided further insight regarding the challenges and data bias that can occur when using Billboard charts to build a corpus.

## 2.5 AUDIO PRODUCTION TECHNIQUES

This final area of my literature review is divided into three main sections: a description of how the recording studio has evolved; an overview of the main audio production techniques used by audio professionals; and a description of dynamic range compressors in popular music production.

### 2.5.1 EVOLUTION OF THE RECORDING STUDIO: ANALOG TO DIGITAL

Audio production technology used in present-day recording studios consists of both analog and digital tools. This is due to how studios historically evolved from the 1970s to 2000s. Studios were originally built with analog equipment, which included mixing console, and a large array of cumbersome and expensive audio processing units. For example, a standard piece of equipment was the twenty-four-track recording device, largely accessible only to audio professionals working within recording studios by the 1980s. This was due to the most popular machines like the MCI JH-24 having a $30,000 list price in 1970 (Bammel TV, 2016). Even in 2016, the average price was around $8,000 when professionally refurbished (Bammel TV, 2016). Other important developments included the invention of digital recorders such as the 1980's Sony PCM-1600 originally worth $40,000. The analog recording studio was utilized by popular artists like the Beatles, AC/DC, Queen, Madonna, and Michael Jackson (Bennett, 2018). By the 1980s, high profile popular artists were tied to studios owned by record labels. Consequently, these studios became known as elite recording houses (Bennett, 2018). Meanwhile, gear was becoming more compact and slightly more affordable, starting around $7,500 to $8,000. Digital effects processors such as the Lexicon 224X, Lexicon 224X XL, and AMS RMX-16 Digital Reverberator, were used instead of, or along with, reverb plates and recording in large reverberant spaces (Bennett, 2018). Large-scale studios began to trade out gear and renovate their

spaces to keep up with technological advancements, which were changing the popular music industry standards and demands. At the same time, the flourishing of hybrid home studio setups gave artist's access to all the technological capabilities of a larger studio but with smaller, affordable digital gear. The limitations of home studios forced audio professionals to find creative solutions, such as blending their use of analog and digital gear like bigger studios did. A popular music example of this is Alanis Morrissette's debut album *Jagged Little Pill* (1995), which was recorded in Gen Ballard's home studio (Bennett, 2018).

In the late 1970s and early 1980s, software audio mixing environments or Digital Audio Workstations (DAWs) like ProTools became common place. Furthermore, DAWs were, and continue to be, modelled after the multitrack tape recorders used in analog recording studios (Wilmering et al., 2020). By the mid 1990s, DAWs had been democratized and since globalized (Pras et al., 2019), especially with respect to interface design. For instance, DAWs were globalized by using symbolic control features such as a solid circle indicating the record button. The way larger mixing consoles like the SSL and Neve allowed for bigger productions, working purely 'in the box' with a DAW offered a new sense of limitlessness during the creative process (Bennett, 2018). As such, audio professionals are able to make cuts, edits, and fades in the middle of a take without introducing audible flaws in the performance (Bowers, 2019). Popular music productions use of pre-programmed sounds, as found in drum machines, and digital synthesisers became ubiquitous and defined charting popular music (Bennett, 2018). The trend of using synthesisers and sequencers continued in popular music genres in productions such as Def Leppard's '*Hysteria'* (1987), Ricky Martin's '*Livin' La Vida Loca'* (1999), and Christina Aguilera's '*Genie in a Bottle'* (1999). Since then, affordable digital consumer recording setups have become readily available. As a result, the "number of school programs that teach audio

production techniques […] attended by a large number of self-taught DAW practitioners who seek to improve their music engineering skills" is larger than it has ever been (Pras et al., 2013, p. 1).

In DAW-based studios, mixing consoles and signal processing hardware have been replaced by software plugins (Wilmering et al., 2020). In addition, some analog gear continues to be used and maintained today. As such, music today is made with a distinctive blend of production choices, using both analog outboard gear and 'in-the-box' plugins in a DAW. Those working in audio production are consistently updating their workflow to include new technology that has the potential to provide a superior product (Chambers-Moranz et al., 2019). As such, we can compare this phenomenon with advancements from mono and direct-two-track mixing to stereo and multitrack mixing. The music industry has and will continue to adapt with rapidly changing technological developments.

One of the many conclusions that can be made when exploring the dividing cultural paradigm of using analog versus digital gear is that mixing audio professionals are "influenced by one's generation, preferred musical genre, cultural and geographical background, and that it has become an identity statement that defines mixers' creativity and workflow" (Chambers-Moranz et al., 2019, p. 1). These influencers are also shown in audio professionals' choices and are therefore reflected in the music they make. In this way, creators of historically older genres, such as Rock or Country, would be slightly more likely to have an analog-based creative process. Contrastingly, those favoring a slightly more digital workflow are creators of newer genres like Dance and Electronic music (Chambers-Moranz et al., 2019). That is not to say that audio professionals working in these genres are bound to working with only analog or digital gear, as "findings suggest that the new generations of mixers […] consider both types of technology to be

valuable in terms of sound quality" (Chambers-Moranz et al., 2019, p. 8). Today, access to blended analog and digital studio setups have allowed audio professionals individualized creative processes to bring specific sonic elements to each project (Bennett, 2018). This is due to each project's unique aesthetic goals, such as genre, that may require the distinct aesthetic qualities and personality of analog hardware with the versatility and flexibility of digital plugins (Chambers-Moranz et al., 2019). Though some would find popular music production more accessible, moving to a completely digital workspace is not yet feasible as current technology cannot yet emulate analog gear with DAW plugins.

#### 2.5.1.1 AUDIO EFFECTS

As DAWs have become more accessible, the number of 'in-the-box' accessories, such as plugins, have become innumerable. This has given audio professionals more tools than ever before at their fingertips. These tools are used to create different audio effects, which today are commonly applied via preprogrammed plugins. Examples of such are time-alignment and phase-flip which are a specialized delay and a part of the equalization toolkit, respectively (Wilmering et al., 2020). In this way, audio effects correlate to audio production techniques such as panning, equalization, reverberation, delay, and dynamic range compression. Audio professionals choose to use certain audio production techniques to produce audio effects that manipulate the specific sonic qualities to achieve sonic goals ranging from functional to creative. One such tool that has been used both functionally and creatively is autotune. For some artists it is a purely functional audio effect that corrects a performer's vocal line to stay in tune. Other artists use it creatively, creating their own autotuned vocal sonic signature like Cher. '*Believe'* (1998) is considered to be one of the first mainstream hits to popularize the effect of exaggerated autotuning, giving Cher's

vocals a “typical synthetic sound characterised by perfect pitch and unnatural instantaneous pitch changes (Wilmering et al., 2020, p. 807).

#### 2.5.1.2 DYNAMIC EFFECTS AND THE LOUDNESS WAR

Audio production techniques are used based on technical needs, traditional practices, and experimentation to creatively transform sound (Wilmering et al., 2020). Audio professionals do this by using the recording studio’s equipment as a compositional tool during their creative process (Eno, 2017 [1966]). The sound aesthetic needs of a track can dictate the application of an audio effect “to enhance the perceived quality of an audio signal [to] alter one or more of perceptual attributes, such as loudness, time or rhythm, pitch, timbre, and spatialization.” (Wilmering et al., 2020, p. 791). For example, dynamic range compressors provide greater clarity in smaller dynamic ranges and lowest intensity levels, i.e., a pen writing on paper, to the loudness of an explosion (Bowers, 2019). A higher ratio setting on a dynamic range compression will result in less dynamic range. Historically, the main concern for studio professionals was ‘loudness’ as wax cylinders can only pick up very direct sound signals. Performers physically moved toward and away from the bell of the gramophone in accordance with the pitch and timbre of their instrument. Dynamic range compression in popular music produced with acoustic and electronic instruments can be used create a more consistent dynamic range, effectively ‘gluing’ the mix together. For example, Rock songs such as ‘*Going Under’* by Evanescence have layered vocals that range from whispers to near screams which are heard just as clearly as the drumkit and electric guitars. When vinyl and compact cassettes became available, studio professionals were attentive to the use of dynamic range compressors during the recording, mixing, and mastering processes due to the physical limitations of the medium. For example, the needle, used for vinyl, could jump out of its carved groove due to a lack of dynamic range.

In the early 1990s, FM radio's automatic process to use compression on music mastered and released for CD normalized consumers to listening to music with a lower dynamic range than what they originally had experienced. It changed their taste preferences causing the musicians and labels to ask audio professionals, mixing and mastering engineers, to achieve FM radio's levels of compression on new CD releases. As a result, studio professionals started applying increasingly higher ratios of dynamic compression, aiming to reach the maximum amplitude peaks more frequently, shortening a song's overall dynamic range. By 1999, waveform analysis revealed just how much dynamic range compression affected popular music's sound quality which had been sacrificed for loudness. Remastered older recordings were also victims of having their dynamics significantly altered, not always for the better as it tended to distort and/or flatten the performance. During this time and into the 2010s, consumers and studio professionals were being subjected to what is referred to as the 'loudness war'. As such, restrictions were set in place by the CD Red Book advising what are reasonable amounts of dynamic range compression to ensure that a certain level of quality is maintained for music consumer's auditory heath. As well, to stop the industry-wide abuse of the dynamic range compressors which led to many albums produced and remastered over these years to be labeled as victims of the loudness war. Many songs suffered a consequence of a high dynamic ratio called 'pumping' as heard in this song, though this technique can also be applied creatively. The clapping audience, only in Evanescence's *Going Under* (2003) music video, has 'pumping' creatively used to emphasize a forward momentum within the song. The samples used in popular Electronic, Dance, and Hip-Hop music are consistent by nature, so compressors are used more to shape tones and less to control varying dynamic ranges. Examples of this can heard in *'Scary Monsters And Nice Sprites* by Skrillex (2007) and *'Paper Planes'* performed by M.I.A. (2008).

During the loudness war, popular music artists released various copies of the same track with lower loudness units (LU), introduced by Camerer, to meet broadcasting standards while providing consumers with 'louder' versions (Wilmering et al., 2020; Camerer, 2009). A decibel Sound Pressure Level (dB SPL) is a measurement of how much air pressure is displaced by a sound at a fixed point in time and uses the Earth's standard air pressure as its reference point. Decibels increase and decrease in direct relation to the intensity of a sound but does not measure the loudness of a sound source. This differs from Loudness Unit (LU) measurements which does not need a fixed reference point and instead uses multiple peak values to measure an audio file's average loudness (Camerer, 2009). As a result, the LU scale measures a sound's consistent, perceived volume of loudness for the listener. A formula using a 'K-weighed' curve "applied to all the channels (except the Low-Frequency Effects (LFE) channel which is discarded from the measurement), the total mean square energy is then calculated." converting 1 dB to be equal to 1 LU (Camerer, 2009, p. 3). As such, previously produced music with a limited dynamic range due to high compression ratios are less desired when compared to those that utilize the mix headroom provided by LUs.

Previously remastered recordings have since been 'repaired' to follow the new compression levels similar to the EBU R 128 standard outlined in the ITU-R BS.1770, which aims to increase audio quality for consumers, has now become the norm, (Camerer, 2009). It could be said that streaming platforms helped bring this battle to a head by requiring a standardized loudness measurements referencing digital Full Scale (LUFS), which can "establish an agreed algorithm for the measurement of loudness and the true peak levels" (Camerer, 2009, p. 2). Dynamic range compression restrictions have changed with the advent of online music distribution services such as YouTube, Google Play, and Apple Music. Each platform has their own normalized loudness level that is also used differently depending on the regulations of the

country. Loudness normalization allowed consumers of each distribution platform to enjoy their listening experience. This forced audio professionals to re-evaluate their use of dynamic range compression to have "fewer dynamic compression artefacts, such as 'pumping'" (Camerer, 2009, p. 2). These music industry intermediaries have set new standards relating to audio production techniques that audio professionals and musicians must adhere to throughout their creative process.

### 2.5.2 TYPES OF AUDIO PRODUCTION TECHNIQUES

Audio production techniques concern technical and creative choices made in the recording studio. Under consideration are such aspects as microphone choice and placement, reverberation, delay, panning, equalization, and dynamic range compression. Each technique can be used differently during the phases of production: preparation, recording, editing, mixing, and mastering. This section follows an audio professional's use of each audio production technique during their creative process. As new technology emerges, the way these techniques are used to create different audio effects changes, however the main functional use of each does not.

#### 2.5.2.1 MIRCOPHONE CHOICE AND PLACEMENT: 3-POINT TECHNIQUE

Microphone choice and placement is a vital first step in the preparation stage of an audio professional's creative process. The choices made during this stage affect the overall fidelity of the recording. Bad microphone choice and placement can cause the entire recording to be damaged and usable in later creative stages. An appropriate microphone is chosen for an instrument based on microphone's frequency response and the recording context which includes the recording venue, the instruments/voices being recorded, the aesthetics of the production, and the wishes of the musicians. In addition, choosing a microphone and deciding on its placement requires knowledge of how the sound of the instruments are being produced. Furthermore,

working with microphones includes understanding how you use them later in the creative process while mixing.

As an example, recording an electric guitar can be done by following a 3-point micing technique that utilizes a ‘bright’, ‘dark’, and a room (Pras, 2020). All three microphones are chosen and positioned based on how their signals are used in the mixing stage, later in the creative process. For instance, the bright microphone like the Shure SM57 is placed on an angle to the loudspeaker cone of the guitar amp and very close to the grill of the amplifier to capture the guitar’s attack or presence (Pras, 2020). It is recommended to capture the darker tones with a ribbon mic like the RCA BK-5 placed near the edge and directly pointing at the grill of the guitar amplifier (Pras, 2020). A large condenser or tube mic such as the Neumann U67 is used as a room microphone in this setup. It will “capture the warmness of the guitar (Pras, 2020, p. 295). The room microphone also captures the room’s natural reverberation which can be used later in the creative process alongside other audio production techniques.

It is crucial to also consider other audio production techniques and effects. Audio professionals create a 3D-like depth to a guitar’s stereo image requires the DAW plugin for time-alignment in order to delay the room microphone signal based on the velocity of sound, i.e., approximatively one foot per millisecond, i.e.: approximatively one foot per millisecond. As well, if the room microphone is behind the guitar amplifier, applying a phase-flip to the room microphone will be necessary. These additional steps during the preparation process will allow for cleaner in-session mixing especially when the musicians wish to listen to the progress. It also allows for easy and efficient setup for the editing and mixing stages. Once such fine-tuning is complete, the recording stage can begin. During the recording and editing stages, microphone

choice and placement are not adjusted or moved, provided that the session's instrumentation does not change.

The mixing stage utilizes the audio production techniques of panning, equalization, reverberation, and delay on all the recorded material. Each audio production technique is revisited and evaluated for each individual stem and against the whole mix to ensure a 'tight' cohesive product. Today, it is common for audio professionals to mix using both analog and digital technologies, as needed or available, to achieve their desired sonic goals. Today, it is common for audio professionals to mix using both analog and digital technologies, as needed or available, to achieve their desired sonic goals. The mixing stage utilizes the audio production techniques of panning, equalization, reverberation, and delay on all the recorded material. Continuing with the 3-point micing technique example; an audio professional could first start by panning the 'bright' and 'dark' signals, now presented as distinct tracks, or stems. The goal when panning is to create a more present sound for the guitar while keeping the attack and darkness found in each stem (Pras, 2020). There are many possibilities where the two stems can be panned but audio professionals must be aware of overextending the stereo image. This can be accomplished by panning one track to the farthest left point and the other to farthest right. Audio professionals understand that the stems also cannot be panned superimposed either as it will create phasing (Pras, 2020). This is true for the room microphone stem though panning within the space with or without either the bright or dark microphones will have different results. There is no single wrong way to pan the room microphone, there are simply other considerations involved when deciding if or how to use the stem. A general rule within the field is that stems recorded as a stereo pair are hard panned left and right respectively, to avoid phasing that would be created by an overlap of the two microphones' signals from one speaker. Every stem needs to be panned,

even those that are to remain in the center of the mix, because remaining panned directly to the center is displeasingly jarring to the listener. Each professional will have a different method on which stems to use but the overarching aim is to create a clear stereo image while meeting the compositional goals.

#### 2.5.2.2 EQUALIZATION

The next audio production technique that is used in the mixing stage is called equalization which involves lowering or boosting the gain of different frequencies that make up a sound. Generally speaking, equalization is used to bring clarity to the sonic qualities of a recording. Modern equalization with a full parametric equalizer primarily involves adjusting three parameters: the centre, or cut-off, frequency; quality factor (Q); and gain. The centre frequency value, along with Q, determines the range of frequencies that will be affected. Commonly, an equalizer (EQ) permits independent control over high, mid, and low frequency ranges and can be expanded to include mid-high and mid-low as well (Oltheten, 2018). The Q value sets the bandwidth (or frequency range around a specific centre, or cut-off, frequency) that will be changed. For example, a smaller Q value results in a larger bandwidth, and vice versa. Gain is used to boost or lower the sound intensities of frequencies contained within a particular bandwidth. Every audio professional will have their own workflow for each project as to which stems to start their equalization process with. Toggling through each stem, two questions are used to determine the amount of equalization to use: (1) Are there sonic qualities within this stem that benefit or disrupt the overall mix? and (2) Can these qualities be accentuated or reduced? Not every stem will require equalization, unlike panning, and could be better suited in the mix as is. If there are sonic qualities that need to be adjusted, audio professionals will follow a step-by-step process to apply equalization (as noted below):

1) Narrow the Q to listen for frequency specific sonic qualities
2) Boost the gain to clearly accentuate all frequencies
3) Modulate center frequency parameter, sweeping over the entire spectrum stopping at desired or undesired points
4) Adjust bandwidth by modulating the Q
5) Set the gain to an appropriate level, either boosted or lowering sound intensity

For example, if the previous guitar set-up was recorded in the same area as a drum kit, both stems would contain bleed of each other instrument in them. Using the above steps, an audio professional would use equalization to remove unwanted drum bleed from a guitar stem, e.g.: a mirky crash cymbal's reverberation. This is a functional use of equalization, aiming to not change the integrity of the stem's sonic qualities completely. However, there are creative ways to use equalization to create interesting sonic experiences like distorting and cutting frequencies, so the listener is perceived to be in a different room than the sound source.

#### 2.5.2.3 REVERBERATION

The audio production technique reverberation is used to change the space that recordings happened in. Historically, the only way to create reverberation was to use rooms made for that specific purpose at recording studios (Wilmering et al., 2020). These echo chambers still exist today but have also been emulated with plugins, like Altiverb, which allow audio professionals to superimpose the acoustics of a location onto their recordings. Plugins use various adjustable settings to create and recreate reverberant spaces, such as type, room size, reflection settings (early and late), decay time, pre-delay, wet-dry mix, and gate. The aspect type refers to the old plate or spring reverberation styles from the 1960s (Oltheten, 2018). Pre-set room sizes can vary from closet, large hall, cathedral, and everything in between. These settings are made by

algorithmic formulas to emulated different room acoustics. One way these are made is using impulse responses taken on location at unnamed general spaces or world-famous ones, e.g., the Sydney Opera House pre-set found in Altiverb. The next aspects are closely related because the size of a space will affect the amount of early versus late reflections and the decay time. The first sound to reach the listener is the direct sound. Later, the reverberation that 'bounces back' off the virtual walls towards the listener is classified into two parts, early reflections followed by late reflections (Oltheten, 2018). The materials used for the walls along with the size of the room effect reflections and delay times. A smaller room will have more early than later reflections when compared to a larger room. If either room's walls are covered in more absorbent materials, like carpets, the delay times will be shortened. The decay time is the number of seconds it takes for all of the sound to dissipate to 60 decibels, mathematically known as RT60 (Oltheten, 2018). Pre-delay is the amount of time between when the direct sound and the first reflections are heard. In this way, a longer pre-delay time can be used to bring a sound source closer to the listener within the reflective space. The wet-dry mix aspect of reverberation is the balance between the dry or direct sound and the reflected sounds which are called wet. It allows audio professionals to control how much of the two qualities are used together. Reverberation can be applied to a single track, such as the 1980s drum example discussed earlier, as well as to a group of stems or the entire final mix. The latter two applications are generally used to give the listener the sense of everything being recorded or taking place in the same room or space.

Once each audio production technique has been utilized as needed to deliver the best possible results, the project moves into the mastering stage. Mastering engineers are audio professionals that specialize in using extremely finetuned audio production techniques and

effects. Both mixing and mastering engineers have the same equalization and compression goals, but mixing engineers work stem by stem while mastering engineers work at a holistic level.

#### 2.5.2.4 DYNAMIC RANGE COMPRESSION

Since its invention in the 1910s, the vacuum tube (thermionic valve) was used as an analogue component in guitar amplifiers, microphones, equalizers, and dynamic range compressors (Wilmering et al., 2020). Originally, these tube-based compressors were developed for radio are now considered a requirement in DAW plugins, having become so ingrained in audio professionals' creative process (Wilmering et al., 2020). Dynamic range compression is first used in the mixing stage to help accentuate the 'punchiness' or clarity of a stem's sonic qualities, e.g.: the attack of a kick drum (Madsen et al., 2015). Much like equalization, this audio production technique may not need to be applied to every stem or track. Audio professionals must constantly evaluate if adding dynamic range compression is positively affecting the stem's sonic qualities. There are four main aspects that audio professionals use to control dynamic range compressors: threshold, attack, release, and ratio (Eliasson, 2019). The threshold parameter is in decibels relative to Full Scale (dBFS) which denotes the highest point before the signal will activate the compressor. Attack settings determine how fast the compressor will respond to decrease the sound signals. The release aspect is set based on how fast a compressor will return the sound signal back to its original state once the signal falls below the threshold. The ratio settings on a dynamic range compressor corresponds to the how much the intensity is decreased each time the threshold is surpassed (Eliasson, 2019). When the ratio is 1:1 there is no signal changes whereas 10:1 means that above the threshold there is a decrease in the dynamic range to the $10^{th}$ of the original. The knee aspect is used to shape the threshold point. Output gain boosts the dynamic range compressor's overall output volume (Wilmering et al., 2020). An audio

professional uses the following process to determine the correct settings on a dynamic range compressor:

1) Set the gain and knee to match the original sound source to make the best comparisons
2) Increase the ratio as high as possible without turning the compressor into a limiter
3) Release the threshold to be as wide as possible so that it cannot be activated
4) Set appropriate attack and release times for the sound source
5) Make the threshold as narrow as possible
6) Slowly adjust the threshold appropriately for the sound source to prevents over-compression
7) Next an appropriate ratio is set

When using dynamic range compression, there is a danger of 'flattening' the signal to the point that the mix has no dynamic range, damaging the expressive musicality of the piece. Other dangers include making the song or instrument sound over compressed or overly processed by not setting the proper attack and release times. Too fast an attack time will crush the first 'hit' or transient of a note. As well, setting too fast a release time causes notes to not ring out properly. Overall, the misuse of attack and release time settings causes instruments and their frequencies to be distorted. Using the previous example with the electric guitar and drum kit recording, one might apply compression to various drums, like the snare and kick, to provide a strong forward motion to the rhythms of the song (Oltheten, 2018). This would also pull these vital drums to the forefront of the drumkit's mix overall. As well, an audio engineer may add dynamic range compression to the guitar's bright microphone stem to accentuate its attack when the three guitar stems are mixed with the drumkit. During the mixing stage, dynamic range compressors are also used as master bus compressor affecting the entire track (Oltheten, 2018). This step is optional

and is only required if it helps achieve the project's aesthetic goals. Master bus dynamic range compression can 'tighten' the mix creating a cohesive energetic feel to the entire song while allowing louder and quieter sonic events to shine through. Different dynamic range compression treatments can be used to tame or enhance transients by adjusting the attack and release times; create clearer entrances of instruments withing a mix by using sidechain and/or serial compression; help 'glue' instrument groups, like a drum kit or strings section, together within a space by busing multiple tracks to a compressor; or highlight the overall energy or dynamics of the song's musical genre.

### 2.5.3 GENRE AND DYNAMIC RANGE COMPRESSION

Over time, the dynamic range compressors used have changed but the way that they have been used within genres has not. Though analogue hardware is not as commonly used in today's popular music, it is being digitally emulated for its nostalgic and sonic qualities (Chambers-Moranz et al., 2019). Whether an audio professional is using analogue or digital gear, dynamic range compressors have been persistently used to shape a sound source's envelope and intensity. This means that it is possible to perceive different timings between the same processed and uncompressed stems thus profoundly impacting a song or a genre 'groove' (Brøvig-Hanssen et al., 2020). For example, the distinct snare drum sonic signature found in 1980s popular music helps provide driving rhythms. This sound can be replicated today by audio professionals capturing loud and sharp hits on the snare drum during a musician's recorded performance and later connecting the snare drum track to a gated reverb. This later process is a dynamic range compression effect called sidechaining. This effect allows for one sound or instrument to be used as a trigger for another, allowing the latter to 'cut through' the mix by metaphorically opening a gate for it to enter through. In this case, the snare drum is side-chained to a reverb track. The

distinct 1980s snare drum sound is created in a two-step process starting with a gate compressor on the dry snare drum stem. The second step is to create an unnaturally long, strong echoing reverb, i.e., a hall with four or five-second-decay time. The sounds that pass above the dry snare's gate threshold is sent to the reverb. The gate compressor of the snare drum can be side-chained by the vocal stem so that the snare's reverb is less intense when there are vocals and more intense when there are not. Other audio productions techniques like equalization can be utilized on the tracks before and after the snare-gated reverb effect is created. Therefore, a combination of musical and technological aspects executed by audio professionals create the sonic signature of a resonating 'clash' sound that listeners could not get enough of (Schmutz, 2005). Another example of compressors defining a musical genre has been found in popular electronic dance music or EDM. Various studies have shown that setting different parameters for the attack, release, threshold, and ratio aspects of dynamic range compressors can produce peculiar effects in EDM (Brøvig-Hanssen et al., 2020). The creative use of sidechain 'pumping', ducking, and envelope following are recurring anticipated themes within modern EDM productions. Though these effects are acknowledged by scholars, it is not thoroughly documented "on how producers approach the sonic and temporal parameters as interlinked domains" (Brøvig-Hanssen et al., 2020, p. 12). Audio professionals working in EDM have reported that the overall 'groove' becomes apparent once all the stems have attained their ideal volume and work cohesively in relation to each other (Brøvig-Hanssen et al., 2020). As such, rhythmic elements must be treated individually and holistically then analysed to match the creative processes used by commercial popular music audio professionals. Other popular music genres have been at the center of similar studies, e.g. (Hodgson, 2011; D'Errico 2015), that focused on the rhythm and dynamic in Hip-Hop music. The information from these studies is crucial to furthering conversations about audio professional's role in popular music. However, they lack specificity pertaining to audio

production techniques and broader genre comparisons. My research aims to highlight and explore how different audio production techniques in the recording studio are related to genre classifications in Western popular music. Another study explores how audio professionals create the sonic signatures that differentiate Teutonic (Germanic), British, and American metal music (Herbst, 2020). This study thoroughly documents an audio professional's creative process by comparing very nuanced distinctions of individual tracks and songs as a whole within metal music on a national level. Herbst's research also demonstrates "that the same source material can be modified to create unique sounds" based on the audio professional's vision (Herbst, 2020). His research further supports the idea that subtle audio production techniques can be quantified to classify musical subgenres. The previous studies mentioned showcase the interconnection between subgenres' dynamic range compression and highlight how further research is needed regarding broader genres classification. My research contributes to such discourse by exploring the use of audio production techniques like dynamic range compressors in Western popular music genres. This choice is supported by studies like Bromham, Moffat, Barthet, and Fazekas (2019), which through participant surveys identified how aspects of this technique relates to the following genres: Jazz, Rock, EDM, and Hip-Hop. The settings of a dynamic range compressor are indicative of the sound envelopes heard most particularly in Jazz with a fast attack and slow release, or the inverse in Rock (Bromham et al., 2018). Such studies conclude that computerized algorithmic systems, like music information retrieval systems, can include audio production techniques if more were quantified in ways that computers understand (Bromham et al., 2018).

Many studies have examined the role of dynamic range compression in musical subgenres but there has been minimal scholarly attention devoted to comparing the broader musical genre categories. The studies conclude that the attack, release, ratio, and threshold parameter settings

chosen by audio professionals can be distantly differentiated and quantified. My research focuses on contributing information on the interconnections between artists' and their producers' use of audio production techniques in the recording studio and musical genres. This provides further evidence that the work of audio professionals influences the music industry and popular music long before the music reaches consumers.

# CHAPTER 3: CASE STUDY #1: THE SWEET BOYS

## 3.1 INTRODUCTION

I observed the production process of a genre-eclectic American band called The Sweet Boys during their studio residency in Studio One at the University of Lethbridge from October 26th, 2018, to November 1st, 2018. During this time, The Sweet Boys recorded new material and performed at the A.E.S. Fest hosted by the University of Lethbridge's Student Chapter of the Audio Engineering Society on November 1st, 2018, at the university's pub, The Zoo. They returned the following year, in 2019 for the same timeframe, to record more material and were hosted by the Faculty of Fine Arts for a surround sound performance with live video in the University's Recital Hall. This case study highlights the importance of social characteristics and audio technologies in contemporary music creation.

## 3.2 CONTEXT

In this case study, I draw upon Born's framework of four planes (2011) and Lena's genre classification model (2012). I apply the first two planes of Born's four-plane social mediation framework to analyze the different artistic, professional, and academic roles in this case study. Plane one involves the aspects surrounding music production like the artists and studio professionals; and plane two the network of the artists and studio professionals, i.e., the fans, close family, and friends of the artists (Born, 2011). For this study, the first plane included the band The Sweet Boys, their videographer Nicole Cobb, and their producer Dr. Amandine Pras. Through the prism of Pras, an educator in the Digital Audio Arts program, the students of this program played the roles of audio engineers and assistants. As such, they were close witnesses of the band's creative process and members of Born's second plane. I also apply Lena's model of musical genres aesthetics (Lena & Peterson, 2008; Lena, 2012; Born & Haworth, 2017). Lena's AgSIT model is used to situate The Sweet Boys' music and the genre related choices made during their creative process as related to genre. The band's overall aim is to make music that can give the listener 'an experience' rather than gain celebrity status. This situates The Sweet Boys in the Avant-garde stage of the AgSIT model. However, the band drew upon institutionalized popular music genres to communicate different aesthetic goals during their creative process.

### 3.2.1 PLANE ONE: THE BAND, THEIR VIDEOGRAPHER, AND THE PRODUCER

The Sweet Boys met at New York University and graduated from its Music Technology program of the Steinhardt School in 2015. The band members' skills allow for a variety of musical possibilities because they blend various types of instruments. The band line up consists of Mikey Holmes on keys and vocals, Kevin Copeland on guitar and vocals, Andrew Emge on drums and auxiliary percussions, and Logan Miley on electronics. The Sweet Boys are influenced

by sampling culture and use real-time processing techniques with acoustic, electric, analog, and digital instruments, including electric guitars, tape loopers, a launchpad, synthesizers, and Ableton software.

While visiting, The Sweet Boys were accompanied by experimental filmmaker Nicole Cobb. She graduated from the Tisch School's film program of New York University in 2013. Nicole documented their experiences in 2018 and she released a teaser of The Sweet Boys 2018 live performance on YouTube[2]. When she returned to Lethbridge with the band, Nicole presented her film titled, *The Sweet Boys: Unraveling the Mirror* on November 5th, 2019. She held a free public screening with a question-and-answer period as part of the University of Lethbridge's Music at Noon series. Her film mirrored The Sweet Boys' creative process in the studio to create a portrait of them through her own experimental artistic expressions. It consists of footage from The Sweet Boys' first studio residency and footage she had from the United States of the band members. She treated her free-flowing collage footage by overlaying real-time effects. Nicole used her own paint, water, and oil liquid art manipulations, her home-built video feedback system, and other hardware effects (Cobb, 2019). The film captured an Avant-garde vibe that inspires both Nicole and The Sweet Boys. For their 2019 studio residency, she accompanied The Sweet Boys studio sessions and live performance with her improvised eccentric 1960's art manipulations that moved in time with their music. During Nicole's stay in Lethbridge, she screened digitally prerecorded art manipulations made in her home on an analog monitor. The manipulated recordings were projected on the larger screen which she then filmed with a digital

[2] YouTube link to The Sweet Boys Teaser by Nicole Cobb: https://www.youtube.com/watch?v=cw4b7-rOWBE

camera at a different frame rate. This feedback loop system was another Avant-garde form of expressionist art used within Nicole's film techniques.

Luckily, The Sweet Boys stayed in touch over the years and in connection with their past professor and co-producer of their first album, Pras. As a result, they were offered the opportunity to record new music at the University of Lethbridge. Pras has worked in the music industry for eleven years as a freelance record producer and sound engineer. Her experience in both roles spans various popular and underground genres like Alternative Jazz, New Music, Electroacoustic, and Experimental. As a producer, she aimed to capture the emotion of The Sweet Boys' music to create a link between them and the audience. Working as an Assistant Professor of Digital Audio Arts at the University of Lethbridge, she invited The Sweet Boys and Nicole to carry out a studio residency to record and perform their new material on campus. This provided audio engineering students an opportunity to gain unique recording experience in real-life settings.

### 3.2.2 PLANE TWO: PEDAGOGICAL APPROACH

As independent artists who do not aim to be popular by Western music industry standards, the band members and Nicole were able to tap into their network contacts to capitalize on a mutually beneficial endeavour early into their careers. Due to their earlier 'informal' working relationship with Pras, they were able to travel and stay in Lethbridge to work in a professional studio along with other opportunities in exchange for patience and understanding of the university's learning environment.

This case study of The Sweet Boys was completed as part of the course requirements for the MUSI 5630 course, i.e., a Fall 2018 graduate adaptation of the undergraduate class MUSI 3630 - Advanced Audio Production Techniques taught at the University of Lethbridge by Pras.

This course focuses on providing students with audio production techniques to record, edit, mix, and master music from various pop genres produced in a large analog studio setting. As part of their course requirements, undergraduate students participated in recording sessions as recording engineers, studio assistants, and observers during both The Sweet Boys' 2018 and 2019 residencies. During the Fall 2018 term, one in-class recording session was used as a rehearsal for their live show. The ProTools session consisted of just under two hours of recorded music. There were seven fully conceptualized songs, some duplicated, and various transitional ideas rehearsed in succession with Pras. The ProTools session was used for two assignments, this case study and for students to mix and master a song of their choice. This gave students a chance to get mixing and mastering experience in real-life settings.

The Sweet Boys' 2019 residency utilized the University's recently installed KLANG binaural technology while performing their live show in 2019. KLANG allowed each band member to hear a personalized 360-degree mix in their headset while performing. Immersive sound was one of the aspects that The Sweet Boys explored in another class during the Fall 2019 term. This idea carried through to their 5.1 surround sound performance in the University's Recital Hall in 2019 and added another layer to The Sweet Boys' creative process.

The pedagogical vs. commercial studio context allowed The Sweet Boys to explore an improvisational creative process. They thus recorded improvised sessions for multiple hours each day which were available to the students to review. Between improvisational sets the band would continually discuss and develop ideas in the live room without reviewing their ProTools session recordings. Other times, The Sweet Boys listened back to these long sessions to find ideas regarding how to compose new songs or to develop concepts, thereby to help move their creative process forward. In this way, The Sweet Boys used Brian Eno's technique of improvisation

within the studio to generate compositional material (Eno, 2017 [1966]). Both methods helped The Sweet Boys clarify and examine particular moments as inspired content for the album. These methods were mutually beneficial. The students used these sessions as learning material while The Sweet Boys had access to an excellent studio and producer that they would not have been able to afford otherwise. Throughout the week, many of the students developed a relationship with the band and felt involved as individuals in their creative process.

The Audio Engineering Society at the University of Lethbridge held A.E.S. Fest with a headliner as The Sweet Boys at the Zoo. Members helped with setup, live engineering, take down, and other administrative aspects of the evening such as promotion and selling tickets. Digital Audio Arts students assisted with setup, recording, and takedown of The Sweet Boys' performance; I was tasked with running the live soundboard.

## 3.3 METHODOLOGY

### 3.3.1 DATA COLLECTION FROM DIRECT OBSERBVATION

For this case study, I used the method of *direct observation* that involves the personal collection of data pertaining to individuals and/or groups of individuals behaviour surrounding a specific event or circumstance (Yin, 2014). This method was performed in a participant and non-participant context. Direct participant observation is when the researcher interacts with research participants *in situ*. With the other students, I assisted with the technical aspects by performing studio assistant and tracking engineer tasks, such as running cables; stage setup; running ProTools sessions; etc., but I maintained distance as to not interrupt The Sweet Boys' creative process. I also used this direct participation method during their performance at The Zoo in 2018, as I was their live sound engineer. In the following semester I was able to participate and observe the post-production process of their producer during a reamping session, using the Recital Hall and Fine Arts building's main stairwell, helping to setup and take down equipment. Having the necessary skills and knowledge to work in the studio and run live shows provided me with technical audio insight about the decisions being made and a fuller perspective for this study.

### 3.3.2 DATA COLLECTIONS FROM INDIRECT OBSERVATION, SEMI-STRUCTURED INTERVIEWS, AND SECONDARY MATERIALS

I used the indirect observation method when I observed The Sweet Boys' creative process as they improvised in the studio, because other students were scheduled to assist the band. I also conducted a semi-structured informal interview with The Sweet Boys during their November 28$^{th}$ and 29$^{th}$ 2018 studio sessions. This interview clarified the influences of musical genre on their creative process and genre aesthetic goals. Conducting an unstructured interview with the band members allowed them to remain relaxed and let ideas flow between them, much like in their

studio sessions. As such, my interview questions were decided before and during The Sweet Boys' arrival to Lethbridge, see Appendix 2. During the interview, some questions were answered by a consensus or conferral from the band members. Other questions were directed to one specific member who worked with the equipment specifically pertaining to the question. Their comradery and division of labour shed light onto aspects of their creative process. My questions aimed to see to how The Sweet Boys perceived the influence of genre on their work. The questions also pursued a deeper understanding of *what* and *how* The Sweet Boys used aspects of audio production techniques to achieve different stylistic choices.

During their 2019 residency public workshop, I was a direct non-participant observer taking notes about Mikey and Logan's electronic instrument setup and how it influenced their own creative processes. I used the same method during Nicole's part of the workshop and during her film showing, noting the creative process was linked to The Sweet Boys when performing her expressionist art as a backdrop to the band's music. Nicole also filmed and edited a YouTube teaser of The Sweet Boys performing at the University pub, the Zoo, that was used to gather University funds to cover some of the travel expenses of the 2019 residency. Her capture of the band's performance sneak peek and film presentation were used to assist in making observations about the influence of the social aspects of music on the band.

Once the residency was over, I was able to analyse recorded audio and visual data like the YouTube teaser that Nicole posted and a ProTools session of The Sweet Boys rehearsing for their show in the Zoo on November 1st, 2018. Nicole's teaser showed not only their performance style, but also how they communicated while performing. The rehearsal ProTools session was a compilation of their producer, Pras', preferred takes compiled as a section marked ProTools file of the band's in-class recorded rehearsal.

Figure 1: Capture of YouTube Teaser, The Sweet Boys' 2018 Reunion

Later, I was also able to make observations during the postproduction stage in a reamping session with Pras and other student volunteers as a direct and indirect participant. All the data collected was analyzed between The Sweet Boys' first and second residencies. During the second residency I was able to attend their various public events. Mikey, Logan, and Nicole hosted a workshop walking through their gear setup used for live processing pre-recorded material. As well, they discussed their studio and at home performances as preparation for their live shows. There were also events such as Nicole's *Unraveling the Mirror* film presentation, and the band's immersive sound performance with Nicole's live video in the University Recital Hall. As these events were public, I was able to gain further insight into The Sweet Boys' creative process.

### 3.3.3 METHODS OF ANALYSIS AND ANALYSIS FRAMEWORK

During The Sweet Boys' studio residency, my analysis methods were rooted in grounded theory as outlined by Robert Thornberg and Kathy Charmaz in chapter three of *Qualitative research: an introduction to methods and design*s (Thornberg & Charmaz, 2011). Using 'constructivist' grounded theory, I was able to make the actions, meanings, and processes of those that I observed explicit and allowed for a flexible exchange between data collection and analysis (Thornberg & Charmaz, 2011). This allowed for 'theoretical sampling', where the codes and categories change and evolve as both my direct and indirect observations continued and after

the residency when analysis continued (Thornberg & Charmaz, 2011). For example, during my indirect observations I noted The Sweet Boys' made modifications to their instruments and asked more focused questions regarding these changes. These questions, along with the answers provided in passing and during the interview, shed light on codes related to musical genre identification and recreation in the recording studio. Collections of codes could then be categorized into three main categories: social aspects, music theory, and audio production techniques. My 'theoretical codes' were not forced to fit into a theoretical framework. Rather, they reflected an iterative process between field observations, theories, and past studies.

Drawing upon the theoretical models of Bourdieu, Born, and Lena, this case study seeks to provide new insights in the sociology of music; music theory analysis; and audio production techniques. The data from the studio sessions, live performance, interview, and YouTube teaser from The Sweet Boys' 2018 residency was reviewed for subjects and cues relating to verbal and nonverbal communication; stylistic or mood choices; and any aspects of genre classification that formed the case study's framework. The following table summarizes my data analysis:

Table 1: *Literature Used to Inform Data Analysis (Sweet Boys Case Study)*

| Literature | Data Collected | Data Analysis |
|---|---|---|
| **Social Aspects** | • Studio observations<br>• Interview<br>• Nicole's film screening<br>• ProTools session<br>• YouTube teaser<br>• Studio Assistant and Live Mix Engineer | • Capture the social aspects of their creative process<br>• Listening back to their daily recorded sessions<br>• Note verbal and nonverbal communication used during their performances |
| **Music Theory Analysis** | • Studio observations<br>• ProTools session | • Note various conscious and subconscious uses of music theory to describe the choices the band made<br>• Examine aspects of music theory such as melody, rhythm, form, texture, timbre, and instrumentation. |

| | | |
|---|---|---|
| **Recording Production Techniques** | • Studio observations<br>• Interview<br>• Studio Assistant and Live Mix Engineer<br>• ProTools session<br>• The Sweet Boys gear workshop | • The Sweet Boys were able to communicate their desires to the audio engineers and their producer to achieve the genre aesthetics, stylistic, and mood choices<br>• Note microphone choice, delay, reverb, compression, and other artistic effects like channel saturation during the production process |
| **Audio Postproduction Techniques** | • Studio observations as a reamping session studio assistant | • The Sweet Boys were able to communicate their desires to their producer to achieve the genre aesthetics, stylistic, and mood choices<br>• Note microphone choice and reverb during the reamping session of 'The Hound' as related to musical genre |

## 3.4 RESULTS

In this section, I demonstrate how three of the interdisciplinary approaches to musical genre classification, i.e., sociology of music, music theory analysis, and audio production techniques, are interconnected and influence each other throughout the creative processes of The Sweet Boys and their producer. I also show how these three aspects can help define genre aesthetics to better classify a song's genre. In the next subsections, I detail my observation of The Sweet Boys' use of all three musical genre classification aspects to meet different genre aesthetic expectations for various songs they recorded and performed over the course of their studio residencies.

### 3.4.1 SOCIOLOGY OF MUSIC: THE SOCIAL ASPECTS OF MUSIC-MAKING

Based on my grounded theory analyses of the data there were four social themes: environmental, musical genre aesthetics, cultural, and communicative. These themes were deductively determined based on Lena's works and inductively coded from my observations using 'theoretical sampling' based on 'constructivist' grounded theory methods (Lena & Peterson, 2008; Born & Haworth, 2017).

The Sweet Boys were influenced externally and subconsciously by the environment of the Canadian prairies during their Lethbridge stay. For instance, they produced and performed a song that was inspired by the melancholic thematic material of the Country music genre aesthetic. They later commented that the song may have been inspired by the Lethbridge area, so named it *'Lethbridge Lament'*. Another song that contained distant distressed screams was tracked after recording lyrics in reference to The Sweet Boys' and other American citizens' unrest with current social and political issues with their government. In this way, environmental, geographical, and political factors shifted from subconscious to conscious influences during their creative process.

These shifts continually occurred when I asked The Sweet Boys to identify genres and subgenres that influenced and classify their sound. They would refer to many genres and subgenres when consciously reviewing and categorizing the stylistic choices within their music as part of their compositional process. In my evening interview with the band members, many types of genres and subgenres were listed as inspirational or influential on their music's overarching aesthetic such as: Post-Rock, Math Rock, Shoegaze, Electronic Rock, Ambient, and Atmospheric. Each genre was suggested based on different song ideas that the band was working on. The main instruments used and their treatments within each song created the overall sound of the album and influenced which genre the band would label themselves. As well, the overall mood that the band was working towards was an 'airy' or 'floaty' sensation through the music. They agreed on the description Ambient Electronic Shoegaze as the genre for the new album they were recording.

There were no cultural limitations enforced upon the band as they experimented with their own instruments and the various auxiliary percussion instruments that the drummer, Andrew, played. The Sweet Boys used various cultural percussion instruments thanks to their availability in Adam Mason's percussion studio at the University of Lethbridge. The percussion instruments they chose to use came from cultural backgrounds other than those found in North America. This means that The Sweet Boys were not limited by the traditional playing style of their own Rock genre-based instrumentation, i.e., electric bass, electric and acoustic guitars, and a drumkit. From the start they also had the electronic genre built-in to their style due to their electronic instruments. The different percussion instruments greatly inspired and shaped the creative process of the album, influencing various sounds and sometimes even the whole song. They experimenting with extended and alternative playing techniques, such as bowing or using mallets

on cymbals and cymbal-like instruments. In this way, one of the auxiliary percussion instruments that was made of small metal discs became a thematic motif in the song *E Major Minor Briggs'*.

During one of the sessions, the tape looper started to have issues, which forced the band to try new techniques. The tape looper, when working properly, would capture sounds made in real time and loop them or hold pre-recorded sounds ready to be triggered. When the tape looper broke, similar tape looping effects were simulated by software. Using software and looping techniques opened new sound possibilities such as layering sounds with previously recorded material from the United States and the daily sessions in Lethbridge. The Sweet Boys utilized these possibilities when improvising material for new songs like '*E Major Minor Briggs'* and *'Rainy Drums'*. In this way, both the equipment available and the equipment flaws impacted on their songs' aesthetics.

The Sweet Boys musical gestures were also consciously influenced by their interactions with one another through their instruments. While performing together in the studio and on stage, I observed a 'Call and Response' communication pattern between the musicians. This social aspect of the creation process correlated with the manipulation of each of the band members' sounds processed by Logan. Much like a conversational flow of verbal communication, this style of playing makes the instrument mirror a bandmate's voice responding to another's previous call. The 'Call and Response' style has roots in the African-American Jazz's improvisation techniques, historically found outside the Western music tradition, and has influenced many other genres of music from today's popular music to the Avant-garde of The Sweet Boys (Berliner, 2009; Pras & Lavergne, 2015). As the band developed ideas in the studio, each person was influenced by what another was playing. For example, Andrew's drumming was improvised and spontaneously manipulated by Logan resulting in unexpected desired and undesired results. From there, Andrew would adapt his drumming technique to work with Logan's sound manipulations.

It is this type of continual reciprocity that fueled The Sweet Boys' creative process. When these moments were reviewed in the live room or later behind the board, I observed a shift from subconscious to conscious influences once they wanted to replicate a previously produced sound. The following table, Summary of Social Influences on The Sweet Boys, summarizes four different social themes that the band were influenced by while working in the studio and performing live.

Table 2: *Summary of Social Influences (Sweet Boys Case Study)*

| | |
|---|---|
| **Environmental** | • USA social and political unrest<br>• Lethbridge physical environment (Country) |
| **Musical Genre Aesthetics** | • Influential aesthetics:<br>  ○ Post-Rock, Math Rock, Shoegaze, Electronic Rock, ambient, and atmospheric<br>• How they classify their sound:<br>  ○ Ambient Electronic Shoegaze |
| **Cultural** | • No cultural limitations on instrumentation (aux. percussion & sampling)<br>• Use of extended or alternative playing techniques (using bows & mallets)<br>• Focus on making music for the listener experience, not radio plays |
| **Communicative** | • 'Call and Response' communication between instruments<br>• Reciprocity of individual ideas as musical expression(s) |

### 3.4.2 MUSIC THEORY ANALYSIS

During their studio residency, The Sweet Boys' used aspects of music theory that stemmed from improvisations or conversations between sets while still in the studio. During their recorded daily sessions, they would ask each other about what key, chord, or note another band mate was playing. An example would be while keyboardist Mikey was improvising chords, guitarist Kevin would confirm with him which full progression worked best and what slight changes they could make for the progression to sound even better. They would quickly run through the chord progression's notes a few times, coming to an agreement. It would be decided

right then, among bandmates, whether and how a music idea was going to be developed in a music theory context. If a musical idea was not able to be fleshed out after a few tries, or the band felt they needed some direction, they would move on until Pras could go through it with them. As the producer, she was able to guide The Sweet Boys to focus on the material that worked well to create more efficient and effective environment as they played in the studio or when they listened back in the control room. Most songs, including *'I Can't Be Your Man'* used this method to create musical motifs and ideas and was ready to be tracked for the rehearsal ProTools session and performed at their live show.

During The Sweet Boys' creative process there were instances where improvisational inspiration would affect the band's instrument choice much like with their bass drum and snare drum setup, also discussed further in later sections. An example of these rhythmic and timbre feature choices occurs in the track *'I Can't Be Your Man'*. Improvised rhythms by Andrew on drumkit inspired other members in the band, like Kevin to the point that a guitar motif became a hook for this song. Andrew's ideas, while drumming, also lead to Logan improvising with live processing delay effects on the drumkit to create the song's driving groove. This rhythm along with its timbral counterparts pulls the droning synthesizer sounds along with a forward momentum. Also, the snare is dampened and has a small splash cymbal attached to the side of it with Moongel[3]. By choosing this arrangement, they created a clap/double snare sound with a transient sharp. As well, a "thumpy bass sound" (Emge) from the kick drum is incorporated into the overall groove that The Sweet Boys wanted to achieve[4]. The overall texture of this song

[3] A self-adhesive gel pad that can applied to the surface of most percussion instruments. It is used to change the overall sound of the instrument by dampening or eliminating unwanted resonances.
[4] Quote from band member interviews during recording sessions.

transitions from a ‘thin’ lone drum riff that is built up with the addition of the keys and the guitar. A thicker texture is created by the live processing of the drums and additional synthesizer. Though there is harmony within the guitar riff, it acts more as a supportive low-end texture for the song due to the instrument’s timbre.

Melody and harmony are entangled by the keyboard, synthesizers, and vocals. The chords and melodic notes are repetitions and echoes of each other, which are also integrated into the notes of the vocal line. The building and thinning textures created by these features with the vocal line also helps to form sections within the song, creating a truncated rondo of ABACBA. The song begins with an introduction until the vocals occur, which is the start of A section. When the vocals end, they blend into a B section and the return to an A section without vocals. After the second A section there are transitions both into and out of the C section, which is made of echoes of both the A and B sections in a new form. The return to an extended B section transitions and blends into a brief A with an outro. This song’s variation on the truncated rondo form ends when the texture changes due to the drums and guitar no longer playing. Below is a ProTools screen capture of the song with markers denoting the sections. Over the course of developing *‘I Can’t Be Your Man’* the ending thin texture remained consistent as The Sweet Boys improvised small transitional songs that created a bridge to the next song. This is all noted in the following rough stereo mix caption of *‘I Can’t Be Your Man’*:

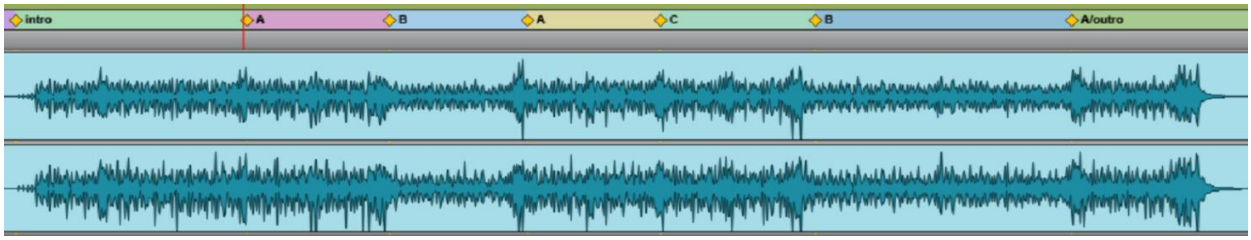


Figure 2: Rough Stereo Mix of ‘*I Can't Be Your Man*’ (with Truncated Rondo Sections)

In many ways *'I Can't Be Your Man'* demonstrates this aspect of musical genre classification as The Sweet Boys' use of the music theory; specifically harmony, melody, rhythm, timbre, texture, and form, assisted in producing their various desired aesthetic goals. These and other aspects were manipulated during other improvisations throughout their creative process until final decisions were made on which sections were solid song ideas to be developed fully and tracked for postproduction.

### 3.4.3 AUDIO PRODCTION TECHNIQUES

Upon completing my analysis, I found two distinct procedures occurring that defined how audio production techniques were applied, the production process and the postproduction process. Both used audio production techniques relating to microphone choice, microphone placement, microphone polar patterns, panning, reverb, delay, equalization, compression, and other effects. Though they use the techniques, the way they are used is very specific to the creative goals at that time and creates the need for two procedures to be differentiated. The production process documented The Sweet Boys and their producer's use of audio production techniques while recording in the studio. This differs from the postproduction process, which took place after the residency, where I observed the producer's decisions while reamping songs for the final albums mix.

#### 3.4.3.1 THE PRODUCTION PROCESS

During recording, The Sweet Boys processed their instruments using only a small amount of equalization and even less compression. By contrast, they added copious amounts of reverb, delay, and saturation. The band also used other effects to process pitches and speed. The sound The Sweet Boys developed for their newest album was "decided on them… [as being] both

ambient and atmospheric." (Holmes) [5]. One way that this sound was achieved is due to the microphone choices made and where they were placed. For instance, the Neumann U87 microphone's frequency curve has a flat midrange with a bump at 8KHz of around 5dB which allowed for a detailed recording of Mikey's piano playing (Neumann, 1996 [2021]). This made it ideal to use three Neumann U87 microphones to create the 3D image Mikey wanted of the studio baby grand piano. Two were set up as an AB stereo pair placed underneath the open lid of the piano, but under the piano cover to reduce bleeding source sounds from the drumkit that was setup across from the piano in the same room. The AB pair was set very close to the piano without concern about narrowing the low-end source sounds as the third U87 positioned under the piano to capture then. This third microphone was treated with a delay of eleven milliseconds. The combination of all three microphones created depth and clarity for the piano within the overall mix. Similarly, the bass guitar amplifier's microphone was placed to capture a realistic sound and include the weighted low-end of the instrument.

Other microphone choices and placements added to the aesthetic such as the two DPA4006 microphones with one for the left and one for the right side to capture the whole room's sound by being placed above the band, pointing at the ceiling, and flush with the walls. This microphone was chosen for its ability to authentically capture sounds due to the 'flatness' of its frequency band, having limited to no boosted or rolled off high or low end. This setup captures the high frequency ceiling reflections and avoids the wall reflections. During production, when this pair of microphones were mixed with the center room microphone, setup between the piano and the drumkit source sounds, they combined to create and replicate the *vibe* of the room

[5] Quote from band member interviews during recording sessions.

within the overall mix. The two systems, the pair of room microphones and the centre room microphones, are metaphorically linked by a 350-sample pre-delay applied to the DPA4006. Using this time alignment technique created a much larger sense of space, or 'atmospheric' aesthetic in postproduction.

To be sure that the appropriate sounds were captured there were many movements to the microphone placements between the guitars, auxiliary percussion, and one vocalist to achieve the different styles needed when those instruments were chosen for a song. As new sounds were produced, such as with the auxiliary percussion, we explored different microphone polar patterns. Changing the pattern from omni-directional, figure eight, and cardioid as needed within the mid-side setup captured less low-end effectively manipulating the proximity effects for each instrument as desired. We found using an omnidirectional polar pattern attained the "…high frequency vibe…" (Holmes) The Sweet Boys were looking for [6]. This was critical when recording the multitude of auxiliary percussion, on various tracks, which included tambourine, bells, chimes, and crotales to name a few. All of these were both hit and bowed to produce unique sounds as desired. One set of instruments that relied on audio production techniques both for production value and to meet aesthetic/mood goals were the keyboard, synthesizers, and Logan's Ableton setup before the signal reached his amp. Since both Logan and Mikey's setups were patched into separate mixers before being routed into the SSL Duality console, they were able to manipulate audio production features like panning, equalization, compression, and levels. Mikey's setup was controlled by his Yamaha digital mixer which included left and right stereo channels at two points in his signal chain. Within Mikey's signal chain was a DX7, a keyboard,

[6] Quote from band member interviews during recording sessions.

and a synthesizer that were all able to be manipulated by his Yamaha mixer. He would adjust his left and right equalization knobs to yield the desired affects and match the changes made to the sound produced by any three of the instruments.

A different electronic approach to music was displayed by Logan who used a tape looper, a launch pad, and Ableton on his laptop all directly inputted to his mixer which was hooked up to a microphoned amplifier. The microphone was then sent to the SSL Duality console. His signal chain not only allowed for him to play samples from his own database of previously made material, but also manipulate the drumkit, guitars, or any other live instruments using different audio production technique aspects. These aspects are reverb/delay, panning, equalization, compression, or other effects (like distortion) in real time with the band. In many ways his improvisational and composed parts within a song added an electronic aesthetic in varying degrees depending on how he 'played' his equipment. For some songs Mikey would process only the sounds produced by the drumkit, creating a saturation effect played along with the original source sounds in their song. In other songs Mikey was able to isolate and then manipulate different instruments as needed to suit their musical goals. The previous example *'I Can't Be Your Man'* as well as the Country inspired song, *'Lethbridge Lament',* display and emphasize The Sweet Boys*'* use of audio production aspects to realise their style/mood/aesthetic goals depending on the song that they are performing. The table titled The Sweet Boys' Microphone Choice/Placement List in the Appendix details the microphones used and their placements for each instrument during the recording process.

#### 3.4.3.2 THE POSTPRODUCTION PROCESS

The postproduction process observed for this case study took place during the Fall 2018 term in MUSI 3630/5630 and the semester after, Spring 2019, by completing assignments and

participating in a reamping session. These instances repeated the use of some audio production techniques but applied them differently. My own assignments made use of delay, reverb, panning, equalization, and compression as part of the mixing and mastering procedures of *'I Can't Be Your Man'*. This gave me more insight into the treatment of the bass drum and snare drum as a grounding groove for the song, discussed earlier.

This hypothesis was solidified by my own work in *'The Hound'*, a much slower and completely different genre of song from *'I Can't Be Your Man'*, but which also has rhythm driven motifs. Some tracks of *'The Hound'* and *'Rainy Drums'* were reamped with large acoustics by their producer, Pras, to accommodate the band's request of a *soupier* sound for their mixes. She suggested reamping the piano, vocals, and electronic tracks of these songs through Meyer sound speakers in the University Recital Hall, and guitar tracks through a cranked Fender Princeton guitar amplifier in the Fine Arts Building's concrete main stairwell.

Figure 3: Amplifier and Microphone Setup in Fine Arts Stairwell for Reamping.

Pras offered students the opportunity to help as studio assistants, running cables and setting up microphones, and to oversee the methods she used to achieve this soupier sound without muddling the overall mix. Understanding and paying careful attention to how the reamping affected individual elements within the mix is an essential part of an audio professional's job. To

prevent muddying the overall mix, Kevin's previously recorded guitar part was re-recorded through a cranked guitar amplifier approximately in the middle of the stairwell and resulted in a clearer direct sound than the ambiently reflective Recital Hall. An M149 microphone was placed halfway up one flight of stairs facing the opposite direction of the amplifier to capture the reflections throughout of the building, thus creating a sensation of 'room mic'. After the reamping session, in an email between Kevin and Pras, Kevin stated that he liked that his guitar was sounding like a dinosaur because of the effect. Other parts of the mix, excluding channels with room microphones, were patched to the Meyer speakers in the University Recital Hall. These speakers were mic'd with the stereo pair system, each microphone set about eight feet back from the speakers, to capture the reflections in the hall. Both locations were recorded and treated using the SSL in Studio One to produce the best mix of created reverb. The recordings from the reamping session were successfully added to originally recorded and mixed tracks of '*The Hound'* thus fulfilling the artistic intents of The Sweet Boys and the musical vision of their producer. Later, Pras would apply the audio production technique delay to the reamped tracks in the mix to create depth in the stereo image and avoid 'muddiness' (Pras, 2020).

## 3.5 DISCUSSION

Drawing upon Born (Born, 2011) and Lena (Lena, 2012), I have highlighted the importance of social, musical, and audio production techniques in my analysis of The Sweet Boys. My analysis of the social aspect of genre creation and classification focused on the interconnection of the physical, social, and political environment; musical genre aesthetics; equipment; and communication (Lena & Peterson, 2008; Born et al., 2017). Influenced by Lena's work on the genre lifecycle, I highlighted how various physical, social, and political influences shaped the genre aesthetic choices made by The Sweet Boys' and Nicole's self-classification. The genre or artistic style that both the band and Nicole identify with are firmly within Lena's Avant-garde lifecycle (Lena, 2012). The film captured the Avant-garde nature that inspires both Nicole and The Sweet Boys. The musical genre aesthetics of The Sweet Boys revealed various influences from the Post-Rock, Math Rock, Shoegaze, and Electronic Rock subgenres which are a part of today's underground and historically popular music scenes (Lena, 2012). These genres were used to help classify their own 'sound' called Ambient Electronic Shoegaze. The equipment/instruments used were integral to how the band communicated, not just verbally, but also using experimental and improvisational musical gestures to meet their genre aesthetic goals (Born et al., 2017). Together, the five identified areas: the natural and sociocultural environment, politics, genre traditions, communication, and equipment impacted The Sweet Boys' and their producer's creative processes both subconsciously and consciously (Eno, 2017 [1966]; Thompson, 2019).

Part of The Sweet Boys' creative process is their use of other genre aesthetics and music theory terms as descriptors to communicate their ideas. The Sweet Boys and Pras referenced the popular music genre Country and discussed which melodies and harmonies to use to artistically

express the band's own *'Lethbridge Lament'*. This showcases how their original content is placed within the context of the larger field of music. These long standing highly regarded areas were weaved into The Sweet Boys' work and show how it is "valued by the social organization that understands and uses the domain" (Thompson, 2019, p. 5). The domain in this instance is the music industry. The Sweet Boys' creative process of listening back to daily recorded improvisation sessions reflects how the recording studio can move "the definition of creativity...beyond the inexplicable to acknowledge these broader interactions and influences" (Thompson, 2019, p. 16; Born et al., 2017).

Audio production techniques have been analyzed in countless studies pertaining to musical genre classification. One such study by Hilsamer and Herzog, examined compressor presets as "input signal statistics…which could be the typical statistics of [musical] genre" (Hilsamer & Herzog, 2014, p. 35). Popular music genres have been at the center of similar studies, e.g.: Hodgson (2021) and D'Errico (2015), that focused on the rhythms and dynamics in Hip-Hop music while others analyze the how dynamic range compression is distinctly used within a musical genre, like Electronic Dance Music (EDM) (Brøvig-Hanssen et al., 2020). The Sweet Boys and Pras' use of audio production techniques gave results that displayed their interconnection to genres. When examining the treatment of the bass and snare drums, in songs like *'I Can't Be Your Man'* and *'The Hound'*, it became clear how integral these elements are to a song's artist style. Their audio production treatments, like compression, influenced each song's rhythm and groove which are integral in defining musical genres. In this way, *'I Can't Be Your Man'* and *'The Hound'* used specific audio production techniques to emulate the artistic styles of American popular music while respecting the artists Avant-garde classification.

The Sweet Boys focused on making music as an experience that could transcend their listener's minds and they stated that they had no interest in filling up stadium seats like mainstream popular artists do (McDermott & Pras, 2021). The band's focus on listener experiences can be linked to the aesthetics that influenced the band, such as the genres of Post-Rock, and Shoegaze. Such statements about Western popular music reaffirm their position in Lena's genre lifecycle model as Avant-garde artists (Lena & Peterson, 2008). This was reflected during their studio residency by performing smaller, intimate shows on the university campus. The band's music was heard by Born's second and third planes as their producer, the university students and faculty, Lethbridge community members, and I attended their live performances (Born, 2011).

## 3.6 CONCLUSION

I observed all three genre-defining aspects of the sociology of music, music theory analysis, and audio production techniques while The Sweet Boys were creating new music at the University of Lethbridge. The Sweet Boys were externally, consciously, and unconsciously influenced by the social aspects of music-making during their creative process. The sociology of music field also provided a framework to analyze the influence of different genres has on their work. As well, The Sweet Boys manipulated musical features from music theory such as rhythm, harmony, melody, timbre, form, texture. They were able to utilize audio production technique aspects during production or postproduction through microphone choice, microphone placement, microphone polar patterns, delay, reverb, panning, equalization, and compression to fulfill their genre expectations for each song on their album. The bands' and audio professionals' characterization and manipulation of popular subgenre aesthetics confirms the relevance of identifying the intertwined social aspects with past artistic references and audio technologies in contemporary music creation.

# CHAPTER 4: CASE STUDY #2: THE BILLBOARD6:2019 CORPUS

## 4.1 INTRODUCTION

Most corpora and datasets that include genre classifications use short excerpts of songs, e.g., less than thirty seconds, making it difficult to identify what audio production techniques were used and associate them to specific genres (Balen, et al., 2015; Collins, 2015). Therefore, I designed a new corpus, Billboard6:2019 found in Appendix 5, which references full-length tracks for future researchers to potentially analyze the different audio production techniques used in Western popular music with both MACs and MIRs. As such, most of the Billboard6:2019 corpus' genres classifications can be considered ground truths, or the 'correct answer', if used to develop audio production technique feature vectors in MIRs. The Billboard6:2019 corpus can also be used to explore and identify aspects of the Western music industry, the popular music it produces, and the reflected limitations and bias that are perpetuated by computer algorithms (Nishina, 2017; Olivet, 2018; Olivet, 2019; Cottom, 2016).

The first section of this case study provides contextual information about the history and types of data that have been collected to create the different Billboard charts, and about the way these charts have been curated with the aid of MIR-based systems (Billboard, 2013). MIRs are integrated into the Billboard charts because they are based partly on information from streaming platforms, like Spotify and YouTube, which main functions are preformed using MIRs (Billboard, 2013).

The methodology section outlines my process of building the Billboard6:2019 corpus using a partial snapshot of the 2015 to 2018 Billboard charts of six genres: Pop, Rock, Country, Dance/Electronic, R&B/Hip-Hop, and Latin. I chose these six genre charts because they are

counted among Western popular music's most predominant genres (Lena & Peterson, 2008). This section also situates my Billboard6:2019 corpus within my analysis framework, which is based Born, Lena, Cottom, and Noble's works.

Informed by my literature review, I highlight three of the most common problematic areas in Billboard6:2019 corpus: song and artist saturation, blurred genre boundaries, and gender representation. Various studies, like Goulart (2019); Lewis (2017); Molanphy, 2014; and Smith, Choueiti, and Pieper (2018), have emphasized the biases and limitations of the Billboard charts. One of my objectives for this case study is to thoroughly comb through the original charts to shed light on disparities and inequalities that can occur in a new dataset made from other popular music charts (Schreiber, 2015; Strum, 2012). For instance, the boundaries that distinguish genres such as Pop-Rock versus Country Pop are not clear. This is partly due to the music industry's long-standing idea that if an artist wants to get onto a chart, they should sound more like other Pop songs, so Pop genre aesthetics became a common ground for most Western popular music genres (Molanphy, 2014). This advice is not directly linked to the Billboard charts methodology, however it has informed the production choices of artists and their producers for many decades and inadvertently affected how popular music sounds today.

This case study presents the creation of the Billboard6:2019 corpus and a documented analysis of its six genre corpora that are easily accessible and well organized, which is critical to the longevity and recreation of a dataset for other studies to validate past innovations and to make future discoveries (Gomez et al,, 2016; Peeters & Fort, 2012). By repurposing an industry standard corpus, i.e., the Billboard charts, I argue how my Billboard6:2019 corpus provides the foundations of a popular music corpus that industry professionals can use with both MACs and

MIRs to identify and categorize genres based on audio professionals' choice and use of audio production techniques.

## 4.2 CONTEXT

Billboard started as a weekly printed magazine in the United States, specifically Cincinnati, Ohio on November 1, 1894 (Lampel et al., 2006). The company first published bills for traveling carnivals and live performances (Nishina, 2017). Later, its publications focused on music with articles that covered the invention of music technology such as the phonograph, record players, and wireless radios (Lampel et al., 2006). On January 4th, 1936, Billboard published its first music chart and has since been expanding their charts (Sale, 2011). Today, Billboard has a massive readership and claims to be "music's most definitive music ranking and [a] benchmark for success" (Rojas, 2019, p. 4). Due to this, Billboard is reflective of the United States popular music culture, making it appropriate to use in a North American case study on popular music genres.

Billboard has a history of collecting listeners' taste data to calculate their music charts. Rankings were originally determined by airplay and singles sales from 1958 to 1991 (Nishina, 2017). In 1991, Billboard incorporated *SoundScan* to collect data digitally, and therefore dropped the requirement that a song had to have been released as a single to be included on charts (Nishina, 2017). When calculating chart rankings, Billboard included digital download information from platforms like iTunes in 2005, and on-demand MIRs-based streaming platforms like Spotify in 2012 (Nishina, 2017). The most recent addition was in 2013 when Billboard integrated YouTube video views into their ranking methodology (Nishina, 2017). Finally, touring data and social interaction data is now collected from venues and sites like Facebook and Twitter (Billboard, 2019). It is assumed that the more hits a song has using any of these methods, the more it is liked by society. The Billboard charts' pulls information from MIRs-based streaming platform's listener data and uses it heavily within their ranking methodology (Billboard, 2013).

As such, streaming platform's weekly populated playlists with 'top listened to songs' have strong correlations with that week's Billboard charts. However, there may be slight variations from the playlists in the charts as Billboard's methodology uses more than streaming platform listeners habits, such as broadcast radios' airtime and frequency.

The Billboard *Hot 100* charts uses data collected from "retail and internet CD sales, the number of broadcast radio plays, and the number of downloads from cooperating websites" across all charted musical genres to determine one hundred of most popular songs every week. (Nishina, 2017, p. 125; Billboard, 2019). Currently, Billboard partners with *Nielson Music* which uses the same methodology that other industry merchants use to track the inventory of 90% of the United States' music retail market (Billboard, 2013). The sales data from *Nielson Music* include, among others, direct-to-consumer sales in stores and online, and "a limited array of verifiable sales from concert venues" (Billboard, 2013). The Billboard charts use the *Nielson Music* airplay monitoring feature to calculate rankings by monitoring commercial station airwaves in over 140 Unites States markets (Billboard, 2013). This data is cross-referenced with data from *Arbitron* a system that indicates which song is played on which stations. It should be noted that *Arbitron* weights a song more heavily when it is played on a station with a large audience at peak listening times (Billboard, 2013). This supposedly allows the Billboard charts to take radio show attendance into consideration knowing the approximate number of listeners at different times and for different stations.

All of this data is used by various cultural intermediaries to meet their own music selection needs, such as radio disc jockeys who pick songs for airplay based on streaming platform playlists and Billboard chart rankings. Commercial radio stations can use these charts to stay 'on trend' with what is happening in the music industry. Songs with above average play rate

data are filtered into ‘trending’ playlists on streaming platforms. Platforms’ play data is then fed into other affiliated companies’ charts, like Billboard. The resulting feedback loop generates a vacuum of taste bias in popular music perpetuated by cultural intermediaries. Thus, charts like Billboard’s create a taste bias, even if inadvertently, of what the audiences perceives to be the ‘hottest’ popular music. An example of such taste bias is found in the top five songs for each of Billboard’s *Hot 100* charts in 2017, where Drake appeared eight out of forty times making up 20% of the year’s ‘hottest’ songs (Olivet, 2019). The resulting artist saturation can imply that music consumers in 2017 really liked listening to Drake due how much he saturated the chart. Other studies reveal different forms of saturation, like musical composition preferences, which can imply other forms of taste bias that are being reflected within popular music charts (Olivet, 2018; Nishina, 2017). As well, this feedback loop being partially driven by computerized information which is subject to present unintentional bias that are reflective of the music industry like gender inequalities (Cottom, 2016). Overall, the influence of Billboard charts on society seems immeasurable considering that other music media are influenced by them.

## 4.3 METHODOLOGY

### 4.3.1 CREATING THE BILBOARD6:2019 CORPUS

I created each genre in the Billboard6:2109 corpus based on the songs that appeared in the Billboard charts' top 10 rankings from December 29, 2018, until it reached a minimum of one hundred unduplicated songs. Drawing upon the reviewed literature, I aimed to avoid foreseeable challenges that imbalanced datasets can create, such as skewed or inaccurate results by establishing aspects of my methodology early on. The following choices were made to focus on recordings that are available on global streaming platforms and were primarily produced in commercial or independent professionals' studios. My methodology will also ensure consistency in the Billboard chart's selection methodology:

- Only studio recordings are included (no live performances).
- As close to equal amounts of data will be collected for each genre specific corpus.
- Charted songs must be available on Spotify and/or found by label publication ID.
- Covers versions are included; defined as "a new recording of an old song by a different band." (Oxford Learner's Dictionary, 2021).
- Songs with the same name repeated for multiple weeks on the same Billboard chart are only included once.
- Artists and songs can be duplicated across the different genre charts. A duplicate song is the same composition with the same performers and the same production.
- Data cannot be collected from charts that were published before 2013 due to changes in Billboard's methodology used to calculate charts' rankings, e.g., addition of YouTube consumer statistics.

For the Billboard6:2019 corpus to be easily reproduced for future studies, I 'tagged' each song with a unique sample number, the genre chart(s) it belonged too, the last chart position it appeared on that Billboard genre chart, the song's title, the name of the main artist(s), and the date of the that weekly charts' publication.

One of the challenges that occurred during data collection was the weekly publication rate of the Billboard charts. On the last publication date recorded, some of the charts had so many new songs that appeared in the top ten rankings that it put the genre corpus total over one hundred songs. However, was done to ensure that the full top ten of the publication date was included. As well, the number songs over the one hundred minimum for any genre chart were not an concerning amount that could potentially skew future genre-based classification research.

The first songs of each genre corpus appeared in the Billboard charts on the same publication date. If a song appeared on the same chart for consecutive weeks, the duplicate song was not included again in that corresponding genre corpus. This meant that months of publication dates go by with minimal to no song changes occurring in the top ten rankings. Therefore, the Billboard6:2019 corpus' publication dates range from 2015 to 2018, referencing the Billboard charts' publication dates. As such, isolated by year does not provide an equal number of songs per genre chart. If only one year, say 2018, was chosen then the Rock dataset would have fifty-six songs and the Dance/Electronic dataset would have forty-two songs.

### 4.3.2 BILLBOARD6:2019 CORPUS ANAYLISIS FRAMEWORK

The analysis framework used for my Billboard6:2019 case study is based models and concepts discussed in Born, Lena, and Cottom, and Noble's research. My analysis framework is linked with Born's first, third, and fourth planes (Born, 2011). All of the artists that appear on the Billboard charts are a part of Born's first plane and are cultural intermediaries of that

corresponding popular music genre within the Western music industry field (Bourdieu, 1993 [1983]). The third plane focuses on the global audience of Western popular music consumers due to the Billboard charts methods of tracking listener information. Born's fourth plane in this case study are the institutions that influence the Western popular music industry which include global cultural intermediaries such as the radio disc jockeys that utilize the Billboard charts (Born, 2011) (Thompson, 2019). The Billboard charts are used mainly to track the rankings of popular music within the Western music industry. Therefore, the songs and artists are all apart of genres that are those most integrated into society through institutions like FM radio and streaming platform services. As such, the six popular music genres, Pop, Rock, Country, Dance/Electronic, R&B/Hip-Hop, and Latin, used in my Billboard6:2019 case study are situated in the institutional area of Lena's lifecycle theory (Lena, 2012). Both Borna and Lena's models highlights the Billboard charts interconnections between society and musicians creating popular music, their consumers, and the cultural intermediaries within the Western music industry.

The Billboard charts integration and reliance on computer-based algorithms to populate various charts rankings, like the six genre charts used to curate the Billboard6:2019 corpus, can result in exaggerated reproductions of bias and stereotypes found within society (Cottom, 2016; Noble, 2018). Along with previous corpus studies analysis results, such as the artist saturation found in the Million Song Dataset with ~955, 255 repeated artists, I decided to use a spreadsheet document to add metatags to each song in the Billboard6:2019 corpus so I could run formula and sorting operations to examine the song and artist saturation, blurred genre boundaries, and gender representation.

I tracked the dates that each genre's chart spans, the rate at which a total of one hundred songs in the genre corpus is reached, and how often a new artist entered the scene in that genre

chart. When I calculated how many days have passed between the first and last charts for each genre and the whole corpus as a whole the Billboard6:2019 corpus displayed how unstable the song ranking positions within the field of popular music are. I also analyzed the phenomenon of saturation that occurs when the same song or artist, individually or collaboratively, appears repeatedly within a singular defined genre's chart. Song saturation and blurred genre boundary lines is by having songs that appear on more than one chart. The appearance of an artist on more than one chart was expected, but I did not expect to see duplicated songs on the different charts. An example of the unexpected duplication is *Panic! At The Disco*'s "High Hopes" appearing at number one on December 29th, 2018, in both the *Pop Songs* and *Hot Rock Songs* charts. I analyzed the rate at which these duplicates occurred. The artist saturation data provided insights to each genre's top ten positions are more volatile than others, thus creating a competitive environment. I also calculated the phenomenon of artist saturation by counting how many times an artist appears within each genre's chart, showcasing the 'powerhouses' of that specific genre during the time that the chart spans (Junos, 2020). I then compared the 'powerhouses' of the six genres of the corpus. Running similar tests using metadata tags that classified each artist's gender, based on presentation and recent media press releases, I was able to identify the gender bias that occurs within each of the Billboard6:2019 genre's charts and corpus as a whole.

## 4.4 RESULTS

Each resulting genre corpus consists of 100 or 101 unduplicated songs corresponding to the genre-based Billboard chart starting at December 29, 2018. The charts end on the following dates: November 19, 2018 [Pop]; May 13, 2017 [Rock]; March 4, 2017 [Country]; October 31, 2015 [Dance/Electronic]; June 10, 2017 [R&B/Hip-Hop]; and May 7, 2016 [Latin]. The Pop, Rock, and Latin charts have an 'extra' song, as opposed to Country, Dance/Electronic, and R&B/Hip-Hop charts that have one hundred songs. This is because the last week's worth of data collected had two new songs in Billboard's Latin chart, bringing the total to one hundred one. Table 3 includes the number of days that it took each genre chart of the Billboard6:2019's corpus to reach one hundred or one hundred one songs for each genre corpus. It also features the number of new artists that have made it into the Billboard charts top ten ranking for each genre, which are the number of unique artists for each genre chart in the Billboard6:2019.

### 4.4.1 SONG SATURATION

The less time it took a Billboard6:2019 genre chart to reach the minimum one hundred songs, more competitive that genre is. This is due the methodology I used to curate each of the Billboard6:2019 genre charts, that songs on genre-based Billboard charts ranked within the top ten multiple times were not recorded. Therefore, in Table 3, we observe that the most competitive genre of the Billboard6:2019 corpus is Pop, with one hundred one new top ten Billboard songs within forty-one days. Table 3 also displays remaining most competitive genres in descending order with their corresponding total days spanned as Dance/Electronic [568 days], Rock [596 days], Country [666 days], Latin [967 days], and finally R&B/Hip-Hop [1156 days].

Table 3: *Most to Least Competitive Billboard Genre Charts (Billboard6:2019)*

| Genre | Date Range | # of Days | Song Count | Artist Count |
|---|---|---|---|---|
| **Pop** | November 19, 2018 - December 29, 2018 | 41 | 101 | 164 |
| **Dance/Electronic** | October 31, 2015 - December 29, 2018 | 568 | 100 | 112 |
| **Rock** | May 13, 2017 - December 29, 2018 | 596 | 101 | 112 |
| **Country** | March 4, 2017 - December 29, 2018 | 666 | 100 | 119 |
| **Latin** | May 7, 2016 - December 29, 2018 | 967 | 101 | 213 |
| **R&B/Hip-Hop** | June 10, 2017 - December 29, 2018 | 1156 | 100 | 202 |
| **Total Counts:** | | **1156** | | |
| **Total Counts with duplicates:** | | | 603 | 922 |
| **Total Counts without duplicates:** | | | 584 | 382 |

There are many songs across all of the Billboard charts that have the same song title. I used MACs to determine if they songs with the same title within the Billboard6:2019 corpus was a song that repeatedly appeared. Doing so revealed ninety-four instances where a song of the same title was a repeated within the Billboard6:2019 corpus. These ninety-four repeated songs can be classified into one of three types: same name, cover, or duplicate song.

Twelve of repeated songs have the same title but are musically and lyrically different. These repeated songs are classified as same name songs. For example, *'Walk On Water'* is performed by Thirty Seconds To Mars, sample number 146 (S#146), is categorized as Rock. A song with the same title, identified as S#486, is performed by Eminem featuring Beyonce but appeared on Billboard's R&B/Hop-Hop genre chart. Despite the songs having the same name, they are two distinctly different songs and therefore cannot be classified as covers. Currently, this type of classification can only be done using manually auditory classification (MACs) which relies on an individual listening and sorting to each song.

The other category that requires MACs to classify repeated songs within the Billboard6:2019 corpus is cover songs. Only two of the repeated songs fit into this category, one being the original and the second featuring different artists who are performing the same song.

The song *'Zombie'* originally performed by The Cranberries is tagged as S#151 and the Bad Wolves version as S#124. Both of these songs only appear on Billboard's Rock chart.

Excluding the same name and cover songs from the original ninety-four, there are forty songs repeated at least twice in that Billboard6:2019 corpus, making up the remaining eighty songs. These songs all have different sample numbers because they appear on different genre charts but have a song with the same title, preformed by the same artist(s), and are musically and lyrically the same. As repeated songs appearing in the top ten over multiple weekly publications within each Billboard genre chart were skipped, none of these duplicated songs appear more than once within a Billboard6:2019 genre chart. As such, duplicated songs charted in two different genre-based Billboard charts which is then reflected in the Bollboard6:2019 corpus. An example of Billbaord6:2019's duplicate songs are *'1-800-273-8255'* by Logic featuring Alessia Cara & Khalid as S#52 in the Pop corpus and S#483 in the R&B/Hip-Hop corpus. Another example could be S#65, S#346, and S#493 which labels *'Feels'* by Calvin Harris featuring Pharrell Williams, Katy Perry & Big Sean within the Pop, Dance, and R&B/Hip-Hop corpora. We observe that there are several duplicates for five out of the six genre-based Billboard charts, but none for the songs that are included in the Latin corpus.

Table 4 highlights the forty songs that have the same song title as other songs in the corpus with their classifications as covers, same name, and duplicated songs, making their identification within the corpus more efficient.

Table 4: *Snapshot of Repeated Songs in the Billboard6:2019 Corpus*

| Cover/ Same Name/ Duplicate | Sample # | Chart Genres | Song | Artist |
|---|---|---|---|---|
| **Cover** | 124 | Rock | Zombie | Bad Wolves |
| | 151 | Rock | Zombie | The Cranberries |
| **Same Name** | 285 | Country | Deja Vu | Lauren Duski |
| | 563 | Latin | Deja Vu | Prince Royce & Shakira |
| **Same Name** | 84 | Pop | Mercy | Shawn Mendes |
| | 226 | Country | Mercy | Brett Young |
| **Same Name** | 261 | Country | Light It Up | Luke Bryan |
| | 383 | Dance/Electronic | Light It Up | Major Lazer Featuring Nyla & Fuse ODG |
| **Duplicate/ Same Name** | 59 | Pop | Unforgettable | French Montana Featuring Swae Lee |
| | 487 | R&B/Hip-Hop | Unforgettable | French Montana Featuring Swae Lee |
| | 260 | Country | Unforgettable | Thomas Rhett |
| **Same Name** | 29 | Pop | Wait | Maroon 5 |
| | 333 | Dance/Electronic | Wait | Chantel Jeffries Featuring Offset & Vory |
| **Same Name** | 146 | Rock | Walk On Water | Thirty Seconds To Mars |
| | 486 | R&B/Hip-Hop | Walk On Water | Eminem Featuring Beyonce |
| **Duplicate** | 503 | Latin | Taki Taki | DJ Snake Featuring Selena Gomez, Ozuna & Cardi B |
| | 304 | Dance | Taki Taki | DJ Snake Featuring Selena Gomez, Ozuna & Cardi B |
| **Duplicate** | 70 | Pop | That's What I Like | Bruno Mars & Cardi B |
| | 490 | R&B/Hip-Hop | That's What I Like | Bruno Mars & Cardi B |
| **Duplicate** | 68 | Pop | I'm The One | DJ Khaled Featuring Justin Bieber, Quavo, Chance The Rapper & Lil Wayne |
| | 495 | R&B/Hip-Hop | I'm The One | DJ Khaled Featuring Justin Bieber, Quavo, Chance The Rapper & Lil Wayne |
| **Duplicate** | 17 | Pop | No Brainer | DJ Khaled Featuring Justin Bieber, Chance The Rapper & Quavo |
| | 429 | R&B/Hip-Hop | No Brainer | DJ Khaled Featuring Justin Bieber, Chance The Rapper & Quavo |

| | | | | |
|---|---|---|---|---|
| **Duplicate** | 101 | Pop | Cold Water | Major Lazer Featuring Justin Bieber & MO |
| | 366 | Dance/Electronic | Cold Water | Major Lazer Featuring Justin Bieber & MO |
| **Duplicate** | 52 | Pop | 1-800-273-8255 | Logic Featuring Alessia Cara & Khalid |
| | 483 | R&B/Hip-Hop | 1-800-273-8255 | Logic Featuring Alessia Cara & Khalid |
| **Duplicate** | 8 | Pop | Better Now | Post Malone |
| | 409 | R&B/Hip-Hop | Better Now | Post Malone |
| **Duplicate** | 91 | Pop | Closer | The Chainsmokers Featuring Halsey |
| | 358 | Dance/Electronic | Closer | The Chainsmokers Featuring Halsey |
| **Duplicate** | 291 | Country | Fast | Luke Bryan |
| | 298 | Country | Fast | Luke Bryan |
| **Duplicate** | 51 | Pop | Feel It Still | Portugal, The Man |
| | 131 | Rock | Feel It Still | Portugal, The Man |
| **Duplicate** | 65 | Pop | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean |
| | 346 | Dance/Electronic | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean |
| | 493 | R&B/Hip-Hop | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean |
| **Duplicate** | 36 | Pop | Finesse | Bruno Mars & Cardi B |
| | 464 | R&B/Hip-Hop | Finesse | Bruno Mars & Cardi B |
| **Duplicate** | 32 | Pop | God's Plan | Drake |
| | 438 | R&B/Hip-Hop | God's Plan | Drake |
| **Duplicate** | 4 | Pop | Happier | Marshmello & Bastille |
| | 303 | Dance/Electronic | Happier | Marshmello & Bastille |
| **Duplicate** | 99 | Pop | Heathens | twenty one pilots |
| | 185 | Rock | Heathens | twenty one pilots |
| **Duplicate** | 1 | Pop | High Hopes | Panic! At The Disco |
| | 102 | Rock | High Hopes | Panic! At The Disco |
| **Duplicate** | 37 | Pop | Him & I | G-Ezay & Halsey |
| | 471 | R&B/Hip-Hop | Him & I | G-Easy & Halsey |
| **Duplicate** | 18 | Pop | I Like It | Cardi B. Bad Bunny & J Balvin |
| | 416 | R&B/Hip-Hop | I Like It | Cardi B, Bad Bunny & J Balvin |
| **Duplicate** | 338 | Dance/Electronic | I Miss You | Clean Bandit Featuring Julia Michaels |

| | | | | |
|---|---|---|---|---|
| | 341 | Dance/Electronic | I Miss You | Clean Bandit Featuring Julia Michaels |
| **Duplicate** | 19 | Pop | In My Feelings | Drake |
| | 418 | R&B/Hip-Hop | In My Feelings | Drake |
| **Duplicate** | 71 | Pop | It Ain't Me | Kygo & Selena Gomez |
| | 344 | Dance/Electronic | It Ain't Me | Kygo & Selena Gomez |
| **Duplicate** | 94 | Pop | Let Me Love You | DJ Snake Featuring Justin Bieber |
| | 356 | Dance/Electronic | Let Me Love You | DJ Snake Featuring Justin Bieber |
| **Duplicate** | 38 | Pop | Let You Down | NF |
| | 470 | R&B/Hip-Hop | Let You Down | NF |
| **Duplicate** | 14 | Pop | Lucid Dreams | Juice WRLD |
| | 411 | R&B/Hip-Hop | Lucid Dreams | Juice WRLD |
| **Duplicate** | 34 | Pop | Meant To Be | Bebe Rexha & Florida Georgia Line |
| | 206 | Country | Meant To Be | Bebe Rexha & Florida Georgia Line |
| **Duplicate** | 60 | Pop | No Promises | Cheat Codes Featuring Demi Lovato |
| | 339 | Dance/Electronic | No Promises | Cheat Codes Featuring Demi Lovato |
| **Duplicate** | 24 | Pop | One Kiss | Calvin Harris & Dua Lipa |
| | 310 | Dance/Electronic | One Kiss | Calvin Harris & Dua Lipa |
| **Duplicate** | 79 | Pop | Paris | The Chainsmokers |
| | 359 | Dance/Electronic | Paris | The Chainsmokers |
| **Duplicate** | 33 | Pop | Pray For Me | The Weeknd & Kendrick Lamar |
| | 452 | R&B/Hip-Hop | Pray For Me | The Weeknd & Kendrick Lamar |
| **Duplicate** | 22 | Pop | Psycho | Post Malone Featuring Ty Dolla $ign |
| | 435 | R&B/Hip-Hop | Psycho | Post Malone Featuring Ty Dolla $ign |
| **Duplicate** | 77 | Pop | Rockabye | Clean Bandit Featuring Sean Paul & Anne-Marie |
| | 368 | Dance/Electronic | Rockabye | Clean Bandit Featuring Sean Paul & Anne-Marie |

| | | | | |
|---|---|---|---|---|
| **Duplicate** | 45 | Pop | Rockstar | Post Malone Featuring 21 Savage |
| | 453 | R&B/Hip-Hop | Rockstar | Post Malone Featuring 21 Savage |
| **Duplicate** | 73 | Pop | Something Just Like This | The Chainsmokers & Coldplay |
| | 323 | Dance/Electronic | Something Just Like This | The Chainsmokers & Coldplay |
| **Duplicate** | 66 | Pop | Stay | Zedd & Alessia Cara |
| | 343 | Dance/Electronic | Stay | Zedd & Alessia Cara |
| **Duplicate** | 26 | Pop | The Middle | Zedd, Maren Morris & Grey |
| | 306 | Dance/Electronic | The Middle | Zedd, Maren Morris & Grey |
| **Duplicate** | 47 | Pop | Thunder | Imagine Dragons |
| | 118 | Rock | Thunder | Imagine Dragons |
| **Duplicate** | 30 | Pop | Whatever It Takes | Imagine Dragons |
| | 132 | Rock | Whatever It Takes | Imagine Dragons |
| **Duplicate** | 63 | Pop | Wild Thoughts | DJ Khaled Featuring Rhianna & Bryson Tiller |
| | 489 | R&B/Hip-Hop | Wild Thoughts | DJ Khaled Featuring Rihanna & Bryson Tiller |
| **Duplicate** | 41 | Pop | Wolves | Selena Gomez x Marshmello |
| | 327 | Dance/Electronic | Wolves | Selena Gomez x Marshmello |

### 4.4.2 ARTIST SATURATION

Table 5 presents the ‘powerhouse’ artist(s) of the entire Billboard6:2019 corpus and for each genre chart from most to least predominant. The ‘powerhouse’ artist for the corpus overall is The Chainsmokers with seventeen occurrences across five genre charts. This artist also dominates the Dance/Electronic genre with fourteen songs. The ‘powerhouse’ of Latin music is J Balvin, who also charted fourteen songs. The ‘powerhouses’ of the Rock chart are Imagine Dragons who charted with ten songs. Drake is also a ‘powerhouse’ with ten songs on the R&B/Hop-Hop chart. The ‘powerhouses’ with the smallest number of songs, six, are Halsey and Thomas Rhett in the Pop and Country genre charts, respectively.

Table 5: *'Powerhouse' Artist(s) of the Billboard6:2019 Corpus*

| Corpus Name | Artist | Occurrences |
|---|---|---|
| **Full Dataset** | The Chainsmokers | 17 |
| **Dance/Electronic** | The Chainsmokers | 14 |
| **Latin** | J Balvin | 14 |
| **Rock** | Imagine Dragons | 10 |
| **R&B/Hip-Hop** | Drake | 10 |
| **Pop** | Halsey | 6 |
| **Country** | Thomas Rhett | 6 |

Table 6 presents the ‘elite’ artists, i.e.: the artists who released at least four songs that appeared in the top ten ranking in addition to the ‘powerhouse’ for each genre corpus. The genre-based ‘powerhouse’ analysis also showed a distinct barrier that separates a few frequently occurring artists who produce the highest number of charted songs from the remaining majority of charted artists. For example, in the Pop corpus there is the ‘powerhouse’ Halsey and three other artists that occurred five times each and then four artists that occurred four times, see Table 6. From there, the number of artists greatly increases to fifteen, having charted three times each. The jump between the number of artists that chart more than three songs in one thousand fifty-six days showcases how much more music ‘elite’ artists chart within the Pop chart. The fifteen ‘elite’ artists that create this barrier against the rest of the corpus as a whole, make up only 1.64%. The ‘elite’ artists make up 7.14% of the Rock chart’s total. 6.44% of the Latin corpus are ‘elite’ artists for that genre. Comparatively, the R&B/Hip-Hop genre’s ‘elite’ artists make up 5.36% of that chart along with the Country ‘elite’ consisting of 5.36% of their respective chart. The Dance/Electronic chart is made up of 5.16% ‘elite’ artists. Lastly, the 4.89% of the artists in the Pop chart are ‘elite’.

Table 6: *Analysis of 'Powerhouse' and 'Elite' Artist(s) in Billboard6:2019 Corpus*

| Corpus Name | Artist | Occurrences |
|---|---|---|
| **Full Corpus** | The Chainsmokers | 17 |
| | J Balvin | 15 |
| | Imagine Dragons | 14 |
| | Ozuna | 14 |
| | Calvin Harris | 13 |
| | Cardi B | 13 |
| | Drake | 13 |
| | Bad Bunny | 12 |
| | Justin Bieber | 12 |
| | Khalid | 11 |
| | Post Malone | 11 |
| | Maluma | 10 |
| | Nicki Minaj | 9 |
| | Halsey | 8 |
| | Kendrick Lamar | 8 |
| | **% of corpora that is 'elite'** | **(15/922) = 1.63 %** |
| **Rock** | Imagine Dragons | 10 |
| | Linkin Park | 7 |
| | Queen | 6 |
| | twenty one pilots | 6 |
| | Panic! At The Disco | 5 |
| | Fall Out Boy | 4 |
| | Tom Petty | 4 |
| | The Cranberries | 3 |
| | **% of corpora that is 'elite'** | **(8/112) = 7.14 %** |
| **Latin** | J Balvin | 14 |
| | Ozuna | 14 |
| | Bad Bunny | 11 |
| | Maluma | 10 |
| | Nicky Jam | 9 |
| | Shakira | 7 |
| | Anuel AA | 6 |
| | Daddy Yankee | 6 |
| | Wisin | 6 |
| | Yandel | 6 |
| | Romeo Santos | 5 |
| | Karol G | 4 |
| | Pitbull | 4 |
| | **% of corpora that is 'elite'** | **(13/202) = 6.44 %** |
| **R&B/Hip-Hop** | Drake | 10 |
| | Cardi B | 7 |
| | Post Malone | 7 |

| | | |
|---|---|---|
| | Eminem | 5 |
| | J. Cole | 5 |
| | Kendrick Lamar | 5 |
| | Migos | 4 |
| | **% of corpora that is 'elite'** | **(6/119) = 5.36 %** |
| **Country** | Thomas Rhett | 6 |
| | Thomas Rhett | 6 |
| | Jason Aldean | 5 |
| | Luke Bryan | 5 |
| | Luke Combs | 5 |
| | Florida Georgia Line | 4 |
| | **% of corpora that is 'elite'** | **(6/112) = 5.36 %** |
| **Dance/Electronic** | The Chainsmokers | 14 |
| | Calvin Harris | 9 |
| | David Guetta | 7 |
| | Major Lazer | 6 |
| | Clean Bandit | 5 |
| | Kygo | 5 |
| | Marchmello | 5 |
| | **DJ Snake** | **4** |
| | Justin Bieber | 4 |
| | Martin Garrix | 4 |
| | Nicki Minaj | 4 |
| | **% of corpora that is 'elite'** | **(11/213) = 5.16 %** |
| **Pop** | Halsey | 6 |
| | Ariana Grande | 5 |
| | Maroon 5 | 5 |
| | Justin Bieber | 5 |
| | Khalid | 4 |
| | Taylor Swift | 4 |
| | Ed Sheeran | 4 |
| | Camila Cabello | 4 |
| | **% of corpora that is 'elite'** | **(8/164) = 4.89 %** |

### 4.4.3 GENDER DISTRIBUTION

I evaluated the Billboard6:2019 corpus' gender distribution by inference as not all artists wish to declare their gender openly to the general public. The gender results for this case study are based on the binary genders of man or woman as the Billboard6:2019 corpus, at the time of its curation in 2019, lacked artists that identify as non-binary or gender non-conforming. As I am

not asking the artists directly, I must use some level of assumption. Therefore, I have assigned a gender to each artist based on presentation of self on online-posted images and articles' use of pronouns when referring to the artist or member of a group. When evaluating the presenting genders of a group, if all of the members were presenting as men, the artist is labeled as such. The same is true for artist groups listed as women. I have used the tag 'mixed' to identify groups who appear to have both men and women. The resulting ratio of artists identified as men to women is 297:68 out of three hundred sixty-four artists. The total number of artists in the Billboard6:2019 corpus without duplication is three hundred eighty-two. Knowing that the mixed artists include men, combining the tags men and mixed changes the ratio to 314:68 out of three hundred eighty-two artists at 82.20%. The distribution of assumed genders as mixed groups is 4.45%, females is 17.80%, and males is 77.75%.

Table 7: *Distribution of Gender in the Billboard6:2019 Corpus*

| Gender | Counts | Percentages |
|---|---|---|
| **Men** | 297 | 77.75 % |
| **Women** | 68 | 17.80 % |
| **Mixed** | 17 | 4.45 % |
| **TOTALS** | **382** | **100 %** |

## 4.5 DISCUSSION

The lack of artists that can be identified as women in the top ten of the Billboard genre-based charts, as seen in Table 7 with 82.20% of the Billboard6:2019 corpus consisting of men as solo and group artists. My results are in line with previous studies focused on gender representation in the Billboard charts which analysis and summarize yearly data (Olivet, 2018) (Olivet, 2019) or discuss the effects of popular music's gender stereotypes on women (Faupel & Schmutz, 2011). Therefore, the Billboard6:2019 supports claims that gender disparities can be found throughout the Western music industry (Smith et al., 2018). An example of this is gendered gatekeeping that occurs within the Western music industry as both White and Black men have more success than women in similar roles, both as musicians and audio professionals (Lafrance et al., 2017; Wolfe, 2019). This has been reflected in the Pop music genre, which is often feminized and devalued. (Smith et al., 2018; Whiteley, 1997). The gender disparity of the Billboard6:2019 corpus seems more balanced than other industry studies suggest, but this could be due to my 'mixed' gender tag which does not separate each person's gender within an artist group, such as Florence and the Machine. In part, the lack of a more balanced representation within Western popular music is related to genre gatekeeping. For example, women are publicly recognized by music media as distinctly different from men in the same genre, such as being marginalized as 'women in rock'. (Whiteley, 1997). This historical trend goes back women being cast as 'novelty acts' recalling previously successful genres dominated by women, such as 1940's 'canaries' becoming 1970-1980's 'glamour queens' to the 1990's 'pop divas' (Dowd et al., 2005). As Pop and Rock music took more dominant positions within the Western music industry field, both gained more symbolic and economic capital (Bourdieu, 1993 [1983]). The potential for artists to

gain more capital could be a contributing factor for the Pop genre corpus being the most competitive.

In the Western music industry, the Pop genre is competitive with artists legitimacy tied shortened 'expiration dates' of being "only as good as [their] most recent hit." (Dowd et al., 2005, p. 19). The drive to create and distribute new music is reflected in the Billboard6:2019 genre charts using Tables 3, 5, and 6. The artists' top ten positions change most rapidly in the Pop charts, reaching the minimum one hundred songs for each genre in the corpus the fastest. However, this rapid turnover of artists does in infer that there are artists in the Pop chart overall as it features the smallest 'elite' group. This combination suggests that a select few 'big names' are able to be set apart by controlling the most social capital within a dizzying amount of new music constantly being produced and tracked by the Pop chart (Bourdieu, 2011 [1986]). While the result is not unexpected, due to the findings presented in Olivet's most recent studies, the amount of competitiveness due to artist saturation is surprising. (Olivet, 2018; Olivet, 2019). The popular music industry as a large-scale field of cultural production has artists that act as cultural intermediaries who inhabit different positions. The genre 'powerhouses' of each genre chart, a result of artist saturation, inhabit a dominant position within the field (Bourdieu, 1993 [1983]).

By contrast, the Latin chart has the second slowest turnover rate with the second largest 'elite' percentage of its total artists. This combination can be seen in the Rock genre chart as well and means that though not as much music is being produced and charting as the Pop charts, there is a diverse group of leading artists that are striving to create the same amount of music that the 'powerhouse' artists do. This creates a different type of competition, like a having to meet a standard of excellence comparted to a mad dash to make something 'fresh' and new as found in the Pop charts. The opposite of these types of competition, with the majority being a clambering

mass reaching for an untouchable pedestal, is music created using collaborative methods. There are a staggering number of collaborations in the Dance/Electronic chart, followed closely by the R&B/Hip-Hip chart. An example of such collaborations found in the Billboard6:2019 corpus is the song S#317: *'Goodbye'* by Jason Derulo, David Guetta featuring Nicki Minaj, and Willy William from the Dance/Electronic chart. This song is not a duplicated song within the corpus and has artists that would be predominantly on the R&B/Hip-Hop chart. This example shows how collaboration differentiates these two genres from Pop, Rock, Country, and Latin. The cooperative nature of both the Dance and R&B/Hip-Hop artists have lessened the gap between the 'powerhouse', 'elite', and the rest of the artists in their charts. For all the negative social connotations that historically surround the roots of R&B/Hip-Hop as 'Black music', it is those artists that are able to work together and spread success more equally to their fellow artists through collaborative projects (Dowd & Blyler, 2002; Smith et al., 2018). The result from the Country corpus reveals a slow, steady, and varying number of artists that are willing to collaborate outside of their genre which could be the competitive middle ground.

The duplication of data within the Billboard charts is its weakness. Some of the duplication of artists and songs among different genre charts can be explained by the blurring of genre boundary lines. Song saturation occurs when an artist appears on more than one Billboard genre chart with the same song. These repeated instances show how artists can occupy multiple positions within the Western music industry field (Bourdieu, 1993 [1983]). This is when the same song by the artist is recorded in more than one genre chart. When a corpus has these duplicated songs that are not easily dealt with like cover versions or duplications, the statistical analysis and inference are blocked. Previous studies have either done nothing and kept the duplicates while others have removed and/or replaced them. I chose to keep and highlight this

type of song saturation in Table 4 as theses songs are one of the keys to unlocking how the addition of audio production techniques into MIRs could help better define and differentiate genres. Both duplicated songs with their unduplicated counterparts can be analysed to explore how the audio professionals' choices when using audio production techniques correlates with each songs Billboard genre classification(s). Doing so will expand MIRs currently limited ability to utilize this aspect when categorizing music by genre and compiling playlists. These song duplications will thus be kept for comparison observations in future manual and computerized audio production classification coding.

## 4.6 CONCLUSION

This case study illustrates how Billboard charts can be used to build a balanced Western popular music genre-based corpus. My Billboard6:2019 case study is a genre-based Western popular music corpus which reflects the limitations and bias of the industry through the prevalence of song saturation, artist saturation, and gender distribution.

Most revealing was the evidence to support blurred genre boundaries caused by artist and song saturation. Returning to the '*High Hopes'* by Panic! at the Disco example, arguments can be made that it contains Electronic/Dance audio production effects throughout with clear Pop genre aesthetics as well. Meanwhile, the return of the last chorus presents the lead singer, Brenden Urie, in his traditional Rock band setting. The Billboard charts have categorized this song as both Pop and Rock which has caused bias results in previous popular music datasets as discussed in Bertin-Bertin-Mahieux, Ellis, Whitman, and Lamere (2011) and Strum (2012). By documenting duplicated songs in the Billboard6:2019 corpus, I have provided an opportunity for researcher to use the remaining genre data for comparative analyses. In the future, this corpus and its duplicates can be used to highlight how genre boundary lines are blurred, investigating genre classifications like audio production techniques using either MACs or MIRs. As well, further analysis can be done on the representation of genders and statistics on collaborations within each chart of the Billboard6:2019 corpus.

# CHAPTER 5: CONCLUSION WITH INTERVIEW QUOTES

Audio professionals have a complicated role as they "sit in a unique intersection between art, music, technology, and financial demands in the music industry" (Bowers, 2019, p. 57). My research contributes to the field of audio by tracing how standard audio production techniques were historically used; how they have been developing and are changing; and how their use can create distinct sonic signatures. As such, all three sections demonstrate the need to better understand audio professionals' use of audio production techniques in popular music genres. As well, my research provides evidence that the choices of audio engineers should be an integral addition to MIRs' algorithms in streaming platforms in order to provide listeners with more accurate music recommendations.

Technical music aspects, like the recording and production decisions made in the studio, are often overlooked but are just as critical in determining how a piece of music 'sounds' and therefore its genre. The findings from The Sweet Boys case study documents how their audio production choices in the studio informed the specific genre aesthetic goals for their tracks. While they were improvising and rehearsing, many of their ideas were identified by genre, such as Country, and implemented through the use of music theory and audio production techniques. During the production and postproduction processes, the microphone choices and placements, a small amount of equalization and compression, and a large amount of reverberation and delays were critical to achieving the Ambient, Shoegaze, Post-Rock, or Country genre aesthetic the band wanted. The distinct sound qualities that resulted from each choice made by The Sweet Boys and their producer, Pras, in the studio further revealed the degree to which audio production techniques affect genre classification. These decisions were informed by the genre aesthetics determined by prior audio professionals in the field. This is an important area of study for audio

professionals as the field of Western popular music is constantly evolving, which means that the traditional knowledge and techniques used by such cultural intermediaries must explored, documented, and adapted. The Sweet Boys case study documents how the characterization and manipulation of popular subgenre aesthetics are shaped by social, musical, and audio production techniques.

The Billboard6:2019 corpus case study reaffirms that Western popular music corpora reflect the limitations and bias of the industry through the prevalence of song saturation, artist saturation, and gender distribution. Further analysis focused on song saturation revealed three types of song repetitions: covers, same name, and duplications. This chapter identified genre-balanced song duplications and how they would be useful for MIR and MAC professionals to study the relationship between audio production techniques and Western popular music genre classification. This could provide better genre boundary clarity ensuring consumers receive more accurate streaming platform recommendations. For example, when two different artists performed the same named song in very different styles, Billboard was able to easily distinguish two distinct genres. However, in other instances Billboard would classify the exact same song on two unrelated genre-based charts. This is partially because computerized genre-based classification systems, MIRs, are extensively programmed to interpret only two of the three aspects that help define musical genres: the social and musical. However, manual labour is still needed to program MIRs with tags related to social aspects such as an artist's location to denote geographical based musical genres (Participant B)[7]. MIRs will recognize this 'tag' and categorize music by that artist without further manual intervention. Music theory analysis terms, like

[7] Information from interviewed professional working with MIRs

rhythm, were the first features used to categorize music using MIRs feature vectors. The third aspect, audio production techniques, is not yet fully encoded and therefore prevents genre-based MIRs from correctly identifying a song's genre. The Billboard6:2019 corpus analysis results demonstrate that computerized genre-based classification systems, like MIRs, lack crucial audio production technique coding information that could reveal genre classifications for the duplicated songs.

The multidisciplinary nature of my research aims to bridge gaps between the fields of audio engineering, sociology, music production and business, and computer science, with the aim that my findings will influence the improvement of MIR algorithms used to recommend music to listeners on streaming platforms. I am therefore complementing this thesis conclusion with quotes from three professionals who have a combined twenty years of experience working in the music industry as musicians, music software technologists, MIRs developers, consultants, and researchers. I recruited these interviewees by email through industry contacts. Interviews were conducted virtually on Zoom from June 3rd to June 29th, 2021, see Appendix 5 for interview guide used. Though every effort was made, I was only able to interview White men. This mirrors the gender analysis results of my Billboard6:2019 corpus, i.e.: there is a lack of gender diversity in the music industry. Participants at the time of the interviews were actively working with MIRs functionality, aiming to improve the experience for end-user consumers, the listeners.

MIRs have become integrated into consumer driven music streaming platforms like Spotify, Deezer, Apple Music, and Google Play. As such, expanding their genre classification capabilities will lead to economic developments. Each participant stressed the importance of accurate musical genre identification as "a tool to help make matches between content and

consumers, probably one of the first tools [used]" (Participant C)[8]. "Most tracks have multiple genres…Mother Mother is a great example, you could argue that this track is Pop, Rock, and Indie…and [they] will have to step in" and sort it out themselves, explained participant B[9]. As such, improving the capabilities of genre-based MIRs is vital to the commercial streaming platforms. Sadly, these platforms' programming is still heavily reliant on human intervention costing companies valuable time and money. As noted by one interviewee "There is a lot of great work out there, but I don't think it fully capture the way our brain interprets audio" (Participant A)[10]. In conclusion, including audio production techniques into genre-based MIRs will improve streaming listeners' experiences, and assist the platform's economically by opening the door to future advancements.

In closing, my research highlights the importance of social, musical, and audio production elements of genre classification. I also illustrate how artists' and studio professionals' creative processes are interconnected to these elements of genre classification, especially audio production techniques. I have also highlighted how MIRs, such as Billboard6:2019 corpus, are reflective of the sexism and racism Western music industry. It is my hope that these findings will influence how genres are classified in MIRs in order to pave the way for more inclusive programming.

[8] Quote from interviewed professional working with MIRs
[9] Quote from interviewed professional working with MIRs
[10] Quote from interviewed professional working with MIRs

## REFERENCES


Airoldi, M., Beraldob, D., & Gandini, A. (2016). Follow the algorithm: An exploratory investigation of music on YouTube. *Poetics, 57*(57), 1-13. doi:10.1016/j.poetic.2016.05.001

Arditi, D. (2017, August 31). Music Everywhere: Setting a Digital Music Trap. (630, Ed.) *Critical Sociology, 45* (4–5), 617. Retrieved from https://doi.org/10.1177/0896920517729192

Balen, J. V., Borgoyne, A., Bountouridis, D., Müllensiefen, D., & Veltkamp, C. R. (2015). Corpus Annalysis Tools for Computational Hook Discovery. *International Society for Music Information Retrieval Conference (ISMIR)*.

Bammel TV. (2016, June 15). *How we fixed a 24 track MCI JH-24 Recording Deck*. Retrieved from Bammel TV: https://www.bammeltv.com/blog/how-we-fixed-a-24-track-mci-jh-24-recording-deck/

Bennett, S. (2018). *Modern Records, Maverick Methods: Technology and Process in Popular Music Record Production 1978-2000.* Bloomsbury Publishing.

Berliner, P. F. (2009). *Thinking in jazz: The infinate art of inprovisation.* University of Chicago Press.

Bertin-Mahieux, T., Ellis, D. P., Whitman, B., & Lamere, P. (2011). The Million Song Dataset. *International Society for Music Information Retrieval (ISMIR) Proceedings.*

Billboard. (2013, January 23). *Billboard Charts Legend*. Retrieved from Billboard: https://www.billboard.com/biz/billboard-charts-legend

Billboard. (2019, February 22). *FAQ*. Retrieved from Billboard: https://www.billboard.com/p/frequently-asked-questions

Born, G. (2011). Music and the materialization of identities. *Journal of Material Culture*, 376-388.

Born, G., & Haworth, C. (2017, November). From Microsound to Vaporwave: Internet-Mediated Musics, Online Methods, and Genre. *Music and Letters, 98*(4), 601–647. doi:https://doi.org/10.1093/ml/gcx095

Born, G., Lewis, E., & Straw, W. (Eds.). (2017). *Improvisation and Social Aesthetics.* London: Duke University Press.

Bourdieu, P. (1993 [1983]). The Field of Cultural Production, or: The Economic World Reversed. In R. Johnson, & R. Johnson (Ed.), *The Field of Cultural Production* (pp. 29-73). New York: Columbia University Press.

Bourdieu, P. (2009 [1984]). Distinction & The Aristocracy of Culture. In J. Storey, *Cultural Theory and Popular Culture: A Reader* (Vol. 4th). Harlow, England: Pearson/Longman.

Bourdieu, P. (2011 [1986]). The forms of capital. (1986). In I. Szeman, & T. Kaposy (Eds.), *Cultural Theory: An Anthology* (1st ed., pp. 81-93). West Sussex, United Kingdom:

Wiley-Blackwell. Retrieved from https://books.google.ca/books?hl=en&lr=&id=tK_KhHOkurYC&oi=fnd&pg=PA81&dq=forms+of+capital+bourdieu&ots=NXAwgWmUPD&sig=Dyb06x26bU8Ngz9-XeCyELyStTI&redir_esc=y#v=onepage&q=forms%20of%20capital%20bourdieu&f=false

Bowers, J. (2019). Shifting the Paradigm: Revealing the Music Within Music Technology. Seattle: Seattle Pacific University.

Bromham, G., Moffat, D., Barthet, M., Danielsen, A., & Fazekas, G. (2019, September). The Impact of Audio Effects Processing on the Perception of Brightness and Warmth. *In Proceedings of the 14th International Audio Mostly Conference: A Journey in Sound*, 183-190. doi:https://doi.org/10.1145/3356590.3356618

Brøvig-Hanssen, R., Sandvik, B. E., & Aareskjold-Drecker, J. M. (2020, May). *Dynamic Range Processing and Its Influence on Perceived Timing in Electronic Dance Music.* Retrieved from A Journal of the Society of Music Theory: https://www.mtosmt.org/issues/mto.20.26.2/mto.20.26.2.brovighanssen.html

Cambridge University Press. (2021). *dataset* . Retrieved from Cambridge Dictionary: https://dictionary.cambridge.org/dictionary/english/dataset

Camerer, F. (2009). *Loudness On the way to nirvana — audio levelling with EBU R 128 Loudness normalisation is a true audio-levelling revolution.* Retrieved from Semantic Scholar: https://www.semanticscholar.org/paper/Loudness-On-the-way-to-nirvana-%E2%80%94-audio-levelling-R-Camerer/66e7cc3dca271a18925f8170702e039ef0f8160a

Chambers-Moranz, R., Pras, A., & Thomas, N. (2019). The Generation Gap - Perception and Workflow of Analog. *Audio Enginnering Society 147th Convention* (pp. 1-10). New York: Audio Enginnering Society.

Cobb, N. (2019, November 15). The Sweet Boys: Unraveling the Mirror. *Music at Noon Series*. Lethbridge, Alberta, Canada: Universtiy of Lethbirdge: Faculty of Fine Arts - Music.

Collins, N. (2015). The UbuWeb Electronic Music Corpus: An MIR investigation of a historical database. *Organized Sound, 20*(1), 122-134. doi:10.1017/S1355771814000533

Collins, N., Manning, P., & Tarsitani, S. (2018). A new curated corpus of historical electronic music: Collation, data and research findings. *Transactions of the International Society for Music Information Retrieval, 1*(1), 34-43. doi:10.5334/tismir.5

CompMusic, Universitat Pompeu Fabra, & European Research Council. (2014). *Research Corpora*. Retrieved from Retrieved from Computational models: for the discovery of the World's Music: https://compmusic.upf.edu/corpora

Costa, Y. M., Oliveira, L. S., & Silla Jr., C. N. (2016). An Evaluation of Convolutional Neural Networks for music classification using spectrograms. *Applied Soft Computing, 52*, 28-38.

Cottom, T. M. (2016, December 7). *Black Cyberfeminism: Ways Forward for Classification Situations, Intersectionality and Digital Sociology.* (J. Daniels, K. Gregory, & T. M. Cottom, Eds.) Retrieved from Digital Sociologies (socarxiv): https://doi.org/10.31235/osf.io/vnvh9

D'Errico, M. (2015). Off the Grid: Instrumental Hip-Hop and Experimentalism After the Golden Age. (J. Williams, Ed.) *The Cambridge Companion to Hip-Hop*, 280-291.

De Clercq, T., & Temperley, D. (2011). A corpus analysis of rock harmony. *Popular Music, 30*(1), 47-70. doi:10.1017/s026114301000067x

Dowd, T. J., & Blyler, M. (2002). Charting race: the success of black performers in the mainstream recording market, 1940 to 1990. *Poetics, 30*(1-2), 87-110.

Dowd, T. J., Liddle, K., & Bly, M. (2005). Charting gender: The success of female acts in the US mainstream recording market, 1940-1990. *Research in the Sociology of Organizations, 23*(1), 81-123.

Eliasson, S. (2019). *Comparing Compressor Interface Designs : How do visual displays on digital compressors impact how audio engineers navigate an interface and the choices they make?* Luleå: Luleå University of Technology.

Eno, B. (2017 [1966]). The Studio as a Compositional Tool. In C. Cox (Ed.), *Audio culture: readings in modern music* (pp. 115-126). New York: Bloomsbury Academic.

Faupel, A., & Schmutz, V. (2011). From fallen women to Madonnas: Changing gender stereotypes in popular music critical discourse. *Sociologie de lArt, 18*(3), 15-34. doi:10.3917/soart.018.0015

Fink, R. (2013, August 25). *Big (Bad) Data*. Retrieved from Musicology Now: http://musicologynow.ams-net.org/2013/08/big-bad-data.html

Gomez, E., Schedl, M., Serra, X., & Hu, X. (2016). Music Information Retrieval: Overview, Recent Developments and Future Challenges. *International Society for Music Information Retrieval Conference (ISMIR).*

Goulart, A. (2019, August 29). *The 2019 MMVAs Have Been Canceled And The Reason Is Pretty Disappointing*. Retrieved from Narcity: https://www.narcity.com/entertainment/ca/toronto-iheartradio-mmvas-were-canceled-in-august-2019

Hebdige, D. (2003). *Subculture: The meaning of style.* New York: Routledge: Taylor & Francis Group.

Hennion, A. (1989). An Intermediary between Production and Consumption: The Producer of Popular Music. *Science, Technology, & Human Values*, 400-424. Retrieved from http://www.jstor.org/stable/689684

Herbst, J.-P. (2020, May). Sonic Signatures in Metal Music Production: Teutonic vs British vs American Sound. *Samples, 18*, 1-23.

Hilsamer, M., & Herzog, S. (2014). A Statistical Approach to Automated Offline Dynamic Processing in the Audio Mastering Process. *DAFx*, 35-40.

Hodgson, T. (2021). Spotify and the Democratisation of Music. *Popular Music, 40*(1), 1-17.

Holt, F. (2007). *Genre in popular music.* Chicago: University of Chicago Press.

Homburg, H., Mierswa, I., Möller, B., Morik, K., & Wurst, M. (2005). A Benchmark Dataset for Audio Classification and Clustering. (pp. 528-531). London, UK: Queen Mary University. Retrieved from http://www-ai.cs.uni-dortmund.de/audio.html

Huron, D. (2013). On the Virtuous and the Vexatious in an Age of Big Data. *Music Perception, 31*(1), 4-9. doi:10.1525/mp.2013.31.1.4

Japan's National Institute of Advanced Industrial Science and Technology (AIST) & Real World Computing Partnership. (2012, August 1). *RWC Music Database*. Retrieved from https://staff.aist.go.jp/m.goto/RWC-MDB/#intro

Junos. (2020). *Past Nominees + Winners*. Retrieved from Junos: on CBC Music: https://junoawards.ca/awards/past-winners-nominees/

Just, N., & Latzer, M. (2017). Governance by algorithms: Reality construction by algorithmic selection on the internet. *Media, Culture & Society*, *39*(2), 238-258. doi:10.1177/0163443716643157

Kroher, N., Díaz-Báñez, J.-M., Mora, J., & Gómez, E. (2016). Corpus COFLA: A research corpus for the computational study of flamenco music. *Journal on Computing and Cultural Heritage (JOCCH), 9*(2), 1-21.

Lafrance, M., Scheibling, C., & Burns, L. D. (2017). Race, Gender, and the Billboard Top 40 Charts between 1997 and 2007. *Popular Music and Society, 41*(5), 522–38. doi:10.1080/03007766.2017.1377588

Lampel, J., Shamsie, J., & Lant, T. K. (Eds.). (2006). *The business of culture: strategic perspectives on entertainment and media.* Psychology Press.

Lena, J. C. (2012). *Banding Togther: How Communities Create Genres in Popular Music.* Princeton, New Jersey: Princeton University Press.

Lena, J. C., & Peterson, R. A. (2008). Classification as Culture: Types and Trajectories of Music Genres. *American Sociological Review, 73*(5), 697-718.

Lewis, R. (2017, November 28). *Grammy Awards 2018: How the Recording Academy has evolved toward relevance*. Retrieved from Los Angeles Times: https://www.latimes.com/entertainment/music/la-et-ms-grammy-awards-2018-news-analysis-20171128-story.html

London, J., Polak, R., & Jacoby, N. (2017). Rhythm histograms and musical meter: A corpus study of Malian percussion music. *Psychonomic bulletin & review, 24*(2), 474-480.

McDermott, C., & Pras, A. (2021). Lethbridge Lament - Exploring musical genres through experiential learning in the studio. *Journal of the Audio Engineering Society (Paper 31)*. Retrieved from https://www.aes.org/e-lib/browse.cfm?elib=21221

Miller, D. L. (2016). Gender, Field, and Habitus: How Gendered Dispositions Reproduce Fields of Cultural Production. *Sociological Forum, 31* (2), 330-353. doi:10.1111/socf.12247

Molanphy, C. (2014, April 14). *I Know You Got Soul: The Trouble With Billboard's R&B/Hip-Hop Chart*. Retrieved from Pitchfork: https://pitchfork.com/features/article/9378-i-know-you-got-soul-the-trouble-with-billboards-rbhip-hop-chart/

Neumann. (1996 [2021]). *Neuman U87 AI Manual*. Retrieved from American Musical Supply: https://media.americanmusical.com/ItemFiles/Manual/NEM_U87AI_manual.pdf

Nishina, Y. (2017, June). A study of pop songs based on the billboard corpus. *International Journal of Language and Linguistics, 4*(2), 125-134.

Noble, S. U. (2018). *Algorithms of Oppression: How search engines reinforce racism.* New York: New York University Press.

Nzegwu, A. (1999, October 11). *African Music Database*. Retrieved from Africa Knowledge Project: https://www.africaknowledgeproject.org/index.php/amd

Ohriner, M. (2017). Metric Ambiguity and Flow in Rap Music: A Corpus-Assisted Study of Outkast's "Mainstream" (1996). *Empirical Musicology Review, 11*(2), 153-179.

Olivet, D. (2018, January 10). *Chartmania!! I Broke Down Every Song That Reached the Billboard Top 5 in 2017*. Retrieved from Soundfly: https://flypaper.soundfly.com/write/chartmania-breaking-down-billboard-top-40-songs-2017/

Olivet, D. (2019, January 21). *We Analyzed Every Dang Song That Cracked the Billboard Top 5 in 2018*. Retrieved from Soundfly: https://flypaper.soundfly.com/produce/we-analyzed-every-dang-song-that-cracked-the-billboard-top-5-in-2018

Oltheten, W. (2018). *Mixing with Impact: Learning to Make Musical Choices.* (G. van Osch, Trans.) New York/London: Routledge: Taylor & Francis Group.

Owens, C. (2020, January 27). *Do the Grammys have a diversity problem?: A Lehigh professor analyzed 60 years of the awards and U.S. history. He sheds light on the music milestones and misses*. Retrieved from The Phladelphia Inquirer: https://www.inquirer.com/entertainment/inq/grammys-2020-awards-nominees-predictions-history-lizzo-billie-eilish-20200124.html

Oxford Learner's Dictionary. (2021). *cover version*. Retrieved from Oxford University Press: https://www.oxfordlearnersdictionaries.com/definition/english/cover-version#:~:text=cover%20version-,noun,a%20different%20band%20or%20singer

Peeters, G., & Fort, K. (2012, October). Towards a (better) Definition of Annotated MIR Corpora. *International Society for Music Information Retrieval Conference (ISMIR)*, 25-30.

Pras, A. (2020). Standard 3-point Micing Technique (Advanced). In A. P. Bell, *The Music Technology Cookbook: Ready-Made Recipes for the Classroom.* Oxford University Press. doi:10.1002/asi.22840

Pras, A., & Lavergne, G. (2015). Sampling in improvisation: Meeting of two instigators of free jazz with a young artist from the noise scene in New York. *Musicae Scientiae, 19*(4), 433-451.

Pras, A., Guastavino, C., & Lavoie, M. (2013). The Impact of Technological Advances on Recording Studio Practices. *Journal of the American Society for Information Science and Technology, 64*(3), 612-626. doi:10.1002/asi.22840

Pras, A., Turner, K., Bol, T., & Emmanuelle, O. (2019, October 8). Production precesses of pop music arrangers in Bamako, Mali. *Audio Engineering Society E-Library*, 10296. Retrieved from http://www.aes.org/e-lib/browse.cfm?elib=20669

Rojas, M. (2019). *Media Kit 2019 - Billboard*. (Billboard) Retrieved from Readkong: https://www.readkong.com/page/media-kit-2019-billboard-8974501?p=1

Sale, J. (2011, October 23). *Sixty years of hits, from Sinatra to ... Sinatra.* Retrieved from The Independant: https://www.independent.co.uk/life-style/sixty-years-of-hits-from-sinatra-to-sinatra-1322429.html

Schmutz, V. (2005, July). Retrospective Cultural Consecration in Popular Music: Rolling Stone's Greatest Albums of All Time. *The American Behavioral Scientist, 48*(11), 1510-1523.

Schmutz, V. (2009, July). Social and symbolic boundaries in newspaper coverage of music, 1955–2005: Gender and genre in the US, France, Germany, and the Netherlands. *Poetics, 37*(4), 298-314.

Schmutz, V., Pollock, S. H., & Bendickson, J. S. (2018). Gender and Critical Evaluation in Popular Music. (M. Segal, & V. Demos, Eds.) *Gender and the Media: Women's Places (Advances in Gender Research), 26*, 197-216. doi:https://doi.org/10.1108/S1529-212620180000026013

Schreiber, H. (2015, October). Improving Genre Annotations for the Million Song Dataset. *International Society for Music Information Retrieval Conference (ISMIR)*, 241-247.

Smith, S. L., Choueiti, M., & Pieper, K. (2018). Inclusion in the Recording Studio?: Gender and Race/Ethnicity of Artist,Songwriters & Producers across 600 Popular Songs from 2012-2017. *Annenberg Inclusion Initiative*.

Spotify. (2019, Febuary 7). *Spotify Terms and Conditions of Use.* Retrieved from Spotify: https://www.spotify.com/us/legal/end-user-agreement/

Spotify. (2020, January 1). *Spotify Privacy Policy.* Retrieved from Spotify: https://www.spotify.com/us/legal/privacy-policy

Spyllman, L. (2020). *What is Cultural Sociology?* Cambridge: Polity Press.

Strum, B. L. (2012, November). An analysis of the GTZAN music genre dataset. *Proceedings of the second international ACM workshop on Music information retrieval with user-centered and multimodal strategies*, 7-12.

Swidler, A. (1986). Culture in Action: Symbols and Strategies. *American Sociological Review, 51*(2), 273-286. doi:10.2307/2095521

Temperley, D., & VanHandel, L. (2013, September). Introduction to the Special Issues on Corpus Methods. *Music Perception: An Interdisciplinary Journal, 31*(1), 1-3.

Thompson, P. (2019). *Creativity in the Recording Studio.* Switzerland, AG: Springer International Publishing.

Thornberg, R., & Charmaz, K. (2011). Grounded Theory. In S. D. Lapan, M. T. Quartaroli, & R. J. Frances, *Qualitative research: an introduction to methods and designs.* United States of America: Jossey-Bass. doi:978-1-118-11883-2

Tzanetakis, G., & Cook, P. (2002). Musical Genre Classification of Audio Signals. *IEEE Transactions On Speech And Audio Processing, 10*(5), 293-302.

Watson, A. (2019, Febuary 15). *Grammy Awards - Statistics & Facts*. Retrieved from Statista: https://www.statista.com/topics/1565/grammy-awards/#dossierSummary__chapter5

Weiß, C., Mauch, M., Dixon, S., & Müller, M. (2019). Investigating style evolution of Western classical music: A computational approach. *Musicae Scientiae, 23*(4), 486-507. doi:10.1177/1029864918757595

Whiteley, S. (Ed.). (1997). *Sexing the groove: Popular music and gender.* New York: Routledge: Taylor & Francis Group.

Wilmering, T., Moffat, D., Milo, A., & Sandler, M. B. (2020). A History of Audio Effects. *Applied Sciences, 10*(3), 791-218. doi:https://doi.org/10.3390/app10030791

Wolfe, P. (2019). *Women in the Studio: Creativity, Control and Gender in Popular Music Sound Production.* New York: Routledge: Taylor & Francis Group.

Xu, K., Zheng, X., Cai, Y., Min, H., Gao, Z., Zhu, B., . . . Wong, T.-L. (2018). Improving user recommendation by extracting social topics and interest topics of users in uni-directional social networks. *Knowledge-Based Systems, 140*, 120-133.

Yin, R. (2014). Case Study Research: design and methods. Los Angeles: Sage.

## APPENDIX 1: SURVEY OF APPLICABLE CORPORA AND DATASETS

Table 8: *A Brief Survey of Applicable Corpora and Datasets (Billboard6:2019)*

| Corpus Name | Corpus Overview | Year | Achievements | Limitations | Used | Reasoning/ Influence |
|---|---|---|---|---|---|---|
| **Hook! Game Corpus** | Western popular music from 1930 to 2015. Used a set of 99 transcribed (symbolic) songs equalling 536 audio song segments. | 2015 | Second-order features: reflect how an observed feature value relates to a reference corpus. They help contextualize feature values. | No genre tags, uses short song segments. | No. | Second-order features can help determine if results in MIRs testing. Are my feature values reflective of genres? |
| **Style Evolution of Western Classical Music** | 200 audio recording capturing 300 years of Western music history composition. | 2018 | Clustering results to explore composition years, individual pieces, and composer's styles. | Corpus contains no popular music. | No. | Showed the feature extractions used to obtain insights that are not based on existing theories. |
| **Tzanetakis Dataset (GTZAN) Reviewed by Bob Strum (GTZAN 2.0)** | 1, 000 30sec excerpts with 100 being in 20 musical genres, 3 speech genres. | 2002<br>**2012** | Genre tagged corpus in MIR. Computationall y shows blurred genre boundaries. Confirms test vs research corpus uses. | 30sec mono excerpts. **Distorted clips, limited artists for each genre, repeated excepts changed dataset total.** | No. | **Could be used at end of study to see how my audio production feature would sort the 20 genre excerpts.** |
| **UbuWeb Electronic Music Corpus** | 476 MP3 audio recordings with duplicates. | 2015 | Machine learning based predictive year labeling of pieces for trend observations. First historical 'art' electronic corpus. | Did not bridge into popular music. Limited genre, cultural, and yearly representatio n. | No. | Gave testing insight to examine corpus data (genre, years, gaps in data). |
| **Million Song Dataset (MSD) Updated by Hendrik Schreiber** | 1, 000, 000 audio recordings, 44, 745 unique artists, | 2011<br>**2015** | 2, 201, 916 asymmetric similarity relationships, 55 feature and analysis tags per | ~800 artists not tagged and ~955, 255 repeated artists. Missing | No. | **No definitive genre tags, mostly Pop/Rock. Other** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 7, 643 Echo Nest tags, 2, 321 MusicBrainz tags, and 515, 576 songs starting from 1922. | | song. Mostly Western popular music. | world and classical music. Missing some song-level metadata/tags. Fink in 2013 fully critiques the MSD. | | **corpora have improved upon this data.** More data isn't always better data. |
| **beaTunes Genre Dataset (BGD) and Last.fm Genre Dataset (LFMGD) from MSD** | BGD: 609, 865 songs<br><br>LFMGD: 340, 323 songs | 2015 | Has been compared to the MDS and the dataset created by Yajie Hu (HO) in 2012 from MSD before corrections to the MSD were published. | Combined genre tags Pop and Rock as Pop/Rock. The combined tag is now attached to > 50% of the corpora's data. | No. | It could be interesting to see if my finished feature vectors for audio production techniques can separate the data tagged Pop/Rock back to Pop and Rock definitely. |
| **A Corpus-Assisted Study of Outkast's "Mainstream".** | Instrumental of Outkast's "Mainstream" album.<br><br>Corpus of rap flows: one a snapshot of the genre and two of specific emcees' flows. | 2017 | Links corpus studies to effective critical and style analysis for music theory. Defines critical analysis and style analysis. Adds to current research rhythm with a focus on corpus studies. | Very limited corpus made for researchers' specific objects. | No. | Corpus of genre snapshot could be compared to the R&B/Hip-Hop part of my corpus to see if the feature vectors match as the genres can cross-over. |
| **Evaluation of Convolutional Neural Networks: ISMIR2004, LMD, and AMD.** | ISMIR2004: A traditional Western database of 1, 458 audio files<br><br>LMD: Latin Music Database of 3, 227 full length audio files.<br><br>AMD: African Music | 2016 | ISMIR2004: tagged with classical, electronic, jazz/blues, metal/punk, rock/pop, and world.<br><br>LMD: 501 different artists uniformly distributed in | ISMIR2004: lacking other tags, genre distribution is not uniform between predefined training and test datasets.<br><br>LMD: was manually tagged | No. | ISMIR2004: There are two many combined genres for my study, could try same method as BGD and LFMGD.<br><br>LMD: could run this |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Database is field recordings of performances only, no studio recordings used. | | the ten tagged genres.<br><br>AMD: expanded ways to classified music from standard Western method: Country, function, ethnic group, or instrumentation. | AMD: possible lacking quality | | corpus through my audio production feature vector and compare results to my Latin corpus.<br><br>AMD: corpus is not applicable to my study in Western popular music. |
| **RWC Music Dataset** | 6 WAV, MIDI, and text collections (3 related to study)<br><br>Popular Music Database: 20 files<br><br>Royalty-Free Music Database: 10 files<br><br>Music Genre Database: 100 files | 2012 | Tags and audio files have been edited to capture beat, harmony (chord names), melody, chorus sections, audio-synchronized SMF, vocal and instrumental activity segments. | Corpus available for my study is too small as most corpora were created for a study in Japan so corpora is focused on Japanese popular music. | No. | Musical Genre Database has the separate genres that I would need but has too few files (1-5) in each genre to be used in my study effectively. |
| **Music Audio Benchmark Dataset** | 1,886 <20sec sample sized mp3 audio files at 44, 100Hz and 128 kb (available with metadata) | 2005 | Using audio files downloaded from GarageBand website. Reviewed each mp3 file by at least 3 people. Created metadata tag: name, ID, genre, reviews, length, and rating. Provide an example set with 49 features extracted. | Dataset has not been updated since 2005 to include more recent popular music examples or been tested against more recent MIR feature extraction. Samples are very short. | No. | Due to age this corpus does not reflect *current* popular music trends and samples are only a matter of seconds long. This makes is nearly impossible to manual assess audio production techniques. |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Rolling Stone* magazine's 500 Greatest Songs of All Time**<br><br>**RS 5x20 Corpus** | 500 rock songs ranked by 172 qualified participants submitting their top 50 songs. Tags: rank, artist, and song. **100 songs with 20 from each decade (50s to 90s). Tags: rank, decade, artist, and song.** | List in 2004<br><br>**Study in 2011** | This method of surveying does provide popular option results of those working in the industry. **Created more even distributed data of rock songs. Added to a rock corpus the field of popular music harmonic analysis.** | 277/500 from before 1970, 203/500 from the 1960s. 4 songs from 2000 and later not included in the study. **Not a survey of current popular music ending in the 1990s.** | No. | It is rock music, but only have 4 songs from 18 years ago make this not a popular music corpus of the rock genre as a whole. **Created with their study in mind so not genre diverse or reflect current treads.** |
| **Billboard Corpus by Yasunori Nishina** | 1, 000 songs from songlyrics.com Billboard *Hot 100* spanning from 1950 to 2011 (10yrs) | 2017 | Analysis of corpora currently used by industry and allows for consumer input (songlyrics.com) bring bias to light. | Study on lyric analysis so very little data needed. (Raw, symbolic, or meta). | No. | Analysis of genre and gender is something that I can do. Not genre diverse enough for my study. |

## APPENDIX 2: INTERVIEW GUIDE FOR THE SWEET BOYS' CASE STUDY

1. What has influenced the sound of your music or inspired you? (Asked to the entire band)
2. What genre(s) would you classify yourselves playing in? (Asked to the entire band)
3. What determines which sounds you will live-process [real-time process] or not? (Asked to Logan)
4. In what ways do you use samples? (Asked to Logan and Mikey)
5. What have you done with your snare drum and why? (Asked to Andrew)
6. What mic choices/placements are you choosing for your stylistic/mood setting qualities? (Asked to the entire band)

## APPENDIX 3: THE SWEET BOYS' MIRCOPHONE CHOICE/PLACEMENT

Table 9: *The Sweet Boys' Microphone Choice/Placement*

| Instrument | Microphone | Placement description |
|---|---|---|
| **Kick (attack)** | AKG D112 | Inside open kick drum |
| **Kick (resonance)** | RE 20 | A few feet away from open kick drum |
| **Snare (top)** | SM 57 | Center of skin, edge of cymbal taped to side of skin |
| **Snare (bottom)** | AKG 414 | Edge of snare towards centre |
| **Floor Toms** | MD 421 | Middle/center of both |
| **Rack Toms** | MD 421 | Middle/center of both |
| **Hi-Hat/Tambourine** | AKG 451 | Directed between meeting point of hi-hat cymbals |
| **Drum Kit (overhead)** | R 121 | Traditional left side overhead placement |
| **Drum Kit (overhead)** | R 121 | Traditional left side overhead placement |
| **Auxiliary Percussion** | U47/M149 | MS in omnidirectional in center of room |
| **Yamaha DX7 Synthesizer** | — | D.I. used to mixer (tape looper/launch pad) to amp |
| **Baby Grand Piano (open/covered)** | U 87 | Left side of stereo pair facing low strings |
| **Baby Grand Piano (open/covered)** | U 87 | Right side of stereo pair facing high strings |
| **Baby Grand Piano (open/covered)** | U 87 | Left side under the 'bell' of piano facing soundboard |
| **Epiphone Guitar** | R 121 | Middle of amplifier cone, inch or so from grill |
| **Princeton Guitar (attack)** | AKG 414 | Closer center of amplifier cone, inch or so from grill |
| **Princeton Guitar (dark)** | MD 421 | Middle of amplifier cone, foot or so from grill |
| **Keyboard (right)** | — | Right input routed to external Yamaha mixer to SSL |
| **Keyboard (left)** | — | Left input routed to external Yamaha mixer to SSL |
| **Synthesizer (right)** | — | Right input routed to external Yamaha mixer to SSL |
| **Synthesizer (left)** | — | Left input routed to external Yamaha mixer to SSL |
| **Vocal Microphone (Kevin)** | R 121 | Cardioid |
| **Bass Guitar** | — | Direct Input box routed to SSL in control room |
| **Bass Guitar** | MD 421 | No D.I. box. Middle of cone, almost touching grill |
| **Amp (Mikey)** | SM 7 B | Middle of cone, almost touching grill |
| **Room (right)** | DPA 4006 | Against right wall of room pointed upward (omni) |
| **Room (left)** | DPA 4006 | Against right wall of room pointed upward (omni) |

## APPENDIX 4: LIST OF ASSUMED GENDERS IN THE BILLBOARD6:2019 CORPUS

Table 10: *List of Assumed Genders in the Billboard6:2019 Corpus*

| Artist | Assumed Gender(s) |
|---|---|
| Clean Bandit | mixed |
| The Weekend | mixed |
| Lennox | mixed |
| The Cranberries | mixed |
| Florence + The Machine | mixed |
| Lady Antebellum | mixed |
| SZA | mixed |
| Artists For Puerto Rico | mixed |
| Brooks | mixed |
| Fleetwood Mac | mixed |
| flora cash | mixed |
| Jeon | mixed |
| Little Big Town | mixed |
| Paramore | mixed |
| Sofi Tukker | mixed |
| Sugarland | mixed |
| The Carters | mixed |
| Cardi B | women |
| Nicki Minaj | women |
| Halsey | women |
| Selena Gomez | women |
| Shakira | women |
| Camila Cabello | women |
| Katy Perry | women |
| Alessia Cara | women |
| Ariana Grande | women |
| Bebe Rexha | women |
| Demi Lovato | women |
| Dua Lipa | women |
| Maren Morris | women |
| Taylor Swift | women |
| Karol G | women |
| Anne-Marie | women |
| Becky G | women |
| Ellie Goulding | women |
| Julia Michaels | women |
| Kelsea Ballerini | women |
| Sia | women |
| Beyonce | women |

| | |
|---|---|
| Carrie Underwood | women |
| Hailee Steinfeld | women |
| Kiiara | women |
| Lady Gaga | women |
| Lauren Alaina | women |
| MO | women |
| Natti Natasha | women |
| Rihanna | women |
| Zara Larsson | women |
| Alice Merton | women |
| Alisa Ueno | women |
| AlunaGeorge | women |
| Anitta | women |
| Au/Ra | women |
| Carly Pearce | women |
| Chantel Jeffries | women |
| CL | women |
| Daya | women |
| Ella Mai | women |
| Elley Duhe | women |
| Emily Warren | women |
| Faith Hill | women |
| HAIM | women |
| Jennifer Lopez | women |
| Jess Glynne | women |
| Kehlani | women |
| Kesha | women |
| Kung vs Cookin' On 3 Burners | women |
| Lana Del Rey | women |
| Lauren Duski | women |
| Lauren Jauregui | women |
| Leah Culver | women |
| Lorde | women |
| Marian Hill | women |
| Miranda Lambert | women |
| NERVO | women |
| Normani | women |
| Nyla | women |
| Olivia O'Brien | women |
| Pink | women |
| Rhianna | women |
| Rhiannon Giddens | women |
| Rozes | women |
| Starley | women |

| | |
|---|---|
| Tomine Harket | women |
| XYLO | women |
| The Chainsmokers | men |
| J Balvin | men |
| Imagine Dragons | men |
| Ozuna | men |
| Calvin Harris | men |
| Drake | men |
| Bad Bunny | men |
| Justin Bieber | men |
| Khalid | men |
| Post Malone | men |
| Maluma | men |
| Kendrick Lamar | men |
| Daddy Yankee | men |
| David Guetta | men |
| Linkin Park | men |
| Major Lazer | men |
| twenty one pilots | men |
| Anuel AA | men |
| DJ Khaled | men |
| DJ Snake | men |
| Florida Georgia Line | men |
| Kygo | men |
| Panic! At The Disco | men |
| Queen | men |
| Thomas Rhett | men |
| Wisin | men |
| Yandel | men |
| Zedd | men |
| 21 Savage | men |
| Bruno Mars | men |
| Ed Sheeran | men |
| Eminem | men |
| J. Cole | men |
| Jason Aldean | men |
| Luke Bryan | men |
| Luke Combs | men |
| Marchmello | men |
| Maroon 5 | men |
| Migos | men |
| Pharrell Williams | men |
| Quavo | men |
| Romeo Santos | men |

| | |
|---|---|
| Big Sean | men |
| Cheat Codes | men |
| Fall Out Boy | men |
| Future | men |
| Martin Garrix | men |
| Pitbull | men |
| Sean Paul | men |
| Swae Lee | men |
| Tom Petty | men |
| Avicci | men |
| Banda Sinaloense MS de Sergio Lizarraga | men |
| Blake Shelton | men |
| Brett Young | men |
| Calibre 50 | men |
| Chris Young | men |
| Coldplay | men |
| Dan + Shay | men |
| Dierks Bentley | men |
| Diplo | men |
| Dustin Lynch | men |
| Enrique Iglesias | men |
| Eric Church | men |
| Farruko | men |
| Grey | men |
| Jonas Blue | men |
| Juan Gabriel | men |
| Kane Brown | men |
| Kanye West | men |
| Kenny Chesney | men |
| Logic | men |
| Luis Fonsi | men |
| Machine Gun Kelly | men |
| Marshmello | men |
| NF | men |
| Offset | men |
| Old Dominion | men |
| Portugal, The Man | men |
| Prince Royce | men |
| Sam Smith | men |
| Shawn Mendes | men |
| Steve Aoki | men |
| Travis Scott | men |
| Ty Dolla $ign | men |
| Zion | men |

| | |
|---|---|
| 6ix9ine | men |
| Alan Walker | men |
| Bastile | men |
| Bazzi | men |
| Bryson Tiller | men |
| Chance The Rapper | men |
| Charlie Puth | men |
| Childish Gambino | men |
| Christian Nodal | men |
| CNCO | men |
| Cole Swindell | men |
| Daft Punk | men |
| Darell | men |
| Darius Rucker | men |
| Fetty Wap | men |
| Five Finger Death Punch | men |
| Foo Fighters | men |
| French Montana | men |
| G-Easy | men |
| G-Ezay | men |
| gnash | men |
| Jon Pardi | men |
| Keith Urban | men |
| Kid Rock | men |
| Lil Uzi Vert | men |
| Lil Wayne | men |
| Lil Yachty | men |
| Marc Anthony | men |
| Reik | men |
| Russell Dickerson | men |
| Skrillex | men |
| Thirty Seconds To Mars | men |
| Tom Petty And The Heartbreakers | men |
| Willy William | men |
| X Ambassadors | men |
| XXXTENTACION | men |
| 5 Seconds of Summer | men |
| A$AP Rocky | men |
| AC/DC | men |
| Afrojack | men |
| Alesso | men |
| Arcangel | men |
| Audien | men |
| Audioslave | men |

| | |
|---|---|
| Ayo & Teo | men |
| Backstreet Boys | men |
| Bad Wolves | men |
| Beck | men |
| benny blanco | men |
| BIA | men |
| Billy Currington | men |
| Bipolar Sunshine | men |
| BlocBoy JB | men |
| Bob Pressner | men |
| Brad Paisley | men |
| Brando | men |
| Brantley Gibert | men |
| Breaking Benjamin | men |
| Brett Eldredge | men |
| Britton Buchanan | men |
| Brother Osborne | men |
| Brytiago | men |
| BTS | men |
| Carlos Vives | men |
| Casper Magico | men |
| Chacha | men |
| Chino & Nacho | men |
| Chris Brown | men |
| Chris Janson | men |
| Chris Jeda | men |
| Chris Stapleton | men |
| Cutty Ranks | men |
| CVBZ | men |
| Dakota | men |
| David Bowie | men |
| David Lee Murphy | men |
| Dawin | men |
| Deorro | men |
| Descemer Bueno | men |
| Devin Dawson | men |
| Disciples | men |
| Disclosure | men |
| Disturbed | men |
| DJ Kass | men |
| DJ Luian | men |
| DJ Smoke | men |
| Don Omar | men |
| Drew Love | men |

| | |
|---|---|
| Dylan Scott | men |
| Dzeko | men |
| El Chombo | men |
| Elvis Crespo | men |
| Flume | men |
| Foster The People | men |
| Francesco Yates | men |
| Frank Ocean | men |
| Fuse ODG | men |
| Garlantis | men |
| Gary Clark Jr. | men |
| Gente de Zona | men |
| George Benson | men |
| George Ezra | men |
| Godsmack | men |
| Gorillaz | men |
| Greta Van Fleet | men |
| Gucci Mane | men |
| IAmChino | men |
| Jack & Jack | men |
| Jacob Forever | men |
| Jake Owen | men |
| James Authur | men |
| Jason Derulo | men |
| JAY-Z | men |
| Jesse Larson | men |
| Jimmie Allen | men |
| John Mayer | men |
| Jon Bellion | men |
| Jordan Davis | men |
| Josh Turner | men |
| Jowell & Randy | men |
| Joyner Lucas | men |
| Judah & The Lion | men |
| Juice WRLD | men |
| Justin Moore | men |
| Kai | men |
| Kip Moore | men |
| Kris Kross Amsterdam | men |
| KYLE | men |
| Ky-Mani Marley | men |
| La Arrolladora Banda el Limon de Rene Camacho | men |
| La Trakalosa de Monterrey | men |
| LANCO | men |

| | |
|---|---|
| Lauv | men |
| Led Zeppelin | men |
| Liam Payne | men |
| Lil Baby | men |
| Lil Dicky | men |
| Lil Pump | men |
| Lin-Manuel Miranda | men |
| Little Mix | men |
| Lord Huron | men |
| Loud Luxury | men |
| Louis Tomlinson | men |
| lovelytheband | men |
| Mambo Kingz | men |
| Mana | men |
| Manuel Turizo | men |
| Mason Ramsey | men |
| MAX | men |
| Metro Boomin | men |
| Michael Jackson | men |
| Michael Ray | men |
| Midland | men |
| Miguel | men |
| Mitchell Tenpenny | men |
| MNEK | men |
| Morgan Wallen | men |
| Mumford & Sons | men |
| Muse | men |
| Nacho | men |
| Nego do Borel | men |
| Niall Horan | men |
| Nio Garcia | men |
| PARTYNEXTDOOR | men |
| Preme | men |
| PSY | men |
| Rag'n'Bone Man | men |
| Raymix | men |
| Regulo Caro | men |
| Rich The Kid | men |
| Rick Ross | men |
| Ricky Martin | men |
| RM | men |
| Robin Schulz | men |
| Rvssian | men |
| Sam Hunt | men |

| | |
|---|---|
| Scotty McCreery | men |
| Shinedown | men |
| Silk City | men |
| Skip Marley | men |
| Sky | men |
| Sleepy Tom | men |
| Soundgarden | men |
| Tarrus Riley | men |
| The Allman Brothers Band | men |
| The Killers | men |
| The Knocks | men |
| The Lumineers | men |
| The Night Game | men |
| The Police | men |
| The Revivalists | men |
| Theory Of A Deadman | men |
| Tiesto | men |
| Tim McGraw | men |
| U2 | men |
| Vince Gill | men |
| Vory | men |
| Walk The Moon | men |
| Walker Hayer | men |
| Watt | men |
| Weezer | men |
| Will Smith | men |
| William Singe | men |
| Winona Oak | men |
| Wiz Khalifa | men |
| Wolfine | men |
| Yo Gotti | men |
| Young Thug | men |
| Zacari | men |
| Zach Williams | men |
| Zayn | men |

## APPENDIX 5: BILLBOARD6:2019 CORPUS

Table 11: *Billboard6:2019 Corpus*

| Sample # | Chart Genre | Chart Position | Song | Artist | Chart Date |
|---|---|---|---|---|---|
| **1** | Pop | 1 | High Hopes | Panic! At The Disco | December 29, 2018 |
| **2** | Pop | 2 | Breathin | Ariana Grande | December 29, 2018 |
| **3** | Pop | 3 | Without Me | Halsey | December 29, 2018 |
| **4** | Pop | 4 | Happier | Marshmello & Bastile | December 29, 2018 |
| **5** | Pop | 5 | Thank U, Next | Ariana Grande | December 29, 2018 |
| **6** | Pop | 6 | Eastside | benny blanco, Halsey, & Khalid | December 29, 2018 |
| **7** | Pop | 7 | Youngblood | 5 Seconds of Summer | December 29, 2018 |
| **8** | Pop | 8 | Better Now | Post Malone | December 29, 2018 |
| **9** | Pop | 9 | Beautiful | Bazzi Featuring Camila Cabello | December 29, 2018 |
| **10** | Pop | 10 | Love Lies | Khalid & Normani | December 29, 2018 |
| **11** | Pop | 10 | Lie | NF | December 15, 2018 |
| **12** | Pop | 10 | Girls Like You | Maroon 5 Featuring Cardi B | December 08, 2018 |
| **13** | Pop | 8 | God Is A Woman | Ariana Grande | November 24, 2018 |
| **14** | Pop | 10 | Lucid Dreams | Juice WRLD | November 24, 2018 |
| **15** | Pop | 8 | Back to You | Selena Gomez | November 03, 2018 |
| **16** | Pop | 10 | I'm A Mess | Bebe Rexha | October 20, 2018 |
| **17** | Pop | 7 | No Brainer | DJ Khaled Featuring Justin Bieber | October 20, 2018 |
| **18** | Pop | 9 | I Like It | Cardi B. Bad Bunny & J. Balvin | October 13, 2018 |
| **19** | Pop | 9 | In My Feelings | Drake | September 29, 2018 |
| **20** | Pop | 10 | No Tears Left To Cry | Ariana Grande | September 22, 2018 |
| **21** | Pop | 10 | Delicate | Taylor Swift | September 01, 2018 |
| **22** | Pop | 10 | Psycho | Post Malone Featuring Ty Dolla $ign | August 25, 2018 |
| **23** | Pop | 8 | Friends | Marshmello & Anne-Marie | August 18, 2018 |
| **24** | Pop | 10 | One Kiss | Calvin Harris & Dua Lipa | August 18, 2018 |
| **25** | Pop | 10 | Mine | Bazzi | August 11, 2018 |
| **26** | Pop | 9 | The Middle | Zedd, Maren Morris & Grey | July 21, 2018 |
| **27** | Pop | 10 | Never Be The Same | Camilla Cobello | July 14, 2018 |
| **28** | Pop | 9 | I Like Me Better | Lauv | July 14, 2018 |
| **29** | Pop | 9 | Wait | Maroon 5 | June 23, 2018 |

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|---|---|---|---|---|---|
| **30** | Pop | 8 | Whatever It Takes | Imagine Dragons | June 16, 2018 |
| **31** | Pop | 9 | In My Blood | Shawn Mendes | June 09, 2018 |
| **32** | Pop | 10 | God's Plan | Drake | June 09, 2018 |
| **33** | Pop | 8 | Pray For Me | The Weeknd & Kendrick Lamar | June 02, 2018 |
| **34** | | 7 | Meant To Be | Bebe Rexha & Florida Georgia Line | May 19, 2018 |
| **35** | Pop | 8 | New Rules | Dua Lipa | May 12, 2018 |
| **36** | Pop | 9 | Finesse | Bruno Mars & Cardi B | May 05, 2018 |
| **37** | Pop | 9 | Him & I | G-Ezay & Halsey | April 28, 2018 |
| **38** | Pop | 8 | Let You Down | NF | April 21, 2018 |
| **39** | Pop | 10 | Perfect | Ed Sheeran | April 21, 2018 |
| **40** | Pop | 10 | Lights Down Low | MAX Featuring gnash | March 31, 2018 |
| **41** | Pop | 10 | Wolves | Selena Gomez x Marshmello | March 24, 2018 |
| **42** | Pop | 8 | How Long | Charlie Puth | March 10, 2018 |
| **43** | Pop | 9 | Havana | Camilla Cobello Featuring Young Thug | March 03, 2018 |
| **44** | Pop | 10 | Bad At Love | Halsey | March 03, 2018 |
| **45** | Pop | 6 | Rockstar | Post Malone Featuring 21 Savage | February 10, 2018 |
| **46** | Pop | 6 | Too Good At Goodbyes | Sam Smith | January 27, 2018 |
| **47** | Pop | 9 | Thunder | Imagine Dragons | January 27, 2018 |
| **48** | Pop | 10 | End Game | Taylor Swift Featuring Ed Sheeran & Future | January 20, 2018 |
| **49** | Pop | 10 | What Lovers Do | Maroon 5 Featuring SZA | January 13, 2018 |
| **50** | Pop | 9 | Sorry Not Sorry | Demi Lovato | December 30, 2017 |
| **51** | Pop | 10 | Feel It Still | Portugal, The Man | December 23, 2017 |
| **52** | Pop | 10 | 1-800-273-8255 | Logic Featuring Alessia Cara & Khalid | December 16, 2017 |
| **53** | Pop | 10 | Praying | Kesha | December 09, 2017 |
| **54** | Pop | 8 | Strip That Down | Liam Payne Featuring Quavo | December 02, 2017 |
| **55** | Pop | 8 | Attention | Charlie Puth | November 25, 2017 |
| **56** | Pop | 10 | Slow Hands | Niall Horan | November 18, 2017 |
| **57** | Pop | 10 | What About Us | Pink | November 11, 2017 |
| **58** | Pop | 7 | Look What You Made Me Do | Taylor Swift | November 04, 2017 |
| **59** | Pop | 9 | Unforgettable | French Montana Featuring Swae Lee | November 04, 2017 |
| **60** | Pop | 10 | No Promises | Cheat Codes Featuring Demi Lovato | November 04, 2017 |
| **61** | Pop | 10 | There's Nothing Holdin' Me Back | Shawn Mendes | October 28, 2017 |

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|---|---|---|---|---|---|
| **62** | Pop | 8 | Believer | Imagine Dragons | October 07, 2017 |
| **63** | Pop | 8 | Wild Thoughts | DJ Khaled Featuring Rhianna & Bryson Tiller | September 30, 2017 |
| **64** | Pop | 8 | Despactio | Luis Fonsi & Daddy Yankee Featuring Justin Bieber | September 23, 2017 |
| **65** | Pop | 10 | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean | September 23, 2017 |
| **66** | Pop | 9 | Stay | Zedd & Alessia Cara | September 09, 2017 |
| **67** | Pop | 10 | Now Or Never | Halsey | September 02, 2017 |
| **68** | Pop | 8 | I'm The one | DJ Khaled Featuring Justin Bieber | August 19, 2017 |
| **69** | Pop | 9 | Castle On The Hill | Ed Sheeran | August 12, 2017 |
| **70** | Pop | 9 | That's What I Like | Bruno Mars | August 05, 2017 |
| **71** | Pop | 10 | It Ain't Me | Kygo & Selena Gomez | August 05, 2017 |
| **72** | Pop | 10 | Shape Of You | Ed Sheeran | July 29, 2017 |
| **73** | Pop | 10 | Something Just Like This | The Chainsmokers & Coldplay | July 22, 2017 |
| **74** | Pop | 5 | Issues | Julia Michaels | July 15, 2017 |
| **75** | Pop | 10 | Say You Won't Let Go | James Authur | July 08, 2017 |
| **76** | Pop | 10 | Slide | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean | June 10, 2017 |
| **77** | Pop | 8 | Rockabye | Clean Bandit Featuring Sean Paul & Anne-Marie | May 27, 2017 |
| **78** | Pop | 10 | Cold | Maroon 5 Featuring Future | May 27, 2017 |
| **79** | Pop | 9 | Paris | The Chainsmokers | May 20, 2017 |
| **80** | Pop | 9 | I Feel It Coming | The Weeknd Featuring Daft Punk | May 06, 2017 |
| **81** | Pop | 10 | I Don't Want to Live Forever (Fifty Shades Darker) | Zayn/Taylor Swift | May 06, 2017 |
| **82** | Pop | 10 | Chained To The Rhythm | Katy Perry Featuring Skip Marley | April 29, 2017 |
| **83** | Pop | 10 | Love On The Brian | Rihanna | April 22, 2017 |
| **84** | Pop | 10 | Mercy | Shawn Mendes | April 15, 2017 |
| **85** | Pop | 10 | Down | Marian Hill | April 08, 2017 |
| **86** | Pop | 8 | Bad Things | Machine Gun Kelly & Camila Cabello | March 25, 2017 |

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|---|---|---|---|---|---|
| **87** | Pop | 8 | Scars To Your Beautiful | Alessia Cara | March 18, 2017 |
| **88** | Pop | 9 | Don't Wanna Know | Maroon 5 Featuring Kendrick Lamar | March 11, 2017 |
| **89** | Pop | 10 | All Time Low | Jon Bellion | March 11, 2017 |
| **90** | Pop | 10 | Side To Side | Ariana Grande Featuring Nicki Minaj | March 04, 2017 |
| **91** | Pop | 9 | Closer | The Chainsmokers Featuring Halsey | February 18, 2017 |
| **92** | Pop | 9 | Starving | Hailee Steinfeld & Grey Featuring Zedd | February 11, 2017 |
| **93** | Pop | 10 | Starboy | The Weeknd Featuring Daft Punk | February 04, 2017 |
| **94** | Pop | 8 | Let Me Love You | DJ Snake Featuring Justin Bieber | January 28, 2017 |
| **95** | Pop | 10 | 24K Magic | Bruno Mars | January 28, 2017 |
| **96** | Pop | 10 | The Greatest | Sia Featuring Kendrick Lamar | December 31, 2016 |
| **97** | Pop | 9 | I Hate U I Love U | gnash Featuring Olivia O'Brien | December 24, 2016 |
| **98** | Pop | 10 | Unsteady | X Ambassadors | December 24, 2016 |
| **99** | Pop | 10 | Heathens | twenty one pilots | December 17, 2016 |
| **100** | Pop | 7 | Gold | Kiiara | November 19, 2016 |
| **101** | Pop | 10 | Cold Water | Major Lazer Featuring Justin Bieber | November 19, 2016 |
| **102** | Rock | 1 | High Hopes | Panic! At The Disco | December 29, 2018 |
| **103** | Rock | 2 | Natural | Imagine Dragons | December 29, 2018 |
| **104** | Rock | 3 | Broken | lovelytheband | December 29, 2018 |
| **105** | Rock | 4 | Bohemian Rhapsody | Queen | December 29, 2018 |
| **106** | Rock | 5 | My Blood | twenty one pilots | December 29, 2018 |
| **107** | Rock | 6 | Another One Bites The Dust | Queen | December 29, 2018 |
| **108** | Rock | 7 | Somebody To Love | Queen | December 29, 2018 |
| **109** | Rock | 8 | Under Pressure | Queen & David Bowie | December 29, 2018 |
| **110** | Rock | 9 | We Will Rock You | Queen | December 29, 2018 |
| **111** | Rock | 10 | You're Somebody Else | flora cash | December 29, 2018 |
| **112** | Rock | 8 | Don't Stop Me Now | Queen | December 22, 2018 |
| **113** | Rock | 9 | Guiding Light | Mumford & Sons | December 22, 2018 |
| **114** | Rock | 5 | Bad Liar | Imagine Dragons | November 24, 2018 |
| **115** | Rock | 10 | The Greatest Show | Panic! At The Disco | November 17, 2018 |
| **116** | Rock | 6 | Africa | Weezer | November 10, 2018 |

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|---|---|---|---|---|---|
| **117** | Rock | 10 | New Light | John Mayer | November 10, 2018 |
| **118** | Rock | 4 | Thunder | Imagine Dragons | November 03, 2018 |
| **119** | Rock | 9 | When The Curtain Falls | Greta Van Fleet | November 03, 2018 |
| **120** | Rock | 9 | Jumpsuit | twenty one pilots | October 27, 2018 |
| **121** | Rock | 10 | Chlorine | twenty one pilots | October 27, 2018 |
| **122** | Rock | 8 | Nico And The Niners | twenty one pilots | October 20, 2018 |
| **123** | Rock | 9 | Morph | twenty one pilots | October 20, 2018 |
| **124** | Rock | 6 | Zombie | Bad Wolves | October 20, 2018 |
| **125** | Rock | 10 | Shotgun | George Ezra | October 20, 2018 |
| **126** | Rock | 10 | Zero | Imagine Dragons | October 06, 2018 |
| **127** | Rock | 9 | Say Amen (Saturday Night) | Panic! At The Disco | September 29, 2018 |
| **128** | Rock | 4 | Believer | Imagine Dragons | September 22, 2018 |
| **129** | Rock | 7 | Sit Next To Me | Foster The People | September 22, 2018 |
| **130** | Rock | 9 | The Sound Of Silence | Disturbed | September 22, 2018 |
| **131** | Rock | 5 | Feel It Still | Portugal, The Man | September 15, 2018 |
| **132** | Rock | 5 | Whatever It Takes | Imagine Dragons | September 01, 2018 |
| **133** | Rock | 10 | Hunger | Florence + The Machine | July 14, 2018 |
| **134** | Rock | 10 | Hey Look Ma, I Made It | Panic! At The Disco | July 07, 2018 |
| **135** | Rock | 7 | Humility | Gorillaz Featuring George Benson | June 16, 2018 |
| **136** | Rock | 9 | No Roots | Alice Merton | June 02, 2018 |
| **137** | Rock | 10 | Where You Come From | Britton Buchanan | June 02, 2018 |
| **138** | Rock | 10 | Bulletproof | Godsmack | May 12, 2018 |
| **139** | Rock | 10 | Gone Away | Five Finger Death Punch | May 05, 2018 |
| **140** | Rock | 9 | Sky Full Of Song | Florence + The Machine | April 28, 2018 |
| **141** | Rock | 10 | One Foot | Walk The Moon | April 21, 2018 |
| **142** | Rock | 10 | (Fuck A) Silver Lining | Panic! At The Disco | April 07, 2018 |
| **143** | Rock | 10 | Live In The Moment | Portugal, The Man | March 31, 2018 |
| **144** | Rock | 9 | Devil | Shinedown | March 24, 2018 |
| **145** | Rock | 10 | Next To Me | Imagine Dragons | March 24, 2018 |
| **146** | Rock | 10 | Walk On Water | Thirty Seconds To Mars | March 17, 2018 |
| **147** | Rock | 9 | Rx (Medicate) | Theory Of A Deadman | March 03, 2018 |
| **148** | Rock | 10 | Thought Contagion | Muse | March 03, 2018 |
| **149** | Rock | 10 | Hold Me Tight Or Don't | Fall Out Boy | February 17, 2018 |
| **150** | Rock | 8 | Dangerous Night | Thirty Seconds To Mars | February 10, 2018 |

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|---|---|---|---|---|---|
| **151** | Rock | 5 | Zombie | The Cranberries | January 27, 2018 |
| **152** | Rock | 6 | Linger | The Cranberries | January 27, 2018 |
| **153** | Rock | 7 | Dreams | The Cranberries | January 27, 2018 |
| **154** | Rock | 5 | Red Cold River | Breaking Benjamin | January 20, 2018 |
| **155** | Rock | 9 | Thunder/Young Dumb & Broke (Medley) | Imagine Dragons + Khalid | January 13, 2018 |
| **156** | Rock | 10 | Up All Night | Beck | January 13, 2018 |
| **157** | Rock | 5 | Wish I Knew You | The Revivalists | January 03, 2018 |
| **158** | Rock | 10 | The Sky Is A Neighbourhood | Foo Fighters | January 03, 2018 |
| **159** | Rock | 10 | Thunderstruck | AC/DC | December 30, 2017 |
| **160** | Rock | 10 | You're The Best Thing About Me | U2 | December 23, 2017 |
| **161** | Rock | 10 | Angela | The Lumineers | December 16, 2017 |
| **162** | Rock | 7 | Come Together | Gary Clark Jr. | December 09, 2017 |
| **163** | Rock | 9 | Immigrant Song | Led Zeppelin | December 09, 2017 |
| **164** | Rock | 9 | Old Church Choir | Zach Williams | December 02, 2017 |
| **165** | Rock | 7 | Every Breath You Take | The Police | November 25, 2017 |
| **166** | Rock | 7 | One More Light | Linkin Park | November 25, 2017 |
| **167** | Rock | 10 | Trouble | Five Finger Death Punch | November 18, 2017 |
| **168** | Rock | 7 | Free Fallin' | Tom Petty | November 11, 2017 |
| **169** | Rock | 10 | The Man | The Killers | November 11, 2017 |
| **170** | Rock | 4 | I Won't Back Down | Tom Petty | October 28, 2017 |
| **171** | Rock | 7 | Mary Jane's Last Dance | Tom Petty And The Heartbreakers | October 28, 2017 |
| **172** | Rock | 8 | Learning To Fly | Tom Petty And The Heartbreakers | October 28, 2017 |
| **173** | Rock | 10 | You Don't Know How It Feels | Tom Petty | October 28, 2017 |
| **174** | Rock | 9 | Runnin' Down A Dream | Tom Petty | October 21, 2017 |
| **175** | Rock | 5 | The Last Of The Real Ones | Fall Out Boy | October 07, 2017 |
| **176** | Rock | 8 | The Night We Met | Lord Huron | September 30, 2017 |
| **177** | Rock | 10 | Tennessee Mountain Top | Kid Rock | September 30, 2017 |
| **178** | Rock | 8 | Take It All Back | Judah & The Lion | September 23, 2017 |
| **179** | Rock | 8 | Heavy | Linkin Park Featuring Kiiara | September 16, 2017 |
| **180** | Rock | 5 | Numb | Linkin Park | September 09, 2017 |
| **181** | Rock | 6 | In The End | Linkin Park | September 09, 2017 |

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|---|---|---|---|---|---|
| **182** | Rock | 9 | What I've Done | Linkin Park | August 19, 2017 |
| **183** | Rock | 8 | Crawling | Linkin Park | August 12, 2017 |
| **184** | Rock | 9 | Somewhere I Belong | Linkin Park | August 12, 2017 |
| **185** | Rock | 4 | Heathens | twenty one pilots | August 05, 2017 |
| **186** | Rock | 9 | Po-Dunk | Kid Rock | August 05, 2017 |
| **187** | Rock | 6 | Human | Rag'n'Bone Man | July 29, 2017 |
| **188** | Rock | 10 | Want You Back | HAIM | July 29, 2017 |
| **189** | Rock | 9 | Hard Times | Paramore | July 22, 2017 |
| **190** | Rock | 10 | Run | Foo Fighters | July 22, 2017 |
| **191** | Rock | 9 | Walking The Wire | Imagine Dragons | July 15, 2017 |
| **192** | Rock | 10 | Champion | Fall Out Boy Featuring RM | July 15, 2017 |
| **193** | Rock | 10 | All I Can Think About Is You | Coldplay | July 08, 2017 |
| **194** | Rock | 9 | Midnight Rider | The Allman Brothers Band | June 17, 2017 |
| **195** | Rock | 5 | Black Hole Sun | Soundgarden | June 10, 2017 |
| **196** | Rock | 7 | Like A Stone | Audioslave | June 10, 2017 |
| **197** | Rock | 10 | Woman | Jesse Larson | June 10, 2017 |
| **198** | Rock | 7 | The Chain | Fleetwood Mac | May 27, 2017 |
| **199** | Rock | 10 | Sucker For Pain | Lil Wayne, Wiz Khalifa & Imagine Dragons With Logic & Ty Dolla $ign Feat. X Ambassadors | May 27, 2017 |
| **200** | Rock | 7 | Young And Menace | Fall Out Boy | May 20, 2017 |
| **201** | Rock | 4 | Lust For Life | Lana Del Rey Featuring The Weeknd | May 13, 2017 |
| **202** | Rock | 10 | American Dream | Bob Pressner | May 13, 2017 |
| **203** | Country | 1 | Speechless | Dan + Shay | December 29, 2018 |
| **204** | Country | 2 | Tequila | Dan + Shay | December 29, 2018 |
| **205** | Country | 3 | She Got The Best Of Me | Luke Combs | December 29, 2018 |
| **206** | Country | 4 | Meant To Be | Bebe Rexha & Florida Georgia Line | December 29, 2018 |
| **207** | Country | 5 | Lose It | Kane Brown | December 29, 2018 |
| **208** | Country | 6 | Drunk Me | Mitchell Tenpenny | December 29, 2018 |
| **209** | Country | 7 | Best Shot | Jimmie Allen | December 29, 2018 |
| **210** | Country | 8 | Burning Man | Dierks Bentley Featuring Brother Osborne | December 29, 2018 |
| **211** | Country | 9 | Sixteen | Thomas Rhett | December 29, 2018 |
| **212** | Country | 10 | Girl Like You | Jason Aldean | December 29, 2018 |
| **213** | Country | 9 | Good Girl | Dustin Lynch | December 15, 2018 |
| **214** | Country | 9 | Hangin' On | Chris Young | December 08, 2018 |

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|---|---|---|---|---|---|
| **215** | Country | 8 | Rich | Maren Morris | December 01, 2018 |
| **216** | Country | 10 | Blue Tacoma | Russell Dickerson | November 17, 2018 |
| **217** | Country | 10 | Simple | Florida Georgia Line | November 03, 2018 |
| **218** | Country | 4 | Break Up In The End | Cole Swindell | October 27, 2018 |
| **219** | Country | 8 | Desperate Man | Eric Church | October 20, 2018 |
| **220** | Country | 10 | Hotel Key | Old Dominion | October 20, 2018 |
| **221** | Country | 6 | Heaven | Kane Brown | October 13, 2018 |
| **222** | Country | 8 | Sunrise, Sunburn, Sunset | Luke Bryan | October 06, 2018 |
| **223** | Country | 9 | Hooked | Dylan Scott | September 29, 2018 |
| **224** | Country | 8 | Drowns The Whiskey | Jason Aldean Featuring Miranda Lambert | September 22, 2018 |
| **225** | Country | 10 | Life Changes | Thomas Rhett | September 22, 2018 |
| **226** | Country | 9 | Mercy | Brett Young | September 15, 2018 |
| **227** | Country | 10 | Get Along | Kenny Chesney | September 15, 2018 |
| **228** | Country | 10 | One Number Away | Luke Combs | August 25, 2018 |
| **229** | Country | 8 | I Was Jack (You Were Diane) | Jake Owen | August 04, 2018 |
| **230** | Country | 10 | Up Down | Morgan Wallen Featuring Florida Georgia Line | July 21, 2018 |
| **231** | Country | 9 | You Make It Easy | Jason Aldean | July 07, 2018 |
| **232** | Country | 9 | I Lived It | Blake Shelton | June 30, 2018 |
| **233** | Country | 7 | Woman, Amen | Dierks Bentley | June 23, 2018 |
| **234** | Country | 10 | Everything's Gonna Be Alright | David Lee Murphy & Kenny Chesney | June 16, 2018 |
| **235** | Country | 7 | For The First Time | Darius Rucker | June 02, 2018 |
| **236** | Country | 10 | Marry Me | Thomas Rhett | May 26, 2018 |
| **237** | Country | 6 | Beautiful Crazy | Luke Combs | May 19, 2018 |
| **238** | Country | 10 | Most People Are Good | Luke Bryan | May 19, 2018 |
| **239** | Country | 4 | Famous | Mason Ramsey | May 12, 2018 |
| **240** | Country | 8 | Singles You Up | Jordan Davis | May 12, 2018 |
| **241** | Country | 8 | Babe | Sugarland Featuring Taylor Swift | May 05, 2018 |
| **242** | Country | 5 | Cry Pretty | Carry Underwood | April 28, 2018 |
| **243** | Country | 9 | The Long Way | Brett Eldredge | April 28, 2018 |
| **244** | Country | 10 | Broken Halos | Chris Stapleton | April 21, 2018 |
| **245** | Country | 8 | All On Me | Devin Dawson | April 07, 2018 |
| **246** | Country | 10 | Five More Minutes | Scotty McCreery | April 07, 2018 |
| **247** | Country | 10 | Written In The Sand | Old Dominion | March 17, 2018 |

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| **248** | Country | 9 | You Broke Up With Me | Walker Hayer | March 03, 2018 |
| **249** | Country | 10 | Yours | Russell Dickerson | March 03, 2018 |
| **250** | Country | 10 | Legends | Kelsea Ballerini | February 24, 2018 |
| **251** | Country | 5 | What Ifs | Kane Brown Featuring Lauren Alaina | February 10, 2018 |
| **252** | Country | 7 | Losing Sleep | Chris Young | February 10, 2018 |
| **253** | Country | 9 | Greatest Love Story | LANCO | February 10, 2018 |
| **254** | Country | 8 | Body Like A Back Road | Sam Hunt | February 03, 2018 |
| **255** | Country | 9 | Like I Loved You | Brett Young | February 03, 2018 |
| **256** | Country | 7 | Round Here Buzz | Eric Church | January 27, 2018 |
| **257** | Country | 7 | I Could Use A Love Song | Maren Morris | January 20, 2018 |
| **258** | Country | 8 | I'll Name The Dogs | Blake Shelton | January 13, 2018 |
| **259** | Country | 10 | When It Rains It Pours | Luke Combs | January 13, 2018 |
| **260** | Country | 10 | Unforgettable | Thomas Rhett | January 06, 2018 |
| **261** | Country | 7 | Light It Up | Luke Bryan | December 30, 2017 |
| **262** | Country | 10 | Small Town Boy | Dustin Lynch | December 16, 2017 |
| **263** | Country | 10 | Fix A Drink | Chris Janson | December 02, 2017 |
| **264** | Country | 7 | Every Little Thing | Carly Pearce | November 25, 2017 |
| **265** | Country | 8 | More Girls Like You | Kip Moore | November 04, 2017 |
| **266** | Country | 8 | Heartache On The Dance Floor | Jon Pardi | October 28, 2017 |
| **267** | Country | 9 | All The Pretty Girls | Kenny Chesney | October 28, 2017 |
| **268** | Country | 9 | They Don't Know | Jason Aldean | October 21, 2017 |
| **269** | Country | 8 | No Such Thing As A Broken Heart | Old Dominion | September 30, 2017 |
| **270** | Country | 9 | Craving You | Thomas Rhett Featuring Maren Morris | September 30, 2017 |
| **271** | Country | 9 | Drinkin' Problem | Midland | September 23, 2017 |
| **272** | Country | 5 | In Case You Didn't Know | Brett Young | September 16, 2017 |
| **273** | Country | 9 | Hurricane | Luke Combs | September 09, 2017 |
| **274** | Country | 10 | You Look Good | Lady Antebellum | September 09, 2017 |
| **275** | Country | 9 | Somebody Else Will | Justin Moore | September 02, 2017 |

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| **276** | Country | 8 | Do I Make You Wanna | Billy Currington | August 26, 2017 |
| **277** | Country | 10 | Flatliner | Cole Swindell | August 26, 2017 |
| **278** | Country | 9 | The Fighter | Keith Urban Featuring Carrie Underwood | August 19, 2017 |
| **279** | Country | 6 | My Girl | Dylan Scott | August 12, 2017 |
| **280** | Country | 10 | God, Your Mama, And Me | Florida Georgia Line Featuring Backstreet Boys | July 29, 2017 |
| **281** | Country | 8 | Everytime I Hear That Song | Blake Shelton | July 22, 2017 |
| **282** | Country | 10 | How Not To | Dan + Shay | July 08, 2017 |
| **283** | Country | 7 | Black | Dierks Bentley | June 17, 2017 |
| **284** | Country | 10 | Dirt On My Boots | Jon Pardi | June 17, 2017 |
| **285** | Country | 4 | Deja Vu | Lauren Duski | June 10, 2017 |
| **286** | Country | 5 | If I Told You | Darius Rucker | June 10, 2017 |
| **287** | Country | 9 | The Weekend | Brantley Gibert | June 03, 2017 |
| **288** | Country | 9 | Yeah Boy | Kelsea Ballerini | May 27, 2017 |
| **289** | Country | 7 | Hometown Girl | Josh Turner | May 20, 2017 |
| **290** | Country | 8 | Any Ol' Barstool | Jason Aldean | May 13, 2017 |
| **291** | Country | 10 | Fast | Luke Bryan | April 29, 2017 |
| **292** | Country | 6 | Speak To A Girl | Tim McGraw & Faith Hill | April 15, 2017 |
| **293** | Country | 8 | Road Less Traveled | Lauren Alaina | April 15, 2017 |
| **294** | Country | 6 | Better Man | Little Big Town | April 08, 2017 |
| **295** | Country | 9 | Think A Little Less | Michael Ray | April 08, 2017 |
| **296** | Country | 8 | Today | Brad Paisley | March 26, 2017 |
| **297** | Country | 10 | Sober Saturday Night | Chris Young Featuring Vince Gill | March 26, 2017 |
| **298** | Country | 6 | Fast | Luke Bryan | March 18, 2017 |
| **299** | Country | 10 | Blue Ain't Your Color | Keith Urban | March 18, 2017 |
| **300** | Country | 9 | Kill A Word | Eric Church Featuring Rhiannon Giddens | March 11, 2017 |
| **301** | Country | 10 | Star Of The Show | Thomas Rhett | March 11, 2017 |
| **302** | Country | 9 | Seeing' Red | Dustin Lynch | March 04, 2017 |
| **303** | Dance/ Electronic | 1 | Happier | Marshmello & Bastille | December 29, 2018 |
| **304** | Dance/ Electronic | 2 | Taki Taki | DJ Smoke Featuring Selena Gomez | December 29, 2018 |
| **305** | Dance/ Electronic | 3 | Close To Me | Ellie Goulding X Diplo Featuring Swae Lee | December 29, 2018 |
| **306** | Dance/ Electronic | 4 | The Middle | Zedd, Maren Morris & Grey | December 29, 2018 |

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| **307** | Dance/ Electronic | 5 | This Feeling | The Chainsmokers Featuring Kelsea Ballerini | December 29, 2018 |
| **308** | Dance/ Electronic | 6 | Electricity | Silk City x Dua Lipa | December 29, 2018 |
| **309** | Dance/ Electronic | 7 | Hope | The Chainsmokers Featuring Winona Oak | December 29, 2018 |
| **310** | Dance/ Electronic | 8 | One Kiss | Calvin Harris & Dua Lipa | December 29, 2018 |
| **311** | Dance/ Electronic | 9 | Jackie Chan | Tiesto & Dzeko Featuring Preme & Post Malone | December 29, 2018 |
| **312** | Dance/ Electronic | 10 | Darkside | Alan Walker Featuring Au/Ra & Tomine Harket | December 29, 2018 |
| **313** | Dance/ Electronic | 10 | Promises | Calvin Harris & Sam Smith | December 22, 2018 |
| **314** | Dance/ Electronic | 10 | Waste It On Me | Steve Aoki Featuring BTS | December 15, 2018 |
| **315** | Dance/ Electronic | 10 | Beach House | The Chainsmokers | December 01, 2018 |
| **316** | Dance/Electronic | 9 | Solo | Clean Bandit Featuring Demi Lovato | November 24, 2018 |
| **317** | Dance/ Electronic | 10 | Goodbye | Jason Derulo x David Guetta Featuring Nicki Minaj & Willy William | November 03, 2018 |
| **318** | Dance/ Electronic | 9 | Remind Me To Forget | Kygo Featuring Miguel | October 20, 2018 |
| **319** | Dance/ Electronic | 7 | Side Effects | The Chainsmokers Featuring Emily Warren | September 29, 2018 |
| **320** | Dance/ Electronic | 9 | Happy Now | Zedd & Elley Duhe | September 29, 2018 |
| **321** | Dance/ Electronic | 10 | Body | Loud Luxury Featuring Brando | September 15, 2018 |
| **322** | Dance/ Electronic | 10 | Rise | Jonas Blue Featuring Jack & Jack | September 08, 2018 |
| **323** | Dance/ Electronic | 5 | Something Just Like This | The Chainsmokers & Coldplay | September 01, 2018 |
| **324** | Dance/ Electronic | 8 | Silence | Marshmello Featuring Khalid | August 18, 2018 |
| **325** | Dance/ Electronic | 8 | Ocean | Martin Garrix Featuring Khalid | August 11, 2018 |
| **326** | Dance/ Electronic | 8 | Born To Be Yours | Kygo & Imagine Dragons | July 28, 2018 |
| **327** | Dance/ Electronic | 10 | Wolves | Selena Gomez x Marshmello | July 21, 2018 |
| **328** | Dance/ Electronic | 10 | Let Me Go | Hailee Steinfeld & Alesso Featuring Florida Georgia Line & Watt | July 14, 2018 |

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| **329** | Dance/ Electronic | 9 | Somebody | The Chainsmokers & Drew Love | June 23, 2018 |
| **330** | Dance/ Electronic | 9 | Flames | David Guetta & Sia | May 26, 2018 |
| **331** | Dance/ Electronic | 10 | Mad Love | Sean Paul + David Guetta Featuring Becky G | May 26, 2018 |
| **332** | Dance/ Electronic | 7 | Levels | Avicci | May 26, 2018 |
| **333** | Dance/ Electronic | 10 | Wait | Chantel Jeffries Featuring Offset & Vory | May 26, 2018 |
| **334** | Dance/ Electronic | 5 | Wake Me Up! | Avicci | May 12, 2018 |
| **335** | Dance/ Electronic | 7 | Hey Brother | Avicci | May 05, 2018 |
| **336** | Dance/ Electronic | 7 | Everybody Hates Me | The Chainsmokers | April 28, 2018 |
| **337** | Dance/ Electronic | 9 | Like I Do | David Guetta, Martin Garrix & Brooks | April 28, 2018 |
| **338** | Dance/ Electronic | 10 | I Miss You | Clean Bandit Featuring Julia Michaels | April 14, 2018 |
| **339** | Dance/ Electronic | 8 | No Promises | Cheat Codes Featuring Demi Lovato | April 07, 2018 |
| **340** | Dance/ Electronic | 7 | Fly | Marshmello Featuring Leah Culver | March 24, 2018 |
| **341** | Dance/ Electronic | 7 | I Miss You | Clean Bandit Featuring Julia Michaels | March 17, 2018 |
| **342** | Dance/ Electronic | 8 | Best Friend | Sofi Tukker Featuring NERVO, The Knocks & Alisa Ueno | March 17, 2018 |
| **343** | Dance/ Electronic | 6 | Stay | Zedd & Alessia Cara | February 24, 2018 |
| **344** | Dance/ Electronic | 9 | It Ain't Me | Kygo x Selena Gomez | February 17, 2018 |
| **345** | Dance/ Electronic | 10 | Faking It | Calvin Harris Featuring Kehlani & Lil Yachty | January 27, 2018 |
| **346** | Dance/ Electronic | 10 | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean | December 16, 2017 |
| **347** | Dance/ Electronic | 9 | All Night | Steve Aoki & Lauren Jauregui | December 09, 2017 |
| **348** | Dance/ Electronic | 10 | Kids In Love | Kygo Featuring The Night Game | November 11, 2017 |
| **349** | Dance/ Electronic | 9 | Feels Great | Cheat Codes Featuring Fetty Wap & CVBZ | November 04, 2017 |
| **350** | Dance/ Electronic | 10 | Swish Swish | Katy Perry Featuring Nicki Minaj | November 04, 2017 |

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| **351** | Dance/ Electronic | 10 | Know No Better | Major Lazer Featuring Travis Scott, Camila Cabello & Quavo | November 10, 2017 |
| **352** | Dance/ Electronic | 10 | Slide | Calvin Harris Featuring Frank Ocean & Migos | September 30, 2017 |
| **353** | Dance/ Electronic | 10 | Mama | Jonas Blue Featuring William Singe | September 23, 2017 |
| **354** | Dance/ Electronic | 9 | 2U | David Guetta Featuring Justin Bieber | September 16, 2017 |
| **355** | Dance/ Electronic | 8 | Honest | The Chainsmokers | September 09, 2017 |
| **356** | Dance/ Electronic | 9 | Let Me Love You | DJ Snake Featuring Justin Bieber | August 19, 2017 |
| **357** | Dance/ Electronic | 10 | Symphony | Clean Bandit Featuring Zara Larsson | August 12, 2017 |
| **358** | Dance/ Electronic | 6 | Closer | The Chainsmokers Featuring Halsey | August 05, 2017 |
| **359** | Dance/ Electronic | 10 | Paris | The Chainsmokers | July 22, 2017 |
| **360** | Dance/ Electronic | 8 | Rollin | Calvin Harris Featuring Future & Khalid | June 03, 2017 |
| **361** | Dance/ Electronic | 10 | Scared To Be Lonely | Martin Garrix & Dua Lipa | June 03, 2017 |
| **362** | Dance/ Electronic | 9 | First Time | Kygo & Ellie Goulding | May 20, 2017 |
| **363** | Dance/ Electronic | 9 | Call On Me | Starley | May 13, 2017 |
| **364** | Dance/ Electronic | 10 | The One | The Chainsmokers | April 29, 2017 |
| **365** | Dance/ Electronic | 10 | This Is What You Came For | Calvin Harris Featuring Rihanna | April 22, 2017 |
| **366** | Dance/ Electronic | 8 | Cold Water | Major Lazer Featuring Justin Bieber & MO | March 11, 2017 |
| **367** | Dance/ Electronic | 9 | In The Name Of Love | Martin Garrix & Bebe Rexha | March 11, 2017 |
| **368** | Dance/ Electronic | 3 | Rockabye | Clean Bandit Featuring Sean Paul & Anne-Marie | March 04, 2017 |
| **369** | Dance/ Electronic | 5 | Don't Let Me Down | The Chainsmokers Featuring Daya | March 04, 2017 |
| **370** | Dance/ Electronic | 6 | Bad Romance | Lady Gaga | February 25, 2017 |
| **371** | Dance/ Electronic | 8 | Poker | Lady Gaga | February 25, 2017 |
| **372** | Dance/ Electronic | 9 | Run Up | Major Lazer Featuring PARTYNEXTDOOR & Nicki Minaj | February 18, 2017 |
| **373** | Dance/ | 9 | Alone | Marchmello | February 11, 2017 |

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| **374** | Dance/ Electronic | 10 | Just Hold On | Steve Aoki & Louis Tomlinson | February 11, 2017 |
| **375** | Dance/ Electronic | 9 | Never Be Like You | Flume Featuring Kai | January 28, 2017 |
| **376** | Dance/ Electronic | 10 | Setting Fires | The Chainsmokers Featuring XYLO | January 28, 2017 |
| **377** | Dance/ Electronic | 10 | Purple Lamborghini | Skrillex & Rick Ross | January 21, 2017 |
| **378** | Dance/ Electronic | 10 | My Way | Calvin Harris | January 07, 2017 |
| **379** | Dance/ Electronic | 10 | This Girl | Kung vs Cookin' On 3 Burners | November 26, 2016 |
| **380** | Dance/ Electronic | 10 | Never Forget You | Zara Larsson & MNEK | October 01, 2016 |
| **381** | Dance/ Electronic | 10 | Middle | DJ Snake Featuring Bipolar Sunshine | September 03, 2016 |
| **382** | Dance/ Electronic | 9 | No Money | Garlantis | August 20, 2016 |
| **383** | Dance/ Electronic | 10 | Light It Up | Major Lazer Featuring Nyla & Fuse ODG | August 13, 2016 |
| **384** | Dance/ Electronic | 8 | Faded | Alan Walker | August 06, 2016 |
| **385** | Dance/ Electronic | 10 | Fast Car | Jonas Blue Featuring Dakota | August 06, 2016 |
| **386** | Dance/ Electronic | 10 | Sex | Cheat Codes x Kris Kross Amsterdam | July 30, 2016 |
| **387** | Dance/ Electronic | 6 | Roses | The Chainsmokers Featuring Rozes | June 25, 2016 |
| **388** | Dance/ Electronic | 10 | Sugar | Robin Schulz Featuring Francesco Yates | May 28, 2016 |
| **389** | Dance/ Electronic | 5 | Lean On | Major Lazer & DJ Snake Featuring MO | April 30, 2016 |
| **390** | Dance/ Electronic | 10 | Dessert | Dawin | April 16, 2016 |
| **391** | Dance/ Electronic | 10 | How Deep Is Your Love | Calvin Harris & Disciples | April 09, 2016 |
| **392** | Dance/ Electronic | 10 | Bang My Head | David Guetta Featuring Sia & Fetty Wap | March 19, 2016 |
| **393** | Dance/ Electronic | 5 | Where Are U Now | Skrillex & Diplo With Justin Bieber | March 05, 2016 |
| **394** | Dance/ Electronic | 10 | Be Right There | Diplo & Sleepy Tom | February 20, 2016 |
| **395** | Dance/ Electronic | 9 | Hold My Hand | Jess Glynne | January 23, 2016 |
| **396** | Dance/ Electronic | 10 | Magnets | Disclosure Featuring Lorde | January 23, 2016 |

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| **397** | Dance/ Electronic | 8 | Daddy | PSY Featuring CL | January 09, 2016 |
| **398** | Dance/ Electronic | 5 | Hey Mama | David Guetta Featuring Nicki Minaj, Bebe Rexha & Afrojack | December 26, 2015 |
| **399** | Dance/ Electronic | 10 | You Know You Like It | DJ Snake & AlunaGeorge | December 26, 2015 |
| **400** | Dance/ Electronic | 9 | Powerful | Major Lazer Featuring Ellie Goulding & Tarrus Riley | November 28, 2015 |
| **401** | Dance/ Electronic | 9 | Omen | Disclosure Featuring Sam Smith | November 07, 2015 |
| **402** | Dance/ Electronic | 10 | Something Better | Audien Featuring Lady Antebellum | October 31, 2015 |
| **403** | R&B/Hip-Hop | 1 | Sicko Mode | Travis Scott | December 29, 2018 |
| **404** | R&B/Hip-Hop | 2 | Sunflower (Spider-Man: Into the Spider-Verse) | Post Malone & Swae Lee | December 29, 2018 |
| **405** | R&B/Hip-Hop | 3 | ZEZE | Kodak Black Featuring Travis Scott & Offset | December 29, 2018 |
| **406** | R&B/Hip-Hop | 4 | Drip Too Hard | Lil Baby & Gunna | December 29, 2018 |
| **407** | R&B/Hip-Hop | 5 | Wake Up In The Sky | Gucci Mane X Bruno Mars X Kodak Black | December 29, 2018 |
| **408** | R&B/Hip-Hop | 6 | Mo Bamba | Sheck Wes | December 29, 2018 |
| **409** | R&B/Hip-Hop | 7 | Better Now | Post Malone | December 29, 2018 |
| **410** | R&B/Hip-Hop | 8 | Going Bad | Meek Mill Featuring Drake | December 29, 2018 |
| **411** | R&B/Hip-Hop | 9 | Lucid Dreams | Juice WRLD | December 29, 2018 |
| **412** | R&B/Hip-Hop | 10 | Trip | Ella Mai | December 29, 2018 |
| **413** | R&B/Hip-Hop | 10 | What's Free | Meek Mill Featuring Rick Ross & JAY-Z | December 15, 2018 |
| **414** | R&B/Hip-Hop | 10 | Money | Cardi B | December 08, 2018 |
| **415** | R&B/Hip-Hop | 7 | BAD! | XXXTENTACION | November 24, 2018 |
| **416** | R&B/Hip-Hop | 9 | I Like It | Cardi B, Bad Bunny & J Balvin | November 10, 2018 |
| **417** | R&B/Hip-Hop | 10 | Taste | Tyga Featuring Offset | November 10, 2018 |

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| **418** | R&B/Hip-Hop | 8 | In My Feelings | Drake | October 27, 2018 |
| **419** | R&B/Hip-Hop | 10 | FEFE | 6ix9ine Featuring Nicki Minaj & Murda Beatz | October 27, 2018 |
| **420** | R&B/Hip-Hop | 9 | Never Recover | Lil Baby & Gunna Featuring Drake | October 20, 2018 |
| **421** | R&B/Hip-Hop | 1 | Mona Lisa | Lil Wayne Featuring Kendrick Lamar | October 13, 2018 |
| **422** | R&B/Hip-Hop | 4 | Don't Cry | Lil Wayne Featuring XXXTENTACION | October 13, 2018 |
| **423** | R&B/Hip-Hop | 6 | Uproar | Lil Wayne | October 13, 2018 |
| **424** | R&B/Hip-Hop | 8 | Let It Fly | Lil Wayne Featuring Travis Scott | October 13, 2018 |
| **425** | R&B/Hip-Hop | 4 | Killshot | Eminem | October 06, 2018 |
| **426** | R&B/Hip-Hop | 8 | I Love It | Kanye West & Lil Pump | October 06, 2018 |
| **427** | R&B/Hip-Hop | 10 | Nonstop | Drake | October 06, 2018 |
| **428** | R&B/Hip-Hop | 10 | Lucky You | Eminem Featuring Joyner Lucas | September 29, 2018 |
| **429** | R&B/Hip-Hop | 9 | No Brainer | DJ Khaled Featuring Justin Bieber, Chance The Rapper & Quavo | September 22, 2018 |
| **430** | R&B/Hip-Hop | 10 | Rap Devil | Machine Gun Kelly | September 22, 2018 |
| **431** | R&B/Hip-Hop | 7 | The Ringer | Eminem | September 15, 2018 |
| **432** | R&B/Hip-Hop | 10 | Fall | Eminem | September 15, 2018 |
| **433** | R&B/Hip-Hop | 9 | Boo'd Up | Ella Mai | September 08, 2018 |
| **434** | R&B/Hip-Hop | 10 | Yes Indeed | Lil Baby & Drake | September 08, 2018 |
| **435** | R&B/Hip-Hop | 10 | Psycho | Post Malone Featuring Ty Dolla $ign | August 25, 2018 |
| **436** | R&B/Hip-Hop | 7 | Stargazing | Travis Scott | August 18, 2018 |
| **437** | R&B/Hip-Hop | 9 | Nice For What | Drake | August 11, 2018 |
| **438** | R&B/Hip-Hop | 10 | God's Plan | Drake | August 04, 2018 |
| **439** | R&B/Hip-Hop | 10 | Sad! | XXXTENTACION | July 28, 2018 |
| **440** | R&B/Hip-Hop | 6 | I'm Upset | Drake | July 14, 2018 |

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| **441** | R&B/Hip-Hop | 7 | Emotionless | Drake | July 14, 2018 |
| **442** | R&B/Hip-Hop | 8 | Don't Matter To Me | Drake Featuring Michael Jackson | July 14, 2018 |
| **443** | R&B/Hip-Hop | 9 | Moonlight | XXXTENTACION | July 07, 2018 |
| **444** | R&B/Hip-Hop | 9 | Apes**t | The Carters | June 30, 2018 |
| **445** | R&B/Hip-Hop | 8 | This Is America | Childish Gambino | June 23, 2018 |
| **446** | R&B/Hip-Hop | 9 | Walk It Talk It | Migos Featuring Drake | June 23, 2018 |
| **447** | R&B/Hip-Hop | 10 | Look Alive | BlocBoy JB Featuring Drake | June 23, 2018 |
| **448** | R&B/Hip-Hop | 7 | Yikes | Kanye West | June 16, 2018 |
| **449** | R&B/Hip-Hop | 9 | All Mine | Kanye West | June 16, 2018 |
| **450** | R&B/Hip-Hop | 9 | Be Careful | Cardi B | June 02, 2018 |
| **451** | R&B/Hip-Hop | 8 | Freaky Friday | Lil Dicky Featuring Chris Brown | May 26, 2018 |
| **452** | R&B/Hip-Hop | 9 | Pray For Me | The Weeknd & Kendrick Lamar | May 26, 2018 |
| **453** | R&B/Hip-Hop | 10 | Rockstar | Post Malone Featuring 21 Savage | May 26, 2018 |
| **454** | R&B/Hip-Hop | 9 | Watch | Travis Scott Featuring Lil Uzi Vert & Kanye West | May 19, 2018 |
| **455** | R&B/Hip-Hop | 7 | Paranoid | Post Malone | May 12, 2018 |
| **456** | R&B/Hip-Hop | 9 | Rich & Sad | Post Malone | May 12, 2018 |
| **457** | R&B/Hip-Hop | 10 | Spoil My Night | Post Malone Featuring Swae Lee | May 12, 2018 |
| **458** | R&B/Hip-Hop | 4 | ATM | J. Cole | May 05, 2018 |
| **459** | R&B/Hip-Hop | 5 | Kevin's Heart | J. Cole | May 05, 2018 |
| **460** | R&B/Hip-Hop | 7 | KOD | J. Cole | May 05, 2018 |
| **461** | R&B/Hip-Hop | 9 | Photograph | J. Cole | May 05, 2018 |
| **462** | R&B/Hip-Hop | 10 | Motiv8 | J. Cole | May 05, 2018 |
| **463** | R&B/Hip-Hop | 7 | Chun-Li | Nicki Minaj | April 28, 2018 |

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| **464** | R&B/Hip-Hop | 9 | Finesse | Bruno Mars & Cardi B | April 28, 2018 |
| **465** | R&B/Hip-Hop | 10 | Plug Walk | Rich The Kid | April 21, 2018 |
| **466** | R&B/Hip-Hop | 3 | Call Out My Name | The Weeknd | April 14, 2018 |
| **467** | R&B/Hip-Hop | 8 | Stir Fry | Migos | April 07, 2018 |
| **468** | R&B/Hip-Hop | 10 | All The Stars | Kendrick Lamar & SZA | April 07, 2018 |
| **469** | R&B/Hip-Hop | 9 | Ric Flair Drip | Offset & Metro Boomin | March 31, 2018 |
| **470** | R&B/Hip-Hop | 9 | Let You Down | NF | March 24, 2018 |
| **471** | R&B/Hip-Hop | 10 | Him & I | G-Easy & Halsey | March 17, 2018 |
| **472** | R&B/Hip-Hop | 10 | Love. | Kendrick Lamar Featuring Zacari | March 03, 2018 |
| **473** | R&B/Hip-Hop | 8 | MotorSport | Migos, Nicki Minaj, & Cardi B | February 17, 2018 |
| **474** | R&B/Hip-Hop | 10 | No Limit | G-Easy Featuring A$AP Rocky & Cardi B | February 17, 2018 |
| **475** | R&B/Hip-Hop | 10 | I Fall Apart | Post Malone | February 10, 2018 |
| **476** | R&B/Hip-Hop | 4 | Diplomatic Immunity | Drake | February 03, 2018 |
| **477** | R&B/Hip-Hop | 10 | Gucci Gang | Lil Pump | February 03, 2018 |
| **478** | R&B/Hip-Hop | 7 | Gummo | 6ix9ine | January 27, 2018 |
| **479** | R&B/Hip-Hop | 10 | Bartier Cardi | Cardi B Featuring 21 Savage | January 27, 2018 |
| **480** | R&B/Hip-Hop | 10 | Bodak Yellow (Monkey Moves) | Cardi B | January 20, 2018 |
| **481** | R&B/Hip-Hop | 5 | River | Eminem Featuring Ed Sheeran | January 03, 2018 |
| **482** | R&B/Hip-Hop | 7 | I Get The Bag | Gucci Mane Featuring Migos | December 30, 2017 |
| **483** | R&B/Hip-Hop | 10 | 1-800-273-8255 | Logic Featuring Alessia Cara & Khalid | December 30, 2017 |
| **484** | R&B/Hip-Hop | 8 | Bank Account | 21 Savage | December 16, 2017 |
| **485** | R&B/Hip-Hop | 10 | Young Dumb & Broke | Khalid | December 16, 2017 |
| **486** | R&B/Hip-Hop | 6 | Walk On Water | Eminem Featuring Beyonce | December 02, 2017 |

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| **487** | R&B/Hip-Hop | 9 | Unforgettable | French Montana Featuring Swae Lee | December 02, 2017 |
| **488** | R&B/Hip-Hop | 10 | Rake It Up | Yo Gotti Featuring Nicki Minaj | December 02, 2017 |
| **489** | R&B/Hip-Hop | 8 | Wild Thoughts | DJ Khaled Featuring Rihanna & Bryson Tiller | October 28, 2017 |
| **490** | R&B/Hip-Hop | 10 | That's What I Like | Bruno Mars & Cardi B | October 28, 2017 |
| **491** | R&B/Hip-Hop | 8 | Humble. | Kendrick Lamar | October 21, 2017 |
| **492** | R&B/Hip-Hop | 9 | XO TOUR Llif3 | Lil Uzi Vert | October 07, 2017 |
| **493** | R&B/Hip-Hop | 10 | Feels | Calvin Harris Featuring Pharrell Williams, Katy Perry & Big Sean | September 23, 2017 |
| **494** | R&B/Hip-Hop | 10 | Congratulations | Post Malone Featuring Quavo | September 16, 2017 |
| **495** | R&B/Hip-Hop | 8 | I'm The One | DJ Khaled Featuring Justin Bieber, Quavo, Chance The Rapper & Lil Wayne | September 09, 2017 |
| **496** | R&B/Hip-Hop | 9 | Redbone | Childish Gambino | September 09, 2017 |
| **497** | R&B/Hip-Hop | 9 | Mask Off | Future | August 12, 2017 |
| **498** | R&B/Hip-Hop | 10 | The Story Of O.J. | JAY-Z | July 29, 2017 |
| **499** | R&B/Hip-Hop | 10 | Location | Khalid | July 22, 2017 |
| **500** | R&B/Hip-Hop | 10 | iSpy | KYLE Featuring Lil Yachty | July 08, 2017 |
| **501** | R&B/Hip-Hop | 10 | Rolex | Ayo & Teo | July 01, 2017 |
| **502** | R&B/Hip-Hop | 8 | DNA. | Kendrick Lamar | June 10, 2017 |
| **503** | Latin | 1 | Taki Taki | DJ Snake Featuring Selena Gomez, Ozuna & Cardi B | December 29, 2018 |
| **504** | Latin | 2 | MIA | Bad Bunny Featuring Drake | December 29, 2018 |
| **505** | Latin | 3 | Despacito | Luis Fonsi & Daddy Yankee Featuring Justin Bieber | December 29, 2018 |
| **506** | Latin | 4 | Te Bote | Casper Magico, Nio Garcia, Darell, Nicky Jam, Ozuna & Bad Bunny | December 29, 2018 |
| **507** | Latin | 5 | Ella Quiere Beber | Anuel AA & Romeo Santos | December 29, 2018 |
| **508** | Latin | 6 | Solo de Mi | Bad Bunny | December 29, 2018 |

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| **509** | Latin | 7 | X | Nicky Jam x J Balvin | December 29, 2018 |
| **510** | Latin | 8 | BEBE | 6ix9ine Featuring Anuel AA | December 29, 2018 |
| **511** | Latin | 9 | Asesina | Brytiago / Darell / Daddy Yankee / Ozuna / Anuel AA | December 29, 2018 |
| **512** | Latin | 10 | Vaina Loca | Ozuna x Manuel Turizo | December 29, 2018 |
| **513** | Latin | 10 | No Te Contaron Mal | Christian Nodal | December 22, 2018 |
| **514** | Latin | 7 | MALA | 6ix9ine Featuring Anuel AA | December 15, 2018 |
| **515** | Latin | 10 | Dura | Daddy Yankee | December 08, 2018 |
| **516** | Latin | 9 | Mala Mia | Maluma | November 10, 2018 |
| **517** | Latin | 10 | Sin Pijama | Becky G + Natti Natasha | November 10, 2018 |
| **518** | Latin | 10 | Culpables | Karol G & Anuel AA | November 03, 2018 |
| **519** | Latin | 10 | Esta Rico | Marc Anthony, Will Smith & Bad Bunny | October 27, 2018 |
| **520** | Latin | 10 | Unica | Ozuna | October 20, 2018 |
| **521** | Latin | 10 | No Es Justo | J Balvin & Zion & Lennox | October 06, 2018 |
| **522** | Latin | 9 | Clandestino | Shakira & Maluma | September 29, 2018 |
| **523** | Latin | 9 | Oye Mujer | Raymix | September 22, 2018 |
| **524** | Latin | 9 | Mi Cama | Karol G & J Balvin Featuring Nicky Jam | September 15, 2018 |
| **525** | Latin | 8 | Me Niego | Reik Featuring Ozuna & Wisin | September 08, 2018 |
| **526** | Latin | 10 | Bella | Wolfine | August 28, 2018 |
| **527** | Latin | 5 | Mi Gente | J Balvin & Willy William Featuring Beyonce | August 04, 2018 |
| **528** | Latin | 7 | El Farsante | Ozuna & Romeo Santos | August 04, 2018 |
| **529** | Latin | 9 | Estamos Bien | Bad Bunny | July 14, 2018 |
| **530** | Latin | 8 | Dame Tu Cosita | Pitbull x El Chombo x Karol G Featuring Cutty Ranks | July 07, 2018 |
| **531** | Latin | 10 | El Prestamo | Maluma | June 02, 2018 |
| **532** | Latin | 9 | La Modelo | Ozuna x Cardi B | May 19, 2018 |
| **533** | Latin | 7 | Echame La Culpa | Luis Fonsi & Demi Lovato | April 28, 2018 |
| **534** | Latin | 10 | Corazon | Maluma x Nego do Borel | April 28, 2018 |
| **535** | Latin | 9 | Scooby Do Pa | DJ Kass | April 21, 2018 |
| **536** | Latin | 9 | El Bano | Enrique Iglesias Featuring Bad Bunny | April 07, 2018 |
| **537** | Latin | 9 | Mayores | Becky G Featuring Bad Bunny | March 17, 2018 |
| **538** | Latin | 10 | Criminal | Natti Natasha x Ozuna | March 17, 2018 |
| **539** | Latin | 10 | Amorfoda | Bad Bunny | March 10, 2018 |

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| **540** | Latin | 10 | Ahora Dice | Chris Jeday, Anuel, Cardi B, Offset, J. Balvin, Ozuna & Arcangel | February 24, 2018 |
| **541** | Latin | 10 | Krippy Kush | Farruko, Nicki Minaj, Bad Bunny, 21 Savage & Rvssian | February 17, 2018 |
| **542** | Latin | 10 | Machika | J Balvin x Jean x Anitta | February 03, 2018 |
| **543** | Latin | 10 | Escapate Conmigo | Wisin Featuring Ozuna | January 27, 2018 |
| **544** | Latin | 9 | Bella y Sensual | Romeo Santos Featuring Nicky Jam & Daddy Yankee | January 20, 2018 |
| **545** | Latin | 10 | Felices Los 4 | Maluma | January 13, 2018 |
| **546** | Latin | 10 | Perro Fiel | Shakira Featuring Nicky Jam | December 30, 2017 |
| **547** | Latin | 10 | Sensualidad | DJ Luian & Mambo Kingz Presentan: Bad Bunny, J Balvin & Prince Royce | December 09, 2017 |
| **548** | Latin | 10 | Amor, Amor, Amor | Jennifer Lopez Featuring Wisin | December 02, 2017 |
| **549** | Latin | 8 | Corrido de Juanito | Calibre 50 | November 25, 2017 |
| **550** | Latin | 9 | Bailame | Nacho | November 25, 2017 |
| **551** | Latin | 10 | Bonita | J Balvin & Jowell & Randy Featuring Nicky Jam, Yandel & Ozuna | November 18, 2017 |
| **552** | Latin | 10 | Ahora Me Liama | Karol G x Bad Bunny | November 04, 2017 |
| **553** | Latin | 3 | Almost Like Praying | Lin-Manuel Miranda Featuring Artists For Puerto Rico | October 28, 2017 |
| **554** | Latin | 10 | Tu Foto | Ozuna | October 28, 2017 |
| **555** | Latin | 9 | El Amante | Nicky Jam | October 21, 2017 |
| **556** | Latin | 7 | Como Antes | Yandel Featuring Wisin | October 7, 2017 |
| **557** | Latin | 9 | Chantaje | Shakira Featuring Maluma | October 7, 2017 |
| **558** | Latin | 9 | Subeme La Radio | Enrique Iglesias Featuring Descemer Bueno, Zion & Lennox Or Sean Paul | September 23, 2017 |
| **559** | Latin | 10 | Imitadora | Romeo Santos | September 2, 2017 |
| **560** | Latin | 10 | Me Enamore | Shakira | July 29, 2017 |
| **561** | Latin | 10 | Adios Amor | Christian Nodal | July 15, 2017 |
| **562** | Latin | 10 | Reggaeton Lento (Bailemos) | CNCO & Little Mix | July 8, 2017 |
| **563** | Latin | 10 | Deja Vu | Prince Royce & Shakira | June 17, 2017 |
| **564** | Latin | 10 | Sigo Extranandote | J Balvin | June 10, 2017 |

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| **565** | Latin | 8 | Dile Que Tu Me Quieres | Ozuna | May 6, 2017 |
| **566** | Latin | 10 | Siempre Te Voy A Querer | Calibre 50 | May 6, 2017 |
| **567** | Latin | 10 | Heroe Favorito | Romeo Santos | April 22, 2017 |
| **568** | Latin | 5 | Hey Ma | Pitbull & J Balvin Featuring Camila Cabello | April 1, 2017 |
| **569** | Latin | 9 | Otra Vez | Zion & Lennox Featuring J Balvin | March 18, 2017 |
| **570** | Latin | 9 | Safari | J Balvin Featuring Pharrell Williams, BIA & Sky | March 11, 2017 |
| **571** | Latin | 10 | Chillax | Farruko Featuring Ky-Mani Marley | March 4, 2017 |
| **572** | Latin | 5 | Hasta El Amanecer | Nicky Jam | February 25, 2017 |
| **573** | Latin | 10 | Sin Contrato | Maluma Featuring Fifth Harmony Or Don Omar & Wisin | February 18, 2017 |
| **574** | Latin | 10 | Shaky Shaky | Daddy Yankee | February 11, 2017 |
| **575** | Latin | 7 | La Bicicleta | Carlos Vives & Shakira | February 4, 2017 |
| **576** | Latin | 8 | Vente Pa' Ca | Ricky Martin Featuring Maluma | January 28, 2017 |
| **577** | Latin | 9 | Tengo Que Colgar | Banda Sinaloense MS de Sergio Lizarraga | January 28, 2017 |
| **578** | Latin | 10 | Duele El Corazon | Enrique Iglesias Featuring Wisin | January 7, 2017 |
| **579** | Latin | 10 | Nunca Me Olvides | Yandal | December 3, 2016 |
| **580** | Latin | 10 | Bailar | Deorro Featuring Pitbull & Elvis Crespo | November 26, 2016 |
| **581** | Latin | 9 | La Carretera | Prince Royce | October 22, 2016 |
| **582** | Latin | 9 | El Perdedor | Maluma Featuring Yandel | October 15, 2016 |
| **583** | Latin | 9 | Bobo | J Balvin | October 08, 2016 |
| **584** | Latin | 8 | De Pies A Cabeya | Mana / Nickz Jam | October 01, 2016 |
| **585** | Latin | 10 | Ay Mi Dios | IAmChino Featuring Pitbull, Yandel & Chacal | October 01, 2016 |
| **586** | Latin | 6 | Me Vas A Extranar | Banda Sinaloense MS de Sergio Lizarraga | September 24, 2016 |
| **587** | Latin | 4 | Querida | Juan Gabriel | September 17, 2016 |
| **588** | Latin | 8 | Hasta Que Te Conoci | Juan Gabriel | September 17, 2016 |
| **589** | Latin | 10 | Asi Fue | Juan Gabriel | September 17, 2016 |
| **590** | Latin | 6 | Ya Me Entere | Reik & Nicky Jam | September 10, 2016 |
| **591** | Latin | 10 | Andas En Mi Cabeza | Chino & Nacho Featuring Daddy Yankee | August 20, 2016 |
| **592** | Latin | 7 | Ginza | J Balvin | July 30, 2016 |

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| **593** | Latin | 8 | Me Va A Pesar | La Arrolladora Banda el Limon de Rene Camacho | July 23, 2016 |
| **594** | Latin | 9 | Cicatrlllces | Regulo Caro | July 23, 2016 |
| **595** | Latin | 8 | Solo Con Verte | Banda Sinaloense MS de Sergio Lizarraga | July 02, 2016 |
| **596** | Latin | 7 | Encantadora | Yandel | June 18, 2016 |
| **597** | Latin | 9 | Obsesionado | Farruko | June 18, 2016 |
| **598** | Latin | 10 | Hasta Que Se Seque El Malecon | Jacob Forever | June 11, 2016 |
| **599** | Latin | 9 | Tan Facil | CNCO | May 28, 2016 |
| **600** | Latin | 10 | Prestamela A Mi | Calibre 50 | May 21, 2016 |
| **601** | Latin | 7 | Borro Cassette | Maluma | May 07, 2016 |
| **602** | Latin | 8 | Traidora | Gente de Zona Featuring Marc Anthony | May 07, 2016 |
| **603** | Latin | 10 | Bronche de Oro | La Trakalosa de Monterrey | May 07, 2016 |

## APPENDIX 6: INTERVIEW GUIDE FOR INDUSTRY PROFESSIONALS

These questions are related to Bourdieu's definition of cultural intermediary professions.

1. How long have you worked in the music industry? In what capacities? What different roles do you have had in the industry? If you are not working full-time in the music industry, what other occupations do you have?
2. How would you describe your position(s) within your current work? How did you come to occupy this/these position(s)?
3. How have your musical, educational, and occupational backgrounds led you to your current position(s)? What role did social networks play in terms of you working at your current position?

This question is related to Lena's framework of a genre's lifecycle and addresses RQ2 and RQ3.

4. What are musical genres? How are they determined in your industry? Who decides? What roles do people play in the classification of music into genres?

These questions address RQ2 and RQ3.

5. Can you please list the audio/musical features used to classify song datasets? Are there any non-musical features used to classify song datasets?
6. What are the categories that the datasets can be categorized into?
7. How does the system use these audio/musical features to determine/differentiate musical genres?
8. What kind of data and/or information is considered when adapting or improving the system?

This question is related to Born's Mediation Theory.

9. Who is your system intended to be used by?

These questions are related to RQ2 and RQ3.

10. What benefits distinguishes your MIRs from others for consumers?
11. What could be added to improve genre classification in MIRs?
12. In what ways does your background inform decision made in the system's design?
13. What other audio/musical features would you include?

Demographics

14. What gender do you self-identify as? What age rage do you belong to: 18-24, 25-34, 35-44, 45-54, 55+? Do you consider yourself to have visible or invisible disabilities? What race and ethnicity do you identify as? What country were you born in? If not Canada, at what age did you move to Canada?