The Development of New Electronic Percussion Instruments in Popular Music of the 1980s: A Technical Study

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Abstract

The influence of electronic percussion (in particular, the Simmons Drum Company's innovations) on the compositions and evolution of 1980s Pop music can be examined through technological advancements as well as stylistic characteristics of drum partitions of the decade. Archived company catalogues in collaboration with Matt Dean's historical timeline provide a clear understanding of the advancements during the time of the company's tenure at the top of the electronic percussion industry. Definitions of the terms "style" and "genre" in both the primary and secondary approaches -by Allan Moore and other theorists- are used. The stylistic properties which create a genre are key in understanding the political, social, and cultural effects on the music. Ultimately, stylistic traits provide sufficient evidence in order to examine similar compositions which were sub-categorized differently on *Billboard's* hit charts. Dave Carlton's Hook Theory is a major resource in selecting pieces of music which share similarities. The differences in sub-categorization identified in this study are shown to derive from the transition to and the use of electronic percussion.

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Glossary

MIDI Stands for "Musical Instrument Digital Interface." It is a connectivity standard that musicians use to hook together musical instruments (such as keyboards and synthesizers) and computer equipment. Using MIDI, a musician can easily create and edit digital music tracks. The MIDI system records the notes played, the length of the notes, the dynamics (volume alterations), the tempo, the instrument being played, and hundreds of other parameters, called control changes. Because MIDI records each note digitally, editing a track of MIDI music is much easier and more accurate than editing a track of audio. The musician can change the notes, dynamics, tempo, and even the instrument being played with the click of button. Also, MIDI files are basically text documents, so they take up very little disk space. The only catch is that you need MIDI-compatible hardware or software to record and playback MIDI files.[1]

COSM**:** Once a musical instrument generates sound vibrations, it reaches the human ear through various mediating objects, each of which significantly affects the sound. The material and configuration of the instrument, the electric/magnetic amplifying system, the air and the reverberation of the room all affect the final sound. Sound modeling, the latest DSP technology, "virtually" reconstructs these objects. Roland's breakthrough Composite Object Sound Modeling (COSM) uses the advantages of multiple modeling methods and succeeds in accurately emulating existing sounds, as well as producing sounds that have never before been created.[2]

“SuperNATURAL: is the technology which improves the way the instrument responds to your playing, making it feel far more natural and authentic technology incorporates ‘Behavior Modeling’ which takes the playing experience a step further than just offering a ‘detailed’ sound. By accurately reproducing the behavior and responses of an acoustic instrument, it transforms the way a digital drum kit responds;

[1] Per Christensson, “Midi,” *Tech Terms,* accessed February 24, 2014, http://www.techterms.com/definition/midi.

[2] Roland, “COSM,” *Roland,* Accessed February 14, 2014, http://www.roland.com/products/en/exp/COSM.html.

> therefore, giving the drums a dynamic and natural 'feel' that until now has not been possible."[3]

[3] Roland, "V-Drums with Supernatural Technology," *Roland,* Accessed February 14, 2014, http://www.rolandus.com/blog/2013/05/16/v-drums-with-supernatural-technology/.

Introduction

The aim of this thesis is not only to explain the innovative development of electronic percussion of the 1980s but also to demonstrate the important relationship of this progression to the evolution of the Pop music of the decade. It will be shown that in fact the Pop music of the 1980s was dependent upon technological advancements. The influence of electronic percussions is evidence of the genre and subgenre differentiations, compositional impact, and popularity of the songs and artists who embraced and utilized the advancements. This thesis will argue that electronic percussion came to be a necessary and distinguishing characteristic of the Pop genre, as well as the stylistic properties of the drum partitions. Similarly, this paper will argue that the characteristic sound of the electronic percussion aided in the emerging of Pop music from disco and R&B and became the pivotal signature of the music. Though it will be argued that the purpose for musical development of the genre may in fact be due to the integration of electronic percussion, a response as to the cause for technological development must be identified. A secondary idea also emerges in the background of the thesis, namely that electronic percussion affected or influenced the musical genre but did not solely represent it.

Identifying the relationship between electronic percussions and 1980s Pop music is carried out in three steps: -the history of electronic percussions is reviewed, the characteristics of 1980s Pop music are presented, and, finally case studies which identify the improvements of electronic percussion are analyzed- each representing a chapter entailing several sections. The first chapter will present the progression of the electronic

percussion in its three forms electronic drums, drum machines, and samplers. Focusing on the improvement from one generation of device to the next will showcase the technological underpinnings for change. Each percussion device introduced in chapter one will entail a detailed description of their on board capabilities. The sonar qualities of the industry's dominating electronic percussive devices – past and present- will also be examined. This analysis will provide a foundation for the comparison of electronic versus acoustic percussion found at the beginning of chapter three. Identifying the advancements is deemed effective when analyzing the case studies also found in chapter three. The case studies will examine the specific attributes (e.g: EPROM, Floppy, and MIDI) and identify the option responsible for a songs classification within *Billboard's* database. The last section on chapter one will analyze the specific technological advancements in order to demonstrate and prove the direct link between compositions of the era and the innovations available at the time. The section will make use of a table setup as a chronological timeline for innovation, enumerating the important characteristics of each generation of electronic drum. Finally this chapter will briefly examine genres other than Pop, in the attempt to identify their respective pioneers.

The second chapter will begin with a discussion concerning the ambiguous –even controversial- use of the terms "style and genre" in scholarly writings extrapolating the necessary information to provide consistency when using both terms throughout the thesis. The debate will center Allen Moore's article *Categorical Conventions in Music Discourse: Style and Genre* which also sheds light on the opposing views of Franco Fabbri and Leonard Meyer. At no point will the thesis attempt to neither provide a definition for either term, nor will it shed preference. Moreover, this section will take into

account two different reasoning which share a common understanding; Venn diagrams will illustrate both views. The chapter continues with a brief exploration of the political, societal, and cultural activities of the 1980s in order to better understand the individualist view that was characteristic of that decade. The relationship between the search for self-identity and 1980s Pop music will be viewed in two ways throughout the case studies in chapter three: the effective on music as well as causation for the creation of electronic percussion of the 1980s.

The final chapter begins with an explicit sonar description of acoustic percussion, entailing multiple factors such as shell construction and materials, cymbal creation, tuning, sticks, and recording. The details will be directly linked to its electronic counterpart, in turn providing a framework for the audible differences between both spectrums. This comparison will continuously be referred to through the case studies in order to provide reasoning for sub-genre differentiation. The chapter will then discuss the theory which will be implemented throughout the case studies. The theory will call upon Dave Carlton's Hook Theory followed by an example of how the theory can be applied. Finally, the three case studies which will attempt to demonstrate and support my hypothesis. These case studies will show that Pop music's categorization resulted from the percussions used, providing the evidence necessary to support the main idea of this thesis. The first two studies will each undergo two levels of analysis (selection and comparison) while the final study will be subject to a comparative analysis. A scientific approach (or process of elimination) will be used, entailing transcriptions and technological descriptions, in order to identify the importance of electronic percussion to the compositions. These methodologies should prove effective in supporting the novel

ideas put forth in this thesis. However, primary and secondary sources are both needed and used in formulating the theory as stated.

Literature Review

The history of electronic percussion is an area that has yet to be examined. The research done throughout this thesis is represented in each of the three chapters. The first chapter is reflective of data which entails specific historical facts of the electronic percussion; the instruments and their construction. Research found in the second chapter is a primarily centers the argument of "style" and "genre", with a secondary section which focuses on the American way of life throughout the 1980s; society, politics, and culture.

That being said, the use of primary sources throughout chapter one, such as *Simmons* and *Roland* archived user manuals, provides much information concerning the company's revolutionary drums; information about the technological advancements are extracted from the data provided in these manuals. Analyzing each characteristic from each generation of drum, I am able to identify the progressive traits such as on board memory, supplemental parameters, pad construction, connectivity, and innovative samples; each of these innovations proves beneficial to percussionists and artists. My objective is to extrapolate (from these primary sources) the information that describes the progressive features from one drum to the next, in order to relate these innovations to the music which they help to evolve. These sources, however, do not provide a clear-cut time frame.

Furthermore, secondary sources such as Matt Dean's *The Drum: A History* (particularly his chapter on electronic drums) and online resources from *Roland*, Ian Boswell, and Techterms provide further information surrounding the history of the electronic drum. A combination of the information available in both sources creates a seamless timeline as to the progression of the electronic percussion. Dean's manuscript, in particular, is cited by many authors whose aim it is to describe the history of percussions, since it details the historical attributes of all percussions and their evolution into the instruments of today. Dean's study, beginning as it does with a hypothesis from the date of creation to the most advanced technologies found within present models, truly focuses on the historical progression of the drum. It examines the earliest African instruments and materials used in the inventing of the first drum machines. Comprehensive as it is, Dean`s book, nonetheless, fails to emphasize the relation between the instruments and the music. My thesis, however, seeks to establish this crucial relationship between the music and the technological advances which influence it. Although the writings by Jeff Nicholls – which focus strictly on the drums and musicians within the rock era- are as recognized within the drumming community as Dean's, the information he provides is less precise in the area of electronic percussion. As will be shown, not all rock music of the 1980s accepted the electronic percussion.

The second chapter discusses the ongoing dialectic between genre and style with the multitude of definitions for each within musicology and music theory. The studies put forward in Allan Moore's article present both ideas independently, suggesting that a definite definition of either, at the present time, is subjective to the author. The literature does not provide a preference, rather it explains the terms from both views. The three

main examples provided in his study present a hierarchy in which genre is atop, genre is second to style, and an equality of the two is a third level. This concept is said to derive from the works of Franco Fabbri and Philipp Tagg, who provide their theory and definitions, drawing upon a system of sets and hierarchy.

Tagg states that "I am using 'genre' and 'style' in the precise senses defined by Franco Fabbri,"[4] in describing style within foreign music; a definition of Fabbri's theory will be thoroughly discussed in chapter two. Furthermore, Fabbri expresses his idea of sets which entail specific characteristics or styles necessary for labelling a genre. For Fabbri this notion of genre also entails behavioural, political, societal, and cultural influences, as in the context of the Italian *"canzone"*. Fabbri's ideals provide a concrete framework for other authors to build on; nevertheless, the definitions of either term remains subjective. His description of each set within the study is utilized throughout Moore's article to enforce the three theories of genre superseding style, style impacting genre, or the two terms having equally value. While analyzing the concepts of other authors, Moore's article does provide further insight, supplying the reader with examples showcasing both ideals; where Fabbri discussed the style within genre, Moore concurs with the concept of hierarchy. Therefore opposing ideas -such as those of Leonard Meyer's article *Style and Music: Theory, History, and Ideology*- would present style as the determining characteristic. Whether discussing Fabbri's sets or Meyer`s reliance of stylistic characteristics, the issue of dependency when defining either term remains

[4] Ibid., 373.

apparent. Meyer's work entails a "study of certain technical attributes of nineteenth century musical style, especially its melodic structure."[5]

Other sources which were consulted in the preparation of this thesis examine the concepts of style and genre as related to race. In particular, David Brackett's article, dealing with the involvement of Black music in genre categorization, presents a personal experience that leads to his study on genres that were directed towards African Americans, specifically the characteristic traits of race that lead to the categorization and labelling of such music. Also, the articles by Kevin Mattson and Timothy Brown examine the political messages found in early punk music; focusing on acts such as *The Sex Pistols* and *Nirvana* in which the political influence is pronounced in lyrical content and behavior. The cultural characteristics of Pop music and the importance of MTV throughout the 1980s, which is examined by Will Straw, establishes the importance of self-identity and image to a new music. Finally the societal acceptance of the music is viewed by André J. M. Prévos. Although the focus of his study is mainly French Pop, the individualist struggles, similar to the struggles in America throughout the 1980s, presents a direct link between both nations; therefore, the ideas found in Prévos article can be applied on an international level. All these sources examine the important characteristics clearly described in Fabbri's article, which, other than musical characteristics, create a style and genre. Yet, the information is incomplete – no concrete definition of either term- there is still room for study. To provide a comprehensive definition, all genres as well as stylistic characteristics must be examined.

[5] Robert P. Morgan, "Style and Music: Theory, History, and Ideology by Leonard B. Meyer," *Music Perception: An Interdisciplinary Journal* 9, no.2 (winter, 1991): 1.

Finally, the last chapter of the thesis draws upon a resource which is most important to the focus of this thesis: Dave Carlton's Hook Theory. The theory is a database of transcriptions which calculates probabilities for upcoming chords in a progression, resulting in the identification of songs which move in a similar manner. The study attempts to aid composers in creating songs that do not resemble published music. The primary rationale for the program is to avoid copyright infringements. Composers utilize this database in order to create chord progressions according to the genre in which they are writing. My thesis uses this theory in retrograde; the goal is to find songs that share similar or exact chord progressions in an attempt to select two pieces of music which use either acoustic or electronic percussion. The transcription of over 1300 pieces of music does create a fertile Pop database which has proven essential for this thesis. The analysis of similarities between two pieces of music results in the possibility of elimination. In areas such as harmony, performance, drum partitions and drums used throughout a selected recording, the theory developed in the final chapter will eliminate the similarities in order to define differentiation. The possibility of selecting two songs for the case studies found in the final chapter gives me the necessary framework to determine and confirm the importance of electronic percussion in 1980s Pop music.

Chapter One: History of Electronic Percussion

Intro

The following chapter will present the history of electronic percussion in three sections each centering on one of the three forms of digital percussion: electronic drums, samplers and drum machines, and self-containing drums. Each category will be depicted by the devices which provided modern drum companies (Simmons, Roland, and Yamaha) a foundation to generate and advance drum technologies. The chapter will examine both primary and secondary sources concerning the percussive technological advancements undertaken throughout the 1980s. Archived owners' manuals from *Simmons*, *Roland*, and *Yamaha* will, along with articles by Andrew Blake and Roberto Mario Aimi, be utilized in understanding the technology present throughout the 1980s. Furthermore, the progression from one generation percussion to its successor will be demonstrated by the advanced technologies such as EPROM, MIDI, and USB, as well as playability (how it impacted performance). This thesis argues that this evolution directly impacts the genres of music that integrate the technology, moreover 1980s Pop. However, the case studies - situated in chapter three- not only confer to this idea, they also provide a possible causation for the evolution of electronic percussion. The importance of this chapter is to provide the reader with a description of the history, their purpose, the sounds they produce, and the limitations of electronic percussion. The percussions discussed in this chapter represent the most utilized devices throughout the history of Pop music. From the

earliest drum machine to the innovated electronic hi-hat, all advancements and limitations will be discussed in order to identify the percussions detected within the case studies. The presence of restrictions within the instrument produces limitations for the music. In other words, a composer must understand that primitive technology will never exceed expectation. The idea that must be retained from this chapter is as follows, as one generation of percussion progressed to the next, the limitations of the possible capabilities diminish. Ultimately, does the diminishment of limitations provide evolution of 1980s Pop, or are these electronic devices constructed for the musicians who perform with them?

The final section of the chapter consists of the researching and graphing the genres, icons, and the drummers who have utilized the technology. In doing so, we can visually understand the magnitude of the evolution; therefore, expressing the who, what, and how technology was utilized in the 1980s, provides further rationale and support to the case studies found in the next chapter.

The history of percussion generates much speculation concerning the estimated time frame in which these instruments were first created. In Matt Dean's book entitled *The Drum: A History,* the retrieval of bone instruments from different eras dating thousands of years does not necessarily provide a definite time frame for percussion. Although it can be assumed that these instruments could have been accompanied by percussion, the wood frames and animal skin – most likely the materials used to create said instrument- would have decomposed over the years.[6] Throughout the history of written music, rhythm remained important for composers. The magnitude has increased

[6] Matt Dean, *The Drum: A History* (Lanham: Scarecrow Press, 2012), 5.

from one era to the next, resulting in the necessity for an individual percussionist or entire percussion ensemble to provide a steady rhythmic figure underlying the melody and its rhythm. Percussion ensembles within orchestras, drum lines in marching bands, and drummers in the music of the 20th and 21st centuries, all shared this similar responsibility. Early jazz remains responsible for the creation of the first drum set. The outcome results in a combination of percussive elements found within a marching band. These instruments would be setup in a manner for a single musician to perform the intricate lines previously performed by many skilled percussionists. The drum set would evolve over the years with some of the greatest inventions for the instrument occurring during the 1890s. The first bass drum pedal would liberate the drummer's arm which was responsible for striking the bass drum; the drum could now be activated by the foot.[7] In1920, William F. Ludwig perfected the first mass produced steel bass drum pedal.[8] Following the bass drum pedal, came the invention of the Charleston pedal, composed of two opposing cymbals attached to a pedal, thus creating an open and closed motion. Significantly these innovations removed all restrictions, and musicians could now utilize all four limbs when presenting a drum pattern. Thus the acoustic drum has undergone many changes over the past century. Experimentations with different woods, hand crafted versus machine made models, and new inventions including accessories and cymbals, are emerging on a yearly basis.

On a grander level the acoustic drum has been altered yet practicality has reached a plateau, innovations are presented as a means of gaining interest. The newest innovation to change the percussion spectrum transpired from the late 1970s. The technological

[7] Ibid.,198.
[8] Ibid.,199.

advancement allowed for the creation of three streams of instrumentation -electronic drums, samplers, and electronic percussion- coincidentally deriving from the same primitive magnetic pulse found in early drum machines. The following three sections of this chapter will focus on the history and progression of top manufactures as well as their prized innovations. Companies that mass produce electronic devices, such as *Roland* and *Yamaha*, are examined according to their professional line of products which in effect are stocked with each company's top innovations. Both Japanese companies do have entry and intermediate level products; however, for the purpose of this thesis, they will be mentioned but not examined.

Section One: The History of Electronic Drums

Primitive Models

Electronic percussion can be heard in genres such as Metal, Rock, Pop, Fusion, and Dance throughout the 1980s, 1990s, and 2000s. The *Futuristic Gadgets*, a term used by Dean, have evolved dramatically from their primitive state in 1971 to present day models. The collaborative effort of Professor Brian Groves, of Sussex University, and professional drummer Graeme Edge, from the band *Moody Blues*, resulted in the initial electronic percussion.[9] This 1971 creation was constructed of rubber pads, magnets, and silver components (coils and paper lining). The magnets behind the pads were linked to synthesizer boxes, encompassing many transistors which in return produced limited sounds. Graeme explains the wiring of the drum to be too fragile; negative repercussions such as hardware malfunction which led to intermittent signals, halted the possibility for

[9] Ibid., 368.

mass production. The drum can be heard on the band's original track entitled "Procession," notably the first recording of electronic percussion.

Robert A. Moog's (Founder of *Moog Audio*) interest in the electronic drum concept led to the 1973 creation of the *1130 Percussion Controller*. While not actually a full drum, the device was a representation of the first percussion *trigger*. Moog installed an electrical component within the shell of a drum. The component utilized the pulse reproduced by striking the skin of the controller which was connected to an external synthesizer. The pulse could now be altered by available sounds and effects present within the performer's choice of synthesizer; the pulse triggered the selected preset sound. The unit is a single self contained drum with a built-in pre-amp. It can produce drum sounds layered with the effect currently selected on the external synthesizer. The capability of performing digital sounding percussive effects as well as musical tones creates the possibility of producing either spatial or melodic sounding effects other than the typical synthesizer. Chapter two will discuss the importance of innovations towards self-identity, and while that may seem ambiguous at this moment, the reader must keep in mind that throughout the 1980s authenticity and what is considered to be the norm, was fading. The revolutionary drummer Carl Palmer of progressive rock group Emerson, Lake, and Palmer, developed a drum kit encompassing multiple controllers each assigned a specific synthesized effect. The sounds reproduced by the triggering of drum shells could be heard especially in the drum solo of the band's 1973 recording of "Toccata."[10] More structurally reliable than previous models, the 1130 also remained dependent on an external electronic device; synthesizer, guitar effects, any unit which can send and

[10] Ibid., 368.

receive audio signals. However, the dependence on other mechanisms resulted in the difficulty to mass produce due to the portability issues and necessary requirements in order for the percussion to sound; in turn this necessitated further evolution.

In 1976 the first commercial electronic drum set was created by Pollard industries. The idea of creating a self-sustaining percussion became the framework for the *Syndrum*. Encompassing four Kevlar pads and a basic synthesizer module (figure 15 in appendix) led to personalization due to the waveform generator within the module. In this model, the generator uses filters that alter sounds in order to "achieve a sound that isn't at all close to a drum."[11] The *Syndrum*, primarily, pioneered traditional electronic sounds such as: Spacesound,' 'Laser,' 'Bird Call' and 'Backwards Tom', and most important, 'Sweeping Doom', a sound which signifies electronic percussion and can still be heard in present recordings. Secondly, it provided drummers with sounds incapable of being produced by acoustic drums. As this chapter progresses, the industry's search for authenticity is dissipated, leading to the creation of futuristic sounds. Pollard Industries – Joe Pollard and Mark Burton- achieved further advancements to the new phenomenon known as electronic drums: cost efficiency. The models previously discussed were all created for internationally renowned musicians; therefore budget was never an issue. Yet Pollard Industries understood the importance of supply and demand releasing the *Syndrum CSM*, a self-containing unit accessible for the everyday musician. Though the primitive models presented technological advancements, they were still viewed as accessories, or add-ons, to the acoustic drum set. The industry of electronic percussion

[11] Ibid., 369.

throughout the 1970s failed to achieve the creation and mass production of a fully structurally reliable drum set.

Simmons Drum Company

1978 was to prove a watershed since this was the year in which the most reputable electronic percussion company was founded. The *Simmons Company* became the landmark for all percussive technological advancements throughout the following decade. "Simmons focused on the belief that a drum sound consisted of both a pitched and unpitched sound. The pitched tone of the drum was to be tuned separately to the unpitched noise element, and a unique sound was achieved that other manufacturers have failed to create."[12] The company's first achievement was the 1980s release of their *Simmons SDS-3*(Simmons Drum Synthesizer). The *SDS-3* marks the first mass produced electronic drum module. This primary series featured electronic triggers which were assembled within acoustic drum shells. The module was made available as a 2 or 4-channel module, each with multiple acoustic and electronic sounding capabilities such as filters for click, decay, bend, pitch and noise as defined in table 1. Figure 15 in the Appendix, presents the advertisement issued by *Simmons*, describing the advancements of both the 2 and 4 channel synthesizer.[13] The more cost efficient 2-channel module was entitled the *SDS-IV*. The original 4-channel *SDS-3* represented by figures 17 and 18 remains the foundation for future advancements within the industry. The vast array of sonar options intrigued many drummers yet the acoustic and electronic incorporation is still present with the *SDS-3*, causing *Simmons* to produce the *SDS-V* (figure 19 in appendix) in 1981, the first self-sustaining drum set. In collaboration with jazz drummer

[12] Ibid., 370.
[13] See figure in appendix

Richard Burgess, the *SDS-V* versatile module along with the hexagonal shaped polycarbonate pads caused a revolution within the electronic percussion spectrum. The addition of more pads, marketed the *SDS-V* as the world's first fully functional drum set; due in part by the new creation of a kick drum. The main influence on music is the long awaited transition from acoustic drums with some electronic devices, to a fully electronic drum. The transition facilitated the recording process, tuning, bleeding, and phasing is no longer an issue. Some notable percussionists who embraced the capabilities of the *SDS-V* included Neil Peart of *Rush*, Bill Bruford of *Yes*, Roger Taylor of *Duran Duran*, and Richard Burgess of *Landscape*. Dean, in his authoritative study, explains how the sounds created by the *SDS-V* module epitomize 1980s popular music with "controls to alter pitch bend, tone level, noise level, attack, and noise tone," as well as the inclusion of a static filter.[14] Each channel is designed as a separate synthesizer; the performer will dial the necessary effects in order to produce the desired sound.

[14] Dean, *The Drum: A History,* 371.

Table 1: Definitions and Effects[15]

Each drum module being specific in its function, the effect of the controls are slightly different for each one as listed in the chart below.

	BASS	SNARE	TOM TOM
NOISE PITCH	Unpitched noise, but gets brighter as the drum is hit harder. Imitating head noise.	Pitched noise with control of pitch. Noise pitch is not affected by the striking force. Imitating the snares.	As Bass drum
TONE PITCH	Low, slightly modulated.	Medium, slightly modulated.	As Snare Drum
BEND	Insensitive to striking force Set fairly high and lower pitch setting for 'thump'.	As Bass drum	Sensitive to striking force. Harder hits send the pitch higher.
DECAY	Controls short or long sound.	As Bass Drum.	As Bass drum.
NOISE-TONE BALANCE	Controls the amount of noise mixed with drum. Bright initially then duller as the sound dies away.	Balance between snare noise and tone of drum.	As Bass Drum.
CLICK-TONE BALANCE	Sets the balance between the beater 'smack' and the drum sound set on the other controls	Sets the balance between the stick 'smack or click' and the drum sound.	As Snare Drum.

Simmons does evolve dramatically from the *SDS-3*, providing a mounting system for each pad alongside a mountable module with capabilities surpassing its predecessor. However, the *SDS-V* displayed several disadvantages. The hard surface of each pad resulted in wrist injuries, and the poor cymbal sounds were replaced by acoustic cymbals.[16] The significant differences between both acoustic and electric cymbals reflect

[15] Simmons, "SDS-V," Unpublished Operating Instructions, 1981, Owner's Manual,8.

[16] Dean, *The Drum: A History,* 371-372.

the audile and tactile aspects of nuances and decay or reaction time; these differences and causation will be further discussed at the beginning of chapter three.

On the first hand, acoustic drums provide a specific sound; they are not expected to change mid performance, nor can they. On the other hand, electronic percussions supply performers the freedom to alter drum sounds regardless of studio or live setting. However, the laborious task of tweaking a module after each song, presents an issue for performers, resulting in another flaw to the *SDS-V* module.

External Hard Drives

Simmons, aware of the time-consuming issue, created what is called Erasable Programmable Read-Only Memory, or EPROM, in 1983. The technology can be seen as an external hard drive. As synthesizers were interloping with floppy hard drives, *Simmons* was focusing on the effects of EPROM. The technology, similar to floppy, allowed the drummer to save preset sounds on EPROM cards which can be loaded at will. Performers could now interchange sounds quickly and efficiently. The era of synthesizers and electronic percussions producing effects through turning knobs and dials was finally obsolete; external memory became the forerunner for technological advancements. EPROM cards, unlike today's USB cards, were relatively limited in space occupying only one channel of a drum module. *Simmons' SDS-7* was the first drum set to entail such technology. This advancement is also responsible for prolonging the career of internationally acclaimed drummer Rick Allen of *Def Leppard*; further explanation to the importance of the *SDS-7* technology will be discussed throughout the final case study in chapter three. Other characteristics such as multiple channels, digital effects processors, less injury prone rubber pads, and balanced outputs (XLR) which can send stereo signals

to each pad, were also available on the *SDS-7*. Not only were the presets superior to its predecessor, the *SDS-7* now flourished in live performances. With this module a watershed had been reached; it can be considered as the primitive transition from strictly analog produced sounds to those merged with digital enhancements. *Simmons* would later create an EPROM blower, a device capable of copying the selected track and burning the desired preset to a new card. The *SDS-7*`s digital interface and EPROM technology is very beneficial to the conclusions found in the third case study of chapter three. This drum spearheads the possibility of playing multiple drum sounds on any given trigger or pad. Previous generations are restricted to the base sound provided by drum channel. In other words, if a drum module is split up into four channels (snare, bass drum, rack tom, and floor tom), the performer cannot produce a snare sound on the bass drum channel. EPROM, however, provides complete freedom to any channel. Rick Allen, of the band *Def Leppard*, owes his career to the technology catapulted by the *SDS-7*; chapter three will provide further information.

The mid to late 1980s shift towards electronic percussions was actually marked by a saturated market. Companies such as Alesis, Ddrum, Pearl, Yamaha, and Roland attempted to undercut profits from *Simmons.* Each company released cost efficient products, whereas *Simmons* was still over pricing their drums. This decade also provided musicians with products which were MIDI (Musical Instrument Digital Interface) capable.

The technology proves useful for storage since digital files can now be stored occupying lesser memory. On board saving (memory) means fewer limitations than the previous EPROM cards. *Simmons* released their next generation of drums which provided

onboard capabilities: 20 factory presets and 20 customizable drum sets. The SDS-9 encompassed 'MIDI thru' ports which can send and receive digital signals from any digital source. The company also introduced dual zone snare pads, creating the illusion of a rim shot and a snare strike; touch sensitive pads also became available with this generation drum. The SDS-9 supplied a drummer with new innovations and capabilities; however, reproducing an authentic drum sound was not made possible.

Demise of Simmons: Roland and Yamaha Rivalry

Demise of *Simmons*

By the late 1980s, acoustic drums reclaimed their popularity. This was due to a subtle shift in musical requirements and the lack of authenticity in the sound quality of electronic percussions. *Simmons'* credibility for producing drums that are both pitched and unpitched was now challenged, resulting in the production of the SDX. The features available were like no other: Digital screen, floppy drive, internal memory, multiple pad inputs, voice inputs, sampler, sampler editing, MIDI configuration, kit configuration, each deriving from the introduction of modes. The use of these modes supplied the performer with a skeletal preset to build upon whereas previous modules would depend on transistors; the saving of presets would only occur if settings remained untouched. The idea of modes is apparent in present drum modules. Yet, ironically, the demise of the *Simmons Company* began following the 1987 production of the SDX. The cost of the SDX was a whopping US$ 13,000, far exceeding the price point of any other drum on the market. Coincidentally that same year the US would experience a dramatic monetary crisis with the stock market crash. Companies such as *Roland* and *Yamaha* would prosper

as a result of creating cost efficient electronic percussions with more onboard options. Finally, 1989 marked the year when the *Simmons* drum company shut its doors.

Rise and Rivalry

The electronic percussion industry changed forever as a result of the *Roland Company's* storage capabilities. The previous drum modules created sounds through analog transistors, with tone pots capable of differing one track from the next. With the exception of the overpriced SDX, *Roland* constructed modules that now had onboard storage and saving possibilities. The progression towards authentic sounding electronic percussions began with the creation of the TD-7 module in 1992, encompassing 512 sampled sounds and 32 fully programmable kits. *Roland* began utilizing modes (*Simmons* idea) which allowed the transformation of any preset kit to be saved within the module. This advancement offers performing drummers the options of creating and pre-programming specific sounds required for performance without the hassle of interchanging memory cards. *Roland*'s new MIDI compatible module builds upon ideas of past modules; the MIDI connection is for external use only, expanding sound from sequencers and synthesizers. Concepts concerning personalization of drum sets, as well as digital expansion (MIDI or USB), were and remain available in all *Roland* modules. Though cheaper than any previous *Simmons* model, the TD-7 was targeted to studio and touring drummers as a result of the elevated price point. Significantly, *Roland* releases a miniature version, entitled the TD-5, supplying drummers with similar features (same number of programmable kits but fewer sampled sounds) for a reduced price. All kits constructed by *Roland* at this time contain round rubber pads with minimal dynamic function. The *Ddrum* Company deserves credit for the creation of dynamic pads. They

can "differentiate between different dynamics and impact positions on the head, triggering different sounds accordingly, … allowing onboard sampling and much more realistic sounds;"[17] a technology utilized in current models. However, *Ddrum* suffers a similar fate as *Simmons*, creating drum sets at elevated price points. The *Yamaha* Group, known for its innovations in motorcycles, engines, and pianos (both digital and acoustic) released the DTX 1.0 with similar features to *Roland's* TD-5. *Yamaha* took brief control of the market with their 1996 release of DTX 2.0, encompassing over one- thousand samples, numerous preset and programmable drum sets, and a sequencer setup with one hundred play-along tracks. Yet, perhaps the greatest novelty to electronic percussion was *Roland's* 1997 release of the V-Drum. The release of the TD-10 module surpasses advancements from any other competitor, utilizing *Roland's* Composite Object Sound Modeling (COSM) technology.

Drummers are searching for an authenticity and in order for electric drum companies to survive the needs of the musician must be met. The V-drums module supplies many onboard options which help produce authentic sounding drums. Room specifications and drum tuning are all available within the TD-10. Alongside the innovated module, *Roland* strives to provide their clients with an authentic feel when striking a pad, replacing hard rubber pads with mesh drum heads. Both silent and responsive, the TD-10 drum kit incorporated positive attributes from previous generations' advancements (onboard saving, General MIDI, play along tracks, multi-zone and dynamic pads, and positional sensing) while focusing on the needs of present drummers. *Yamaha* all the while surpasses its Japanese competitors with the release of

[17] Dean, *The Drum: A History,* 376.

the DTXpress, featuring a less complete module to the TD-10, nevertheless responding to most drummers' needs at a fraction of the cost. The release of the TD-8 module resulted in yet another victory for *Roland*, encompassing the same mesh heads and COSM technology as its sister model.[18] The evolving demands of drummers throughout the late 1990s and early 2000s created healthy competition between both Japanese companies. The industry had greatly distanced itself from the *Simmons* era that was the 1980s, and both companies were now exhausting any means, attempting to create electronic drums which captured authenticity. *Yamaha* released the DTXtreme line featuring advanced logistics to *Roland's* products; however, the utilization of real drumheads could not compete with the quietness and response delivered by the mesh head alternatives. Both companies had yet to realize authentic looking and responsive cymbals, since the round rubber pads supplied with each drum kit did not reflect the look and sound of real bronze cymbals. *Roland* presented its line of V-cymbals, created to mirror the look and movement of acoustic cymbals. The three zone cymbals offered the drummer the opportunity of playing the bell of the ride, the full openness of a crash cymbal –or the sound of a stick tip striking the ride-, and the choking of any particular cymbal due to the innovative third striking zone.

Following the release of the V-cymbals, *Roland* explored the possibilities surrounding the authenticity of the hi-hat, reproducing the multiple positions of the acoustic pairing deemed impossible with 2003 technology. In 2004, significantly, *Roland* altered the future for electronic percussion.

The following advertisement was released:

[18] Dean, *The Drum: A History,* 378.

The First Electronic Hi-Hat Designed Like an Acoustic

Figure 1: V-Hi-hat

This breakthrough electronic hi-hat is designed to precisely model the look and feel of its acoustic counterpart… so much so, that it mounts on an acoustic hi-hat stand! The new V-Hi-Hat uses top and bottom cymbals with full motion capability for ultra-natural stick/pedal work, and is designed to work with the TD-20's enhanced dynamics. The dual-trigger VH-12 creates smooth hi-hat sounds from open to closed—including the half-open position—with all of its delicate nuances. By applying pressure to the pedal (even after closing), you can vary the pitch and decay for playing fast and tight articulations.[19]

.

Roland released the VH-12 as a stepping stone to the introduction of its new TD-20 drum (Appendix figure 20, 21, 22). Unfortunately for *Yamaha*, the new adjustable attributes available in the TD-20 such as snare buzz level, strainer adjustment, cymbal decay and sizzle, cymbal and drum sizes, and bass drum beater materials, surpassed the characteristics offered in the second generation DTXtreme released that same year. The *Yamaha* module encompassed multiple factory presets including WAV[20] (waveform) and AIFF[21] (Audio Interchange File Format) sampling formats, similar sound modelling to

[19] Roland, "VH-12," *Roland,* Accessed February 15, 2014, http://www.roland.com/products/en/VH-12/.

[20] WAV is a "Windows" digital file format that is usually 16bit (although it can be 8) and mostly uses a sample rate of 44.1 kHz (although this too may vary). It is the acronym of Waveform.

[21] An "Apple" digital sound format that can be used on other platforms.

the TD-10, three zone cymbals, and the return to rubber pads from the drum skins found on its predecessor.

Yamaha would play catch-up to its main competitor until the release of the DTXtreme III in 2008 (appendix figure 23). This module incorporated a reduced number of drum sounds in order to occupy more space for larger size files. The new samples would include pre-recorded acoustic and some traditional synthetic sounds, each "allowing greater dynamic and timbral options."[22] The use of acoustic samples surpassed *Roland's* COSM technology. The DTXtreme III's USB capability (appendix figures 24-25), allowed for increased sampling possibilities (either wave or digital) than the general MIDI of the TD-20 (appendix figures 20-21-22). General MIDI was preferred during a decade in which musicians were not looking for sound reproduction; there was a desire for effects and strange noises. The primary digital innovation facilitated large setups with individualized tracks as well as sampling from other MIDI capable instruments (synthesizers, drum machines, samplers, and computers). However, the ease and speed offered by USB connections (USB 3) is preferred to the latency prone General MIDI; regardless if present drum modules supply MIDI in/out for sampling purposes. Therefore, transitioning from MIDI to USB provided many practical advantages. The latter enabled storage of preset sounds, similar to the original EPROM or Floppy technology of the 1980's, yet without the restraints or storage space and loading times. The more effects sampled to a particular drum, the more space it will occupy. External USB hard drives eradicate the issue of space limitations, present with EPROM, Floppy, and Compact Flash. USB capable drum modules load files more efficiently and can process audio

[22] Dean, *The Drum: A History*, 382.

WAVE files or signals, resulting in quicker connectivity than digital signals. Another advantage concerns authenticity. Performers are searching for quantity without sacrificing quality. USB ports sample acoustic drum sounds from computer programs such as *Addictive Drummer* and *Superior Drummer*; drummers have the possibility of performing with electronic drums that sound acoustic. Apart from the near infinite onboard possibilities within present day modules, recording engineers find it advantageous to connect the modules directly to computers disabling the onboard sounds. The pads are simply used as triggers (or sensors) supplying signals of frequency and intensity to the desired computer program. Once data is received, the program activates the selected percussion sound; the result is also a sampled sound.

Yamaha, aware of the requirements and their envied position in the market -due to USB ports- simply adds features that would enhance drummer performances and practice sessions. Meanwhile, their competitor attempted the enhancement of an already under producing drum module. The release of *Roland's* TD-20K module[23] included some new features, yet the recording and practice functions of *Yamaha's* product would preclude a temporary shift in preference amongst professional drummers. *Yamaha's* final advancement was the arrival of the DTX950K in 2010. The new module simply built upon the success of the XtremeIII, supplying textured silicone pads resulting in different

[23] The Td20k is the TD-20 module with an updated expansion card (TDW-20) which features wider drum dynamics and smoother sound control on the hi-hat. It expands the TD-20 module with over 300 new sounds and new ambience-type choices that are optimized for drums. It also provides enhanced V-Editing with improved snare buzz, new mic-size parameter for the kick, and new kit resonance to adjust how the kick affects the total resonance of the entire kit. Furthermore, the TDW-20 also includes extended user interface with additional functions such as versatile kit copying options, increased output routing choices and useful CF card utilities. For more information see Roland, "TDW-20," *Roland,* Accessed February 14, 2014, http://www.roland.com/products/en/TDW-20/.

sensations between each drum, similar to an acoustic drum due to the different sizes of each shell. The capability of controlling a DAW (digital audio workstation) is a feature that offers a drummer full control of programs such as Cubase through the drum's module; there is no need to move back and forth from drum to computer.[24]

Roland has now regained control of the industry with the 2011 release of the TD-30. The utilization of COSM technology, present in all previous generations of *Roland* drums, has been discontinued and replaced by the new *SuperNATURAL* technology.

Figure 26 in the appendix describes how the new technology created by *Roland* is constantly evolving. The processor is a self-adaptable chip, processing each drummer's performance differently. The TD-30 also features USB capabilities and sampled drum sounds resulting in *Roland's* return to the top of the electronic drums industry. The evolution of electronic drums, opposing acoustic drums, is never ending due to advancements in processors and samples. Technology is ever evolving; therefore the electronic percussion is as well.

Section Two: History of Sampling Pads and Drum Machines

According to Dean, electronic drum machines do not only pre-date electronic percussion, they pre-date World War II. A primitive generation of analog drum machines can be found in Nickelodeon roll pianos of the 19th Century; percussion instruments (bass

[24] Dean, *The Drum: A History*, 383.

drum, snare drum, and a cymbal) are integrated within the piano structure.[25] The first electronic drum machine entitled "Rhythmicon" was a 1932 creation providing harmonic and rhythmic patterns as a result of the composer's choice of root notes of the chord and beat subdivisions. The primitive device activated by vacuum tubes, provided limited sounds and is said to be "totally unusable in today's developed electronic drum market."[26] Ian Boswell, in his article, discusses the technological advancements creating the differentiation between the first and second generation drum machines. The "Chamberlin Rhythmate" (appendix figure 27) is an analog device that utilizes 1 inch magnetic tape loops of pre-recorded acoustic drum patterns. This 1949 drum machine, encased 14 separate loops in return encompassing three different drum patterns, totalling 42 patterns.[27] Other than the pre-recorded patterns, this early drum mechanism supplied a composer with options such as volume and speed. Boswell states how "the two machines take different approaches that illustrate an early dichotomy in electronic music: the Rhythmicon synthesized its percussion sounds, whereas the Rhythmate used pre-recorded tape loops. Essentially, the Rhythmicon was a synthesizer, and the Rhythmate was a sampler."[28] Alongside the Rhythmate, Chamberlin invented the world's first universal sampler and produced the prototype in 1956. The concept involved combining the technology of a tape recorder and an organ; the result was the recording of any instrument. "The samples were recorded on 14-1/4" magnetic tapes –prior to mellotron

[25] Dean, *The Drum: A History*, 388.

[26] Ibid., 389.

[27] Ian Boswell, "Part 2: History of the Drum Machine: Invention of the Drum Machine," *BKE Tech* (blog), December 7, 2013,http://www.bketech.com/bkeblog/drum-machine/part-2-history-drum-machine-re-invention-drum-machine/.

[28] Ibid.

technology[29], and were not compressed or otherwise processed, giving them a natural, organic, "live" sound that became the distinction of the Chamberlin."[30] According to Boswell, the Chamberlin was utilized up to the 1980s, replaced by synthesizers which could produce the sounds of multiple instruments.

The following drum machine was created by the *Wurlitzer* organ company. The release of the "Sideman" (appendix figure 28) in 1959 promoted the possibility of a one man band. Similar to the Rhythmicon, the Sideman used synthesis rather than samples. The device was operated by the rotation of a wheel which made contact with a series of triggers. Each trigger completed an electrical circuit in return activating the selected drum pattern. Though the capabilities of tempo provided many options for performers, the lack of sound authenticity led a performer to remain dependent on actual drummers.[31] The use of vacuum tubes dominated drum machines until the release of the "R-1 Rhythm Ace" (appendix figure 29) in 1964 by *Acetone*. The drum machine marked the transition for devices running on tubes to those supporting transistors. The product enabled performers or composers to trigger drum sounds at the touch of a button. The R-1's flaw originated from the lack of preset drum patterns, leading to the creation of its successor, the "FR-1 Rhythm Ace" (appendix figure 30) in 1967. The new innovation not only encompassed 16 drum patterns but each pattern could be edited (by muting certain drum parts) as well as activating two patterns at once. Both Boswell and Dean describe the integration of the Acetone drum machines with Hammond organs. The collaboration would see the resignation of the CEO and founder of Acetone. In 1972 Ikutaro Kakehashi created what

[29] "Mellotron,"*Dictionary.com,* accessed February 17, 2014, http://dictionary.reference.com/browse/mellotron.

[30] Ibid.

[31] Dean, *The Drum: A History*, 389.

has been previously discussed as the most successful and technologically advanced electronic drum company, *Roland.* The sole drum machine at this current time to utilize pre-recorded samples remained the Chamberlin. The next advancement in drum machines would occur in 1980 with the *Linn* "LM-1 Drum Computer" (appendix figure 31), the first drum machine to use digital sampling.[32] The digital technology created sounds that would become essential in defining the percussive sounds of the 1980s. The 8-bit samples were heard due to the digital to analog converter encompassed within the unit. The primary advantage of the LM-1 was concentrated around its fully programmable patterns. The unit also encompassed 12 digital samples which could be performed by the tap tempo feature. This made playing drums via buttons and deciding tempo possible. The device also featured actual drum samples, quantizing (editing the timing of notes in order for them to fit onto a time grid), individual tuning of each sample, and outputs which could be connected to effect boxes for further customizable settings.[33]

Competing with the LM-1 was the synthesized Roland TR-808 (appendix figure 32). The less expensive, equally programmable drum machine, would capture the attention of artists throughout the latter part of the 1980s. Supplying early 1980s synthesized sounds, it is the most utilized drum sequencer to date; the classic sounds supplied by *Roland's* products caused the LM-1 to be considered dated. Furthermore, another technological advancement was the integration of MIDI capabilities within the TR models. Both the "TR-808" and its successor the "TR-909" (appendix figure 33) have

[32] Ian Boswell, "Part 4: History of the Drum Machine| Programable," *Simpler to Sound Better* (blog), January 4, 2014, http://www.bketech.com/bkeblog/drum-machine/part-4-history-drum-machine-programmable-rhythms.

[33] Dean, *The Drum: A History*, 391.

grown popular with R&B artists; some present recording artists still employ samples from both.[34]

Samples are a very popular method for reproducing sounds and mimicking bed tracks. Samples or sampling is a concept that emerged from the 1970s. Popularized by Hip Hop and Dance music in the 1980s, samples can now be heard in genres such as Pop, Dance, Rock, Metal, and Country. They specifically encompass a wide range of specified instrument sounds, drum fills, loops (a short pattern which is repeated as desired), specialized effects, or a backing track (a predesigned track that plays throughout a song) for a part or the entirety of a song. Samples are utilized according to genre necessities. A figure is Hip Hop artists who incorporate drum loops, sampling a one-measure drum beat throughout the song. Samples are very useful in the reproduction of a recorded piece of music. In studio, the number of individual tracks is as limited as the composers' imagination; a single musician can perform multiple tracks due to a track by track recording process. Live performances require the presence of musicians and depending on the number of recorded tracks, acquiring all the necessary musicians might become problematic; thus samples are useful in these situations. A sampled bed track is the result of combining the already recorded tracks of the instruments which will not be present during the live performance. The bed track is then set to a metronome marking making it possible to follow the track during performance. The procedure can be accomplished through the use of present day laptops or sampling machines. However, the primitive

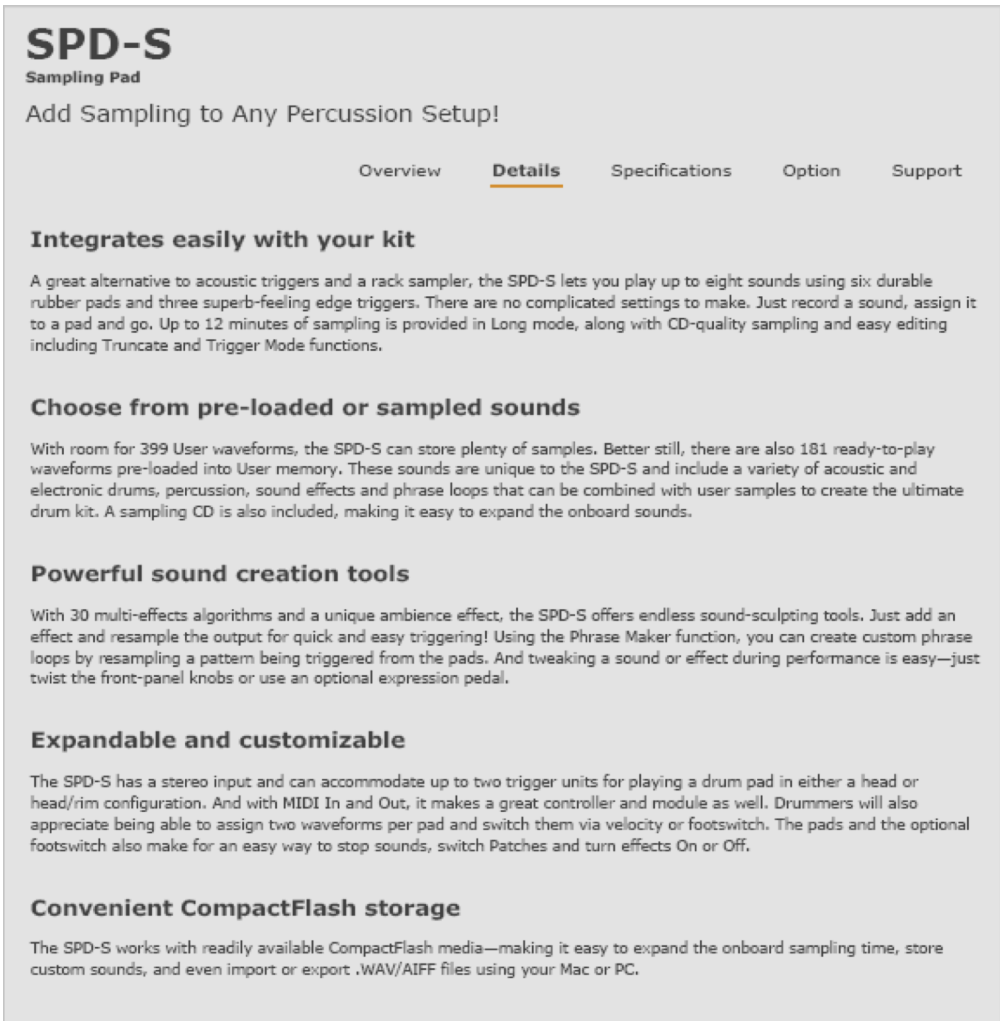
[34]Ian Boswell, "Part 5: History of the Drum Machine: Tale of Drum Machines," *Simpler to Sound Better* (blog), December 25, 2013, http://www.bketech.com/bkeblog/drum-machine/part-5-history-drum-machine-tale-drum-machines/.

state of 1980s sampling could not be accomplished through laptops due to the constraints of the technology available at that time. Samplers are necessary during the decade leading to the creation of the *E-mu* "SP-1200" (appendix figure 34). Previous drum machines did encompass drum samples (drum sounds) but did not have the capability of performing pre-recorded material. The SP-1200 was the first device with both drum machine and limited sampling possibilities. Here, significantly, the on-board drum patterns are fully programmable thanks to the vast selection of preset drum sounds. Yet, this primitive sampler exhibits many limitations due to the lack of technology encompassing strictly 10 seconds of total sampling time.[35] On-board sampling is dependent on available memory. Companies such as *Akai* and *Roland* began experimenting with products which utilized the concept of finger activated triggers and external memory; floppy drives were incorporated within new samplers by 1986. As a result of external memory, samplers and electronic percussion reduced the demand for synthesized drum machines by the 1990s.

The ultimate advancement in sampling performance was created by the *Roland Company*, enforcing its tenure atop the electronic percussion industry. The 2003 release of the SPD-S sampling pad (appendix figure 35) provides drummers with multiple on-board preset sounds, present banks, longer sampling times, and better quality sound. Table 2 lays out the innovative options provided by the SPD-S sampling pad, focusing on kit integration, on-board memory, customizable sounds, and external memory.

[35] Dean, *The Drum: A History*, 394.

Table 2: Features of the SPD-S[36]



SPD-S

Sampling Pad

Add Sampling to Any Percussion Setup!

Overview **Details** Specifications Option Support

Integrates easily with your kit

A great alternative to acoustic triggers and a rack sampler, the SPD-S lets you play up to eight sounds using six durable rubber pads and three superb-feeling edge triggers. There are no complicated settings to make. Just record a sound, assign it to a pad and go. Up to 12 minutes of sampling is provided in Long mode, along with CD-quality sampling and easy editing including Truncate and Trigger Mode functions.

Choose from pre-loaded or sampled sounds

With room for 399 User waveforms, the SPD-S can store plenty of samples. Better still, there are also 181 ready-to-play waveforms pre-loaded into User memory. These sounds are unique to the SPD-S and include a variety of acoustic and electronic drums, percussion, sound effects and phrase loops that can be combined with user samples to create the ultimate drum kit. A sampling CD is also included, making it easy to expand the onboard sounds.

Powerful sound creation tools

With 30 multi-effects algorithms and a unique ambience effect, the SPD-S offers endless sound-sculpting tools. Just add an effect and resample the output for quick and easy triggering! Using the Phrase Maker function, you can create custom phrase loops by resampling a pattern being triggered from the pads. And tweaking a sound or effect during performance is easy—just twist the front-panel knobs or use an optional expression pedal.

Expandable and customizable

The SPD-S has a stereo input and can accommodate up to two trigger units for playing a drum pad in either a head or head/rim configuration. And with MIDI In and Out, it makes a great controller and module as well. Drummers will also appreciate being able to assign two waveforms per pad and switch them via velocity or footswitch. The pads and the optional footswitch also make for an easy way to stop sounds, switch Patches and turn effects On or Off.

Convenient CompactFlash storage

The SPD-S works with readily available CompactFlash media—making it easy to expand the onboard sampling time, store custom sounds, and even import or export .WAV/AIFF files using your Mac or PC.

The preset sounds found within the SPD-S are shaped and created with the similar COSM technology found in *Roland* lines of electronic drums produced at the same time. The extended sampling time provides musical performers the option of adding a full song's length backing track; the addition of sampled instruments supplies the audience with studio quality performances. Additional features such as durable rubber pads capable of withstanding drumsticks, external triggers, XLR recording and MIDI capabilities showcases the unit as more than simply a sampler; it is an all encompassed

[36] Roland, "SPD-S," *Roland,* Accessed February 18, 2014, http://www.roland.com/products/en/SPD-S/.

electronic drum as well. An electronic bass drum and Hi-hat are utilized as external triggers completing the SPD-S setup as a drum. The sampler features sounds of Latin, classical, African, and commercial percussions; the SPD-S can also be viewed as an electronic percussion unit which will be examined in the following section of the chapter. The XLR recording feature is another trademark of the product. Connecting a microphone to the SPD-S activates a recording function in which a performer can record any sound of instrument desired, saving the newly recorded sample internally to be assigned to one of the nine rubber pads. These innovations ensure that the SPD-S remains the industry's leading sampler. However, the SPD-S –alike other electronic percussions- became outdated due in part to the limitations and scarcity of Compact Flash drives alongside the industry's transition from MIDI to USB. In 2011 *Roland* released the successor to the SPD-S, utilizing USB 3 ports as well as increased sampling time and supported by the *SuperNATURAL* technology. The SPD-SX (appendix figure 36) features the following:

- Unique sampling-pad concept — the only instrument of its kind in the world
- 2 GB internal memory, enabling approximately 360 minutes of sampling (mono) without requiring external memory
- Nine velocity-sensitive rubber pads, two external dual-trigger inputs
- Easy capturing and assignment of audio data through Multi-Pad Sampling
- Three units of multi-effects onboard, with two real-time control knobs and four dedicated effect buttons
- Individual Pad Dynamics indicators show pad status and audio-level activity during performance
- Expanded USB functionality (USB Mass Storage, USB MIDI/AUDIO, USB Memory)
- Wave Manager software included for easily importing, assigning, and organizing samples

- Large backlit LCD[37]

Furthermore, the SPD-SX can be treated as an interface, drum module, or simply as a sampler. Figure 37 of the appendix features all the specifications of both the SPD-S and SPD-SX, providing a visual confirmation of the differences discussed as well as those which are not mentioned.

The effects that drum machines and samplers had on popular music are as equally relevant as the influence of electronic percussion. In studio, many pop artists would settle for sampled drum patterns utilizing many of the devices discussed; however, while electronic drums were also beneficial in studio situations, live performances would prefer the latter. Samplers are present in much recorded music, yet are also utilized in performance situations, due to their abilities to provide triggered sounds alongside acoustic drums and performing bed tracks.

Section Three: History of Self-Containing Drums

As discussed in the first section of the chapter, the first company to release mass produced electronic drums and modules was *Pollard Industries*. The examination of its first all encompassed drum revealed many similarities to present electronic percussion units. The electronic module of the *Syndrum CSM* (appendix figure 38) was incorporated within the drums' frame limiting sound manipulation. The stick activated trigger (drum head) had four potentiometers[38] on one side of the shell controlling sustain, frequency

[37] Roland, "SPD-SX," *Roland,* Accessed February 19, 2014, http://www.roland.com/products/en/SPD-SX/.

[38]The *Syndrum CSM i*s a device with three terminals. Two of the terminals are connected to a resistance wire, while the third to a brush moving along the wire so that a variable potential can be tapped off. These terminals can be used as parameters of an

sweep, tuning, and volume. Although the *Syndrum CSM* was not utilized much throughout history and did not produce percussion sounds, it caused companies to take note of the benefits of one unit drums; the relation to modern day percussive devices can be related to the *Syndrum CSM.*

The following self containing drum device was created by *Star Industries* in 1977. The Synare (appendix figure 39) provided a performer with 4 built-in rubber pads, each supporting three different zones, as well as a built in module supplying effects such as ring modulators, sequencers, and pink noise effects.[39] The synthesizer encased sounds that were characteristic of early 1980s music, synthesized effects rather than drum sounds. However, practical limitations of using the synthesizer on stage and the invention of drum samples led to the phasing out of the Synare and successors. *Star Industries* also produced:

> The Synare 2 – shared similarities to generation 1 yet entails twelve individual rubber pads instead of 4 multi-zone pads.
>
> The Synare 3 – one dome-shaped drum with parameters placed around the drum.
> The Synare 4 – similar features to its predecessor utilizing a drum head instead of a rubber pad.

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electronic drum, for example, a volume control. For more information see The Free Dictionary, "Potentiometer," *The Free Dictionary*, Accessed February 19, 2014, http://www.thefreedictionary.com/potentiometer.

[39]Dean, *The Drum: A History*, 369.

And the Synare Tympani (appendix figure 40), a device, similar to the Syndrum CSM. The Synare Tympani also housed the electronic components within a drum shell.

While the latter was an electronic device, the analog circuitry produced a near exact copy of percussions sounds such as timpani, bass drums, bongos, congas, and timbales. Examinations of modules predating the Synare Tympani identify it as the first of its kind; the first electronic percussion which produced traditional percussion sounds not drum sounds. The previous sections of the chapter described *Roland's* desire for creating innovative and digital products; the spectrum of self contained drum units was no different. 1985 the company released the PAD-8 Octapad (appendix figure 41), while it did not supply any internal memory, the device was used as a MIDI controller and can activate any assigned sounds. The reproduction of percussions sounds was possible through MIDI connections and external sound sources. The external trigger inputs made the module expandable and could supply 6 extra triggers. The module also supplied two inputs for footswitches which aided the drummer in switching patches throughout performances. The *Roland* Octapad series has progressed since, supplying musicians with models such as the Pad-80 Octapad II which featured onboard patches and external chips which could be integrated to the module: SPD-8, 11, 20, and finally the SPD-30. Each generation offered the performer new innovations. The primitive SPD models were supplied with the infamous COSM technology, providing sounds which were closer to authenticity than any predecessor. The modules also exhibited the same flaws as electronic drums and drum machines; the limitations of providing solely MIDI out/in. The newest SPD-30 (appendix figure 42) does not limit a percussionist to onboard

capabilities. USB and MIDI ports, as well as external trigger inputs, can transform this all-in-one drum into a drum module, furnishing sounds to drum triggers. The SuperNATURAL processor, a feature in the SPD-30, produces the near authentic sounds discussed previously. The progression of innovations provides options such as authentic sounding percussions resulting from both the onboard sounds and easy connectivity to computer programs, compact percussions sets, dynamic pads, looping, and practice options. Modern day electronic percussions provide performers with textured triggers which make negligible if any acoustic noise; therefore the utilization of headphones supply a percussionist with a portable practice studio. Only the player will hear the sounds reproduced by the device; others may hear a light tapping sound. The Octapad series from *Roland* and any of its competitors have always featured mechanisms triggered by the use of a drumstick or timbale stick.

In the case of percussionists versus drummers, the use of hands and fingers outweighs the demand for drum sticks. Hand percussions are not to be mistaken with drum machines or MIDI controllers; the devices create percussive sounds and not complete patterns. Percussion instruments performed by human hands originate from Indian, Latin, Brazilian, and African drums. Classical percussion, snare drum, bass drum, and timpani in part, share the opposite method of stick dependency. Responding to the demands of hand percussionists, *Roland* released its line of Handsonic products. This chapter discusses the derivative of modern self-containing electronic percussion from the concept of the *Syndrum CSM*. The Handsonic (HPD) modules feature advanced technology still mirroring the ideals of a self contained unit but differing in respect to sticks versus hands. The structurally reliable devices can also be performed with sticks;

however the innovative features present in each are activated by hand and present a greater range of performance benefits. The HPD-15 (appendix figure 43) is the first generation electronic hand percussion from *Roland.* The specifications and options of the HPD-15 can be viewed Table 3 and will later serve as a visual representation of the differences between the HDP-15, 10, and 20.

Table 3: Features of the HPD-15[40]

HPD-15

"HandSonic 15" Hand Percussion Pad

A "Hands On" Approach to Electronic Percussion

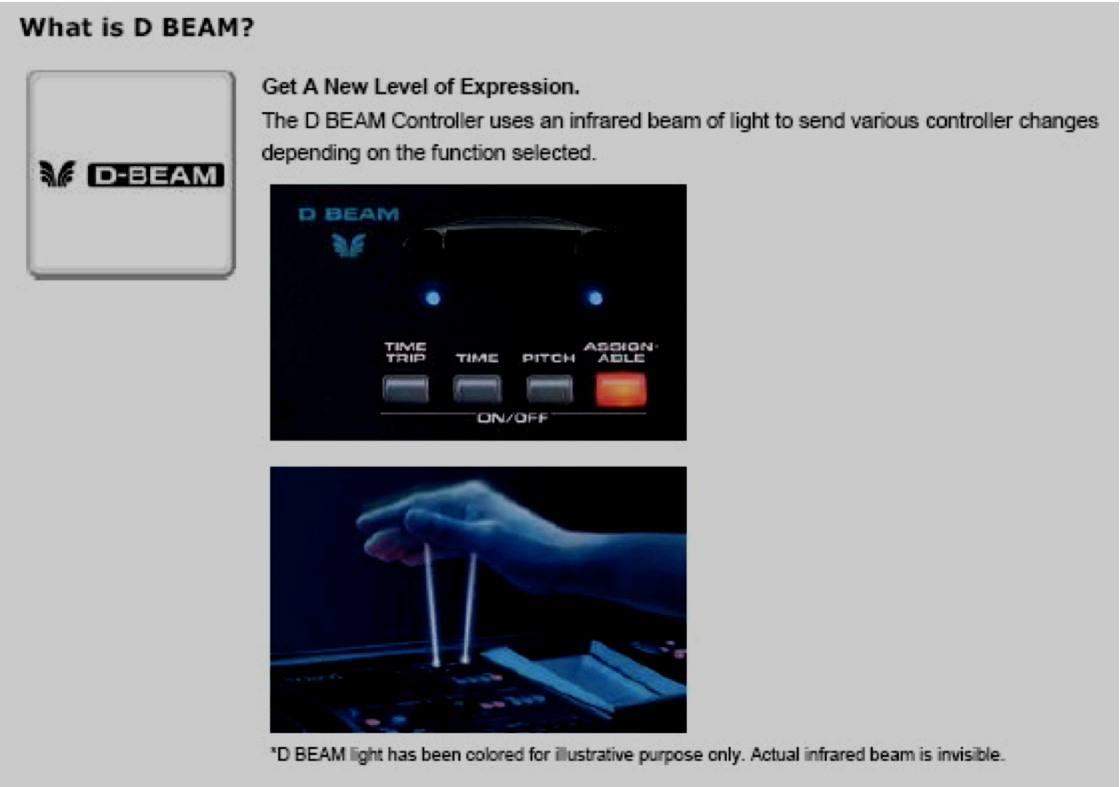
Overview | Details | **Specifications** | Option | Support

Maximum Polyphony	64 Voices
Instruments	Pad Instruments: 600, Backing Instruments: 54
Preset Patches	160
User Patches	80
Patch Chains	10 chains (32 steps per chain)
Effect Type	Reverb, Multi-Effects
Sequencer	Preset Patterns : 99, User Patterns: 99 (Maximum), Tracks: 4, Play Functions: OneShot, Loop, Tap, Resolution: 96 ticks per quarter note, Recording Method: Real-time
Tempo	20-240
Display	16 characters, 2 lines (backlit LCD)
Controls	Volume Knob, Realtime Modify Knob 1/2/3, Ribbon L/R, D Beam Controller
Pad	10 inches, 15 sections, Pressure-Sensitive
Connectors	Output Jacks (L/Mono, R), Phones Jack (stereo), Mix In Jack (stereo), Expression Pedal / Hi-Hat Control Jack, Trigger Input Jack (dual), Foot Switch Jack (dual), MIDI Connectors (IN, OUT/THRU)

[40]Roland, "HPD-15," *Roland,* Accessed February 23, 2014, http://www.roland.com/products/en/HPD-15/.

The device bolsters over 600 percussion sounds all powered by the infamous COSM technology; it is, as well, fully customizable due to real time knobs and both the left and right side ribbons. The ribbons can manually tune the effect triggered as well as slide the frequencies of a desired sound. The newest innovation to electronic percussion pads is the D Beam; a technology previously exclusive to *Roland* synthesizers. The figure below provides a brief definition as to the functions of the D Beam.

Figure 2: D-Beam [41]



The advantage of technology such as ribbons and the D Beam, is always to achieve compact percussion set ups with authentic sounds. The D beam can activate any assigned sound with the swipe of the hand, thus freeing a performer on stage to for example – use a stick and stretch to hit a cymbal. Percussionists can now play more intricate parts with

[41] Roland, "DBeam," *Roland,* Accessed February 14, 2014, http://www.roland.com/products/en/exp/D_BEAM.html.

the reassurance of not missing a beat due to proximity. As the case with *Simmons*, *Roland*, and *Yamaha's* new inventions come at a steep price, yet as we have seen, the creation of a cost efficient module usually follows shortly. *Roland* released the HPD-10 (appendix figure 44) quickly afterwards. Although equipped with less features than its sister model, the cost efficient module supplies percussionists with the same quality sounds with less quantity. Table 4, similar to table 3, illustrates the options of the HPD-10. Furthermore, a visual comparison of both the HPD-15 and HPD-10 can now been done.

Table 4:Features of the HPD-10[42]

HPD-10

"HandSonic 10" Hand Percussion Pad

Roland's Revolutionary E-Percussion Family Expands

Overview Details **Specifications** Option Support

Pad	10 inches, 10 sections, Pressure-Sensitive
Instruments	400
Percussion Kits	64
Effect	Ambience (5 types), Multi-Effects (20 types)
Style Guide Metronome	70 patterns
Tempo	40-200
Coach Mode	QUIET COUNT, RHYTHM CHECK, TIME CHECK, PAD FOLLOW, AUTO UP/DOWN
Controls	D Beam, Modify knob, Volume knob
Display	Icon-driven Backlit LCD
Connectors	Output Jacks (L/MONO, R), Phones Jack (stereo phone type), Mix In Jack (stereo phone type), Trigger Input/Foot Sw Jack (Dual), MIDI Connectors (IN, OUT)

[42] Roland, "HPD-10," *Roland,* Accessed February 14, 2014, http://www.roland.com/products/en/HPD-10/.

As illustrated in the above diagram, the 400 instruments are significantly fewer than the HPD-15. The picture supplied in the appendix also shows the use of 10 versus 15 triggers as well as the lack of side ribbons. Nevertheless, the HPD-10 provides a performer with more than the bare necessities for live and studio situations. The table top percussions offer enough sounds and on board memory required to tempt any acoustic performer. Another advantage of these models is that they can be used by any musician. For example if a skilled timbale player needs a rim shot well he must have the knowledge to perform the task. However if a keyboard player/producer needs the same sound, without previous knowledge he could not produce the effect. The HPD models can provide the musician with the desired sampled sound; all that must be done is to assign the sound to a trigger which can then be activated by anyone. Musicians, other than percussionists, can now incorporate the device to their live setup or studio and utilize the product to their full capability. *Roland* not only simplifies a percussionist's performance, but aids any one person who desires sounds specialized to these devices. Both HPD models are also supported with MIDI capability, making them MIDI controllers as well.

The evolution discussed in the previous section demonstrated the dependence on USB compatible devices. *Roland* as a company, driven by their industry status, released the next generation of HPD modules in 2013, discontinuing the HPD-10 and releasing the HPD-20 (appendix figure 45). Table 5 presents the parameters of the HPD-20, it also provides an evaluation of the HPD-10 (the model that the HPD-20 replaced) and the HPD-15.

Table 5: Features of the HPD-20[43]

HandSonic HPD-20

Digital Hand Percussion

Dynamic E-Percussion for Stage and Studio

Overview | Details | **Specifications** | Option | Support

Pad	10 inches, 13 sections, Pressure-Sensitive * An external trigger input is provided, allowing you to connect a pad (sold separately).
Kits	200
Instruments	850
Kit Chains	15 chains (50 steps per chain)
User Instrument	Number of User Instruments: Maximum 500 (includes factory preloaded user instruments) Sound Length (total): 12 minutes in mono, 6 minutes in stereo File Format: WAV (44.1 kHz, 16 bits)
Effects	Multi-Effects: 3 systems, 25 types Ambience: 10 types 3-band Kit EQ
Quick Rec	Resolution: 480 ticks per quarter note Recording Method: Realtime Maximum Note Storage: approx. 30,000 notes Export File Format: WAV (44.1 kHz, 16 bits)
Controllers	D-BEAM Realtime Modify knob
Display	Graphic LCD 64 x 128 dots
Connectors	OUTPUT (L/MONO, R) jacks: 1/4-inch phone type PHONES jack: Stereo 1/4-inch phone type MIX IN jack: Stereo 1/4-inch phone type TRIG IN jack: 1/4-inch TRS phone type HH CTRL jack: 1/4-inch TRS phone type FOOT SW jack: 1/4-inch TRS phone type MIDI (IN, OUT) connectors USB COMPUTER port: USB Type B (Audio, MIDI) USB MEMORY port: USB Type A DC IN jack
Interface	Hi-Speed USB (USB Audio, USB MIDI, USB Flash Memory)

The USB port, similar to *Roland's* line of samplers and drum modules, can be utilized for importing memory or as a direct link to a computer software program. The HPD-20 also encompasses 13 triggers capable of activating any of the 850 preset sounds, found in over 200 preset drum banks. The new innovation solidifies *Roland's* lead of the

[43]Roland, "HPD-20," *Roland,* Accessed February 24, 2014, http://www.roland.com/products/en/HPD-20/.

market for hand percussions. The innovations shared between live and studio situations present easy performance of percussive sounds.

Section Four: The Artists and Drummers

Understanding who the artists and performers were from the 1980s will aid in understanding their reasoning for incorporating electronic percussion in their music. Analyzing characteristics specific to popular music, prior performances, technique, and style are all tools to better comprehend the utilization of the devices. The findings of this section are directly related to the compositional elements found throughout the case studies of chapter three; therefore, introducing the concepts at this point will better prepare the reader for the conclusion found at the end of the studies.

The Performers and Artists who Benefited

The following section examines some iconic pop artists and performers who adopted electronic percussion and looks at how the introduction of electronic percussion enhanced their compositions and careers. The first section focuses on some drummers and their inspiration as a result of electronic percussion, followed by pop icons who introduced themselves to the innovation. Furthermore, a table of other artists and performers in genres other than pop will aid in understanding the wide range of musicians affected by the introduction of electronic percussion.

Drummers

The following section will discuss various drummers in the percussion spectrum. The analysis will enable the identification of similarities or differences between drummers who are solely electric players or those who transition in between, thus

identifying their impact on the genres of music they perform. In the latter case, this paper will consider their individual styles in each medium (i.e., do they bring the same techniques from one kit to the next? Do they compose their patterns according to what kit they are on, or do they transition from electronic to acoustic?)

One of the most popular drummers of the 1980s was Rick Allen of British Pop-Metal (according to *Billboard*) band Def Leppard. Due to a life changing accident which caused the amputation of his left arm, Allen would be classified in two categories: acoustic drums prior to his accident and electronic afterwards. Prior to the accident Allen was sponsored by companies such as Pearl, Ludwig, and Paiste; however, the accident forced the percussionist to embrace the capabilities provided to him by the electronic setups. Allen, although an iconic pop performer, does not provide sufficient information concerning the differences or similarities presented by the shift from authentic to processed sounds. The Simmons drum company constructed a drum set which enabled Allen to utilize his right arm and left foot to perform patterns which mirrored those of drummers with both arms. Therefore, the transition from acoustic drums to electronic required hours of practice alongside Allen's totally new approach to playing drums. Curiously, Def Leppard as an entity went from being a Hair Metal band prior to Allen's accident to a Pop Metal band on *Billboards Adult Contemporary* and *Top 100* charts, following Allen's return. Although the technology provided by the *Simmons Drum* Company pre-dates Allen`s accident, recent generations of electronic percussions, from companies other than *Simmons,* are producing modules that are extremely user-friendly, entailing LED screens, simple plug and play, multiple channels, and simple on-board editing. Although not the focus of this thesis, another area which must be questioned is

the reasoning for these advancements. It has been mentioned that the *SDS-V* presented issues with channel assignment -sending any sound to any channel- which was resolved with the release of the *SDS-7* and EPROM cards. Yet the module was still limited with the amounts of channels available. In Allen`s case, the use of multiple foot pedals is essential when playing snare shots and/or fills; therefore, channel expansion capabilities are required. The question remains as follows, did *Simmons, Roland,* and *Yamaha* release modules which comprised of expansion capabilities for genre characteristics, or for a performers needs. In the case of Rick Allen, it can be assumed that any set up that he is provided must entail the technology that permits him to successfully perform at his best; the technology was adapted for him. However, this may not be the case for all electronic percussionists due to the demand for large drum set ups, common in music videos of the 1980s.

Another commonly heard name is that of Phil Collins. As the drummer of the internationally proclaimed act *Genesis*, Collins would be categorized as a drummer who transitioned between both percussive spectrums. The early days of Collins' career, 1970s, featured a larger Gretsch Company setup. The drums were made of large components, key in executing the progressive rock sound of that era. However, with the turn of the decade and the pop movement, Collins would be guided towards the Simmons SDS-V setup. Occupying many spots on the *Billboards Top 100* and *Adult Contemporary* (Pop) charts, Genesis would be categorized as a Pop-Rock band throughout the 1980s, distancing themselves from their progressive roots. It may be argued that the shift in genre classification occurred simultaneously with the introduction of electronic percussion. Analyzing Collins' performance on one of the group's many hits *Invisible*

Touch, makes one realize the precision required to produce clear sounding strokes. Although the devices were not dynamically sensitive, they were, however, very touch sensitive. The case studies in chapter 3 will examine some of these aspects in order to identify the evolution of Pop music and inevitably, the progression of some musical acts due to these innovations.

Both Allen and Collins began performing on acoustic drums prior to their move to electronics. In the case of Roger Taylor of *Duran Duran*, the acoustic drum set was always his main instrument of choice, yet he integrated numerous electronic pads within his setup creating the option for new and innovated sounds to be played side by side with the authentic acoustics. Due to the combination of both percussion spectrums, and the acoustic drum superseding the electronic, Taylor's approach from the acoustic to electronic does not change; the occasional striking of an electronic device does not require any excessive training.

Artists who utilized electronic percussions

Madonna, better known as the Queen of Pop, has been releasing a steady string of number one hits since her self-titled debut album *Madonna* in 1983. The production of electronic percussions had already begun by this time and can be heard throughout most of her albums during the 1980s. With drummers such as Dave Weckl, Jonathan Moffett, Jeff Porcaro, and John Robinson, alongside drum programmers (utilizing table top percussions) Fred Zarr and Patrick Leonard, all embracing new electronic devices, the electronic drum patterns provided a sound that was characteristic to artists such as

Madonna. Meanwhile, an artist such as Whitney Houston would select an acoustic or electronic percussion according to the style of song composed. For example, her track *I Wanna Dance with Somebody*, entails the use of electronic percussion performed by producer Narada Michael Walden. However, Houston's ballad entitled *Didn't We Almost Have It* featured an acoustic drum kit. The analysis of two other Houston compositions throughout the decade, reflect a common trend; songs that express dance beats and increased tempos utilize electronic drums, whereas the slower power-ballads rely on the power and natural reverberation of the acoustic drums. While not the focus of this thesis, it can be assumed that Whitney Houston and her producer utilized the electronic drum when composing a pop song, competing with the likes of Madonna and Cyndi Lauper. They seemed to realize that the electronic percussion was indeed required –alongside other electronic devices such as synths and synth bass- in reproducing what can now be argued as the authentic sound of 1980s Pop music.

Significantly, the King of Pop Michael Jackson, incorporated table top devices as early as his 1982 album entitled *Thriller*. While the album does incorporate both electronic and acoustic percussion, there is no cut and paste reasoning for selecting acoustic or electronic. On the other hand, Cyndi Lauper relied heavily on electronic percussion. Few of Lauper's compositions feature acoustic percussion, perhaps leading to the question as to why her *Billboard* charts entries were superior throughout the 1980s to any following decade.

Although this thesis mainly focuses on pop music, we see that electronic percussion has also been present in other genres as well as performed by other percussionists. The following section will list some of the more accredited percussionists

in their respective genres throughout the 1980s. The following table will illustrate the genres, artist, and performers who accepted the integration of electronic percussion. The table will be useful in visualizing the impact that the instrument had towards music of the 1980s.

Other Genres Incorporating Electronic Percussion

Table 6: Genres, Artists, Percussionsts

GENRE	ARTIST	PERCUSSIONIST
Fusion	Chick Correa	Dave Weckl
	Frank Zappa	Terry Bozio
		Chad Wackermann
Rock	Kiss	Eric Carr
	Yes	Bill Bruford
	Rush	Neil Peart
	The Pretenders	Martin Chambers
	Emerson Lake and Palmer	Carl Palmer
	Van Halen	Alex Van Halen
	Queen	Roger Taylor
Progressive Metal	Saga	Steve Negus
Jazz	Herbie Hancock	Vinnie Colaiuta
	Educator	Akira Jimbo
Funk	Tower of Power	David Garibaldi

We may conclude that a review of the three first sections reveals a common reoccurring theme, namely that electronic percussion devices enable and bring new ideas to their respective musical genres. In other words, each module, regardless of the year of construction, provides musicians with beneficial, even critical advancements. 1980s depended on non-authentic sounding samples, performed by other instruments. The electronic percussion allowed composers the option of dispersing the performance of specialized sounds to other instruments rather than simply depending on the synth players. A systematic review of the evolution or history showcases the immense advancement of these products; however, in order to understand and appreciate the compositional advantages as well as the progression of popular music, we must distance ourselves from the present state. Examinations of music from the year 1984 and the percussions used cannot be evaluated by present technology. The advancements must be analyzed up to the year the composition was created; it remains the sole method in discovering and evaluating the importance of electronic percussion in music. The composer's, performers, or producers point of view must always supersede the knowledge of technology we have today; we must put ourselves in their mindset.

At this point it can also be understood that the evolution of electronic percussion provided and enabled both producers and composers to reach the characteristic sounds of eras in music. 1980's Pop music was characterized by space and electronic effects. A device such as the Synare provided artists with the necessary sounds which were key in creating a hit for that era. While causation for technological advancements can be twofold (desire for innovation versus a performers needs), chapters two and chapter three will further assess. The 1990s, on the contrary, showcases many artists working in

collaboration with acoustic drum companies, when designing percussions that answer their demands. The decade also highlights a transition back to authenticity which resulted in little demand for electronic drums. In order to understand this shift, a comparison between differences of acoustic versus electronic drum is necessary. The comparison, which is found at the beginning of chapter three, will discuss the technical characteristics and sonar results of both.

Chapter Two: Genre, Style, and Innovation

In order to understand musical progression and its relation to technological advancements, a definition of the term genre in comparison to the term style must be explored. This thesis does not intend to provide a clear cut definition for either term. The goal of this chapter is to explain the ways in which each term will be utilized throughout the thesis.

The following chapter is divided into three sections. The first part deals with the aforementioned ambiguity surrounding the use of the terms genre and style. The second part discusses the influence of politics, culture and society of the 1980s in the definition of genre and style. The third section depicts the specific percussive technological advancements responsible for Pop music sub-categorization, which will be useful in explaining the progression of technology as a major contributor.

In order to analyze the above concepts, the following three research methods will be applied throughout this chapter. The first will describe the sources pertinent to definition of genre versus style. The first case represents style as a subsidiary to genre, whereas the following views genre as lesser to style. Approaches to each definition will be identified (the primary can agree with the secondary definition and vice versa, the terms focus on the definitions and not necessarily an area of research). Articles by Allan Moore, Franco Fabbri, and Philip Tagg will express the initial standpoint, whereas a review of Leonard Meyer's article will focus on the latter and opposing approach. Lastly, the third methodology expresses the ideas found in articles from David Hesmondhalgh,

Will Shaw, Kevin Mattson, as well as André J. M. Prévos, and David Beer, clarifying the importance of political, societal, and cultural influences on the prior definitions.

Section One: Style and Genre: A Definition

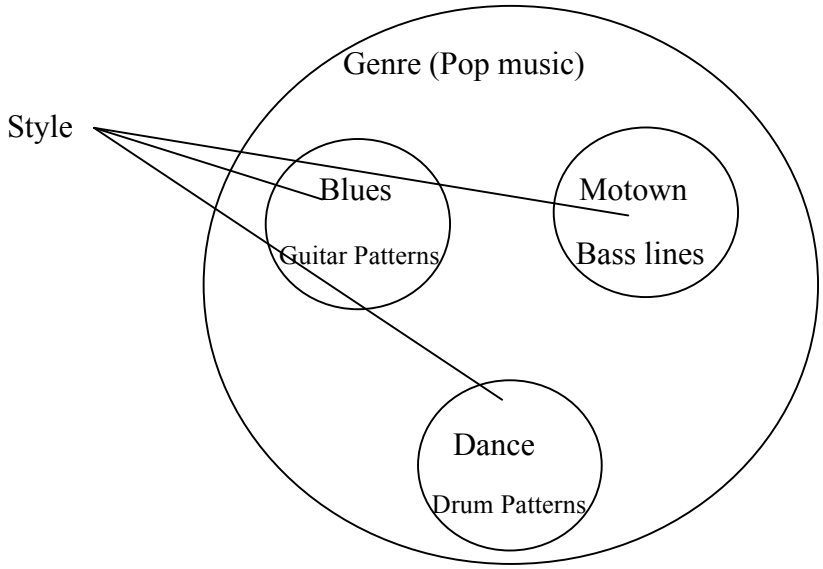
Primary Approach

The ongoing debate surrounding the differentiation between musical style and musical genre demonstrates multiple trains of thought. While this thesis does not attempt to validate any one author's ideas, the concept is important when speaking about sub-categories of music, musical artists, and performers. The proper use of either term does not facilitate nor does it alter the theories outlined in chapter three's case studies. However, in order to understand clearly the issues brought about by this thesis, as well as the utilization of a single term throughout this paper, the defining of both terms within popular music must be provided.

Genre versus Style

As both terms can be arguably interchanged without affecting the context of a given topic, the definitions provided illustrate importance, showcasing style as a subsidiary to genre. This chain of command can be better represented by the following Venn diagrams.

Figure 3: Theoretical Definition of Genre and Style

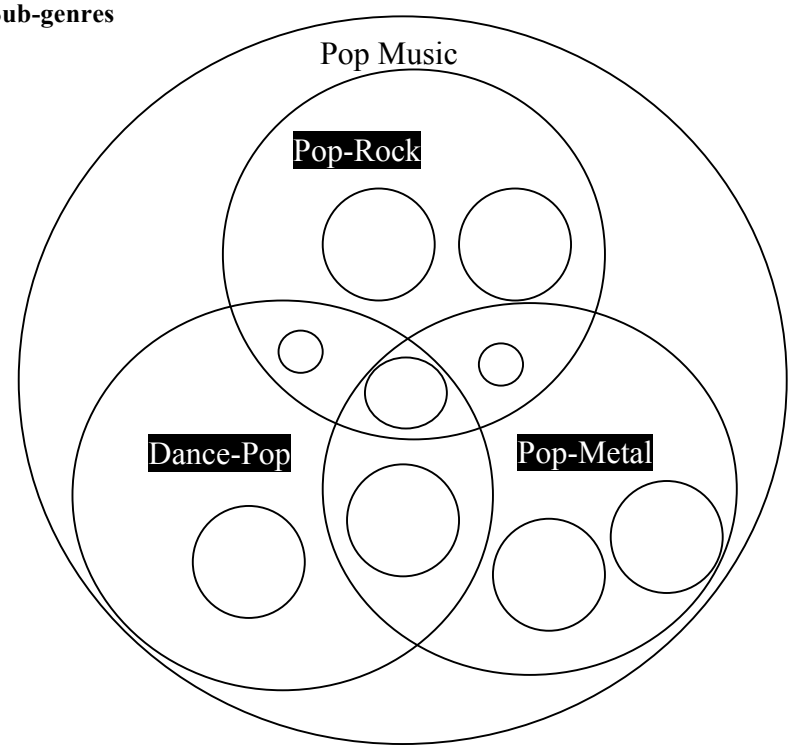


The definition expressed in this section will further be explained by examples from Moore, Fabbri, and Tagg. Genre defines a period of music (not to be confused with the period consisting of an antecedent and consequent, but rather an era in music, eg: The Classical Period). This period is defined by many stylistic traits which in return create the genre. The traits can encompass performance techniques, political, cultural, and societal attributes, as well as instrumentation (digital and analog) and recording processes. Figure 3 illustrates some of the performance characteristics. We can see how the genre supersedes style; however, genre cannot be determined without the presence of the specific characteristics of style. Throughout the remainder of this thesis, the discussion of the 1980s Pop music genre and the relation to electronic percussion will proceed with the identification of stylistic traits of said genre. Providing readers with a foundation surrounding the issues of genre and style prevents further misunderstandings; furthermore, it supports the ideas presented throughout the case studies in chapter three. Nevertheless, the idea must be explained at the sub-genre level. When a genre is created

by the coalescence of other genres and their respective stylistic properties, there emerges a saturation of characteristic properties not always providing harmony within the vast genre. Sub-genres are created by combining a sufficient number of given traits. The purpose of the sub-categorizing artists is deemed useful for marketing and tour line-ups.

When discussing sub-genres the figure is expanded to the following:

Figure 4: Explanation of Sub-genres



If we examine figure 4, we can see three instances of the first diagram within a larger area. This larger area represents genre –as it did in the first example- yet it encompasses sub-genres, each entailing common or specialized stylistic characteristics. Style as a subordinate to genre -illustrated by both examples- is shared by authors Moore, Fabbri, and Tagg's; superiority may present a viable definition for both terms.

The ideas described in Allan Moore's article "Categorical Conventions in Music Discourse: Style and Genre" will demonstrate his view of the matter; shedding light on the definitions provided above. The article is set up in three sections: introduction and definitions, examples and definitions of style, and the same structure for genre. He concludes that the utilization of either term is purely subjective. Moore believes "that both style and genre are terms concerned with ways of erecting categorical distinctions; of identifying similarity between different pieces (songs, objects, performances, and texts)."[44] The question remains whether these similarities exist on the same hierarchical level or whether some were subordinate to others.[45] Similarities are present between Moore's ideas and those previously presented. The ideas can be viewed in two ways: the subjectivity of a theorist or a musicologist. Moore argues that "the sharing of musical techniques (style) would perhaps encourage a musicologist to declare a similarity of style, while the distinction in subject matter calls attention to a difference of genre."[46] For example Heavy Metal music can be discussed as both a style as well as a genre, depending on the standpoint of the author.

Three assumptions can be explored in order to understand the ambiguity surrounding the differentiation of both terms. Firstly the music in question can have characteristics that pertain to both style and genre. The assumption is examined by the comparison between Heavy and White Metal music. Understanding that both share multiple characteristics (musical techniques, dress codes, and performance) does not result in a clear identification of Moore's primary assumption. However, the

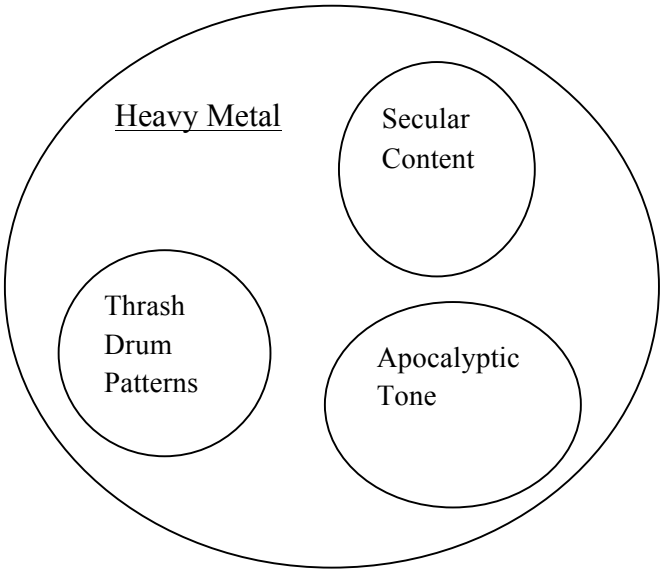
[44]Allan F. Moore. "Categorical Conventions in Music Discourse: Style and Genre," Music & Letters 82, no. 3 (August 2001): 432.

[45] Ibid.

[46] Ibid.

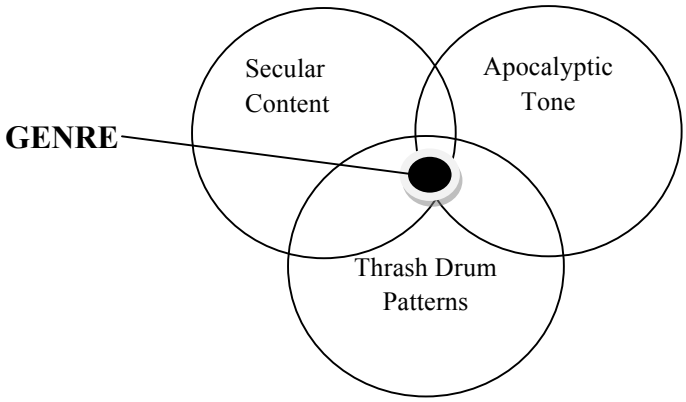
differentiation of subject matter and lyrics, similar to music of the common practice era, raises the debate about genre characteristics. Secondly, the music is both style and genre and one is subsidiary to the other.[47] The example of Heavy Metal as a specific sub-genre to Metal describes this second point. The scenario is presented by figure:

Figure 5: Subsidiaries



The primary approach argues, Heavy Metal (genre) creates the demand for specific characteristics whereas figure 6 below illustrates an opposing superiority theory.

Figure 6: Musicological Definition



[47] Ibid., 432.

Figure 6 illustrates genre as a result of the merger of stylistic characteristics; genre is therefore, the subordinate of style. The third assumption discussed in Moore's article refers to the primary issue concerning the definitions of both terms. There exists an argument which states that both terms have equal value and meaning; one can be interchanged with the other. Therefore, three possibilities must be examined: acceptance, rejection, and resolution of this argument. In the case of Moore, three links are described. First, both genre and style are of equal value, each enlightening similar content with different nuances. Second, style occupies a lesser importance in categorizing music, while the final option is that both terms have different areas of references.[48] Furthermore, the differences surrounding both genres (Heavy or White Metal) are examined throughout the article. These differences refute the validity of this final assumption.

Though "the use of style, as a manner of discourse, was prominent in the music of the Classical Period," the Pop culture examples provided by John Fiske, provide more relevance to this thesis.[49] These ideas highlight the visual lifestyle and political beliefs, or identity, of an artist; style is something to be appropriated.[50] Apart from the inevitable desire for self-identity, which is always evident throughout Pop music, Moore builds upon non theorized data presented by David Cope; musical style refers to the identifiable and specific characteristics of a composer's music, recognizable from one work to the next.[51]

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[48] Ibid., 433.
[49] Ibid., 434.
[50] Dick Hebdige, *Sub-Culture: The Meaning of Style* (London: Routledge, 1979), 87.
[51] Moore, "Categorical Conventions in Music Discourse: Style and Genre," 434.

Carl Dahlhaus declares "genre was defined primarily by a piece of music's function, its text, and its textures."[52] The concept of listening to a piece of music rather than stylistic characteristics is further expressed by Moore, drawing from theories of Nicholas Cook. Robert Walser also weighs in on the discussion of genre throughout his study of Heavy Metal. According to Walser "the purpose of a genre is to organize the reproduction of a particular ideology,"[53] in this case, white male performers tend to a social group of young men, by delivering a message concerning "the nature of masculinity."[54] "Genre is socially constituted, while stylistic traits are autonomous."[55] Moore's article focuses on the notion of superiority and although the definitions are subjective, he demonstrates the importance of the secondary approach: the societal, political, and cultural traits of style which in turn make up the genre, and the theoretical views expressed by Fabbri, Tagg, and Dahlhaus.

Franco Fabbri concludes in his article "A Theory of Musical Genres: Two Applications", that "genre is a set of musical events… whose course is governed by a definite set of sociably accepted rules."[56] Although the focus of his article is aimed towards the Italian *Canzone*, the examination of types of rules and the way they interact with the Italian song can be related to popular music; furthermore, the specific guidelines in identifying a genre, resemble the selection process which is to be found in chapter

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[52] Carl Dahlhaus, "New Music and the Problem of Musical Genre," in *Schoenberg and the New Music,* trans. Derrick Puffet & Alfred Clayton (New York: University of Cambridge Press, 1988), 33.

[53] Robert Walser, *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music* (Hanover: University Press of New England, 1993), 109.

[54] Ibid.

[55] Moore, "Categorical Conventions in Music Discourse: Style and Genre," 439.

[56] Franco Fabbri, "A Theory of Musical Genres: Two Applications," *Popular Music Perspectives* 1 (1982): 52.

three. Fabbri agrees that his definition may be questioned due to its broad nature; however, his solution evolves from the process of comparison. Similarly, Moore also utilized comparative methods when discussing genre and style. Fabbri explains that to resolve the problem of broadness is "to decide each time whether a certain set of musical events is being considered in relation to other opposing sets in which case they are called genres."[57] A common understanding amongst theorists and musicologists is there is no definite "to the point" proper analysis of genre and style. The decision is entirely subjective – given educative support- to the author's field of research. Fabbri believes that his idea of rules creates a "necessity for an interdisciplinary approach, and every custom, musical or not, amongst those forming a genre, is examined in the most appropriate theoretical tools."[58] The concept of hierarchy is also present in Fabbri's theory. Some rules, according to the author, are more important, while others are marginal or ignored. The specific rules or sets are as follows: Formal and Technical, Semiotic, Behavioural, Social and Ideological, Economic and Judicial, Musical Communities, Codification, and Competences. This thesis, however, will make use of the formal and technical, social, economic, and the notion of musical community.

Musicological literature has debated the definitions of genre and style, and through the formal and technical rules, the result is similar to the third assumption found in the previous article: genre, style, form become synonymous. The example provided in Fabbri's article illustrates the scientific confusion amongst readers and scholars, stating that ambiguities are due to over researching the topic. Simply put, one who enjoys the music and sees the big picture might be capable of identifying genre better than those

[57] Ibid., 52.
[58] Ibid., 53.

who try to tear it apart and examine music under the microscope. Fabbri expresses the idea by stating "that a record buying adolescent…has clearer ideas on musical genres than the musicologists who have made such a fuss about it."[59] In the case of a performer, his/her technique and formal training might aid in determining certain genres but not all.

However, the social sets or rules expressed in Fabbri's text do not simply define genre by criteria such as the acceptance and reaction by fans. The rules also examine the labour force of that genre, as well as age groups and social classes. By including the labour force to a set, the economic influences are thus examined in the following section of Fabbri's article. The concepts of society, culture, and economy will be further examined later in this chapter; however, the concept of the musical community is of great importance and examined solely – to his credit- by Fabbri in his article. This community of people is understood to be the people present throughout the musical event (real or possible) though not strictly relating to an audience. Fabbri explains that due to the hierarchy of rules, an audience is not necessarily required in order to acknowledge genre. Furthermore, the "unnecessary" audience relates to Fabbri's ideology indicating how something -in this case a pop song- might not be popular at first, though the growth of followers may occur with the growing appreciation for a piece of music. Although Fabbri describes these sets or rules in relation to the Italian "*canzone,*" similarities to Pop music characteristics can be seen.

According to a blog by Bill Lamb, some characteristics of Pop music include music that relates to a vast and unspecific population, verse to chorus structure, a length of 3 to 4 minutes, and the incorporation of a wide range of musical styles (referring to

[59]Ibid., 54.

figure 4). In Fabbri's article, the "*canzone*" mirrors pop music on many levels; these include duration, diverse structures, and the incorporation of many musical styles. Thus we may conclude that, the sets and rules described by Fabbri in order to identify the genre of the "*canzone*" can be utilized with other genres of music. Although the information presented in Fabbri's article provides a valid theory in defining genre, the arguments expressed in this thesis simply require the concept of superiority in order to defend the use of genre in the upcoming case studies.

The paradigm of sets and rules is enforced in Philipp Tagg's "Towards a Sign Typology of Music". In fact he directly sites Fabbri's work within his article. Tagg understands that music is ever-changing due to culture and semantics; therefore he postulates a similar ideology to Moore's article. Tagg, alongside Moore, realizes that adequate names and definitions must be determined, in order to differentiate between two terms which are so closely related. The example provided by Tagg clearly exemplifies style within genre stating that although the steel guitar sound of Country and Western music indicates the Country genre, on a lesser level it dictates a guitar style.[60] This represents yet again a authority which is present in both Fabbri and Moore's definitions.

An issue arises when attempting to decode style versus genre in a context outside of popular music studies. Moore continues by explaining how theorists and art historians utilize both terms when discussing classical music or romantic art. The basis for Moore's article is an attempt to combine the ideas of a wide range of scholars in their respective discipline. The objective is the closing of the gap between analysis and criticism relating

[60] Philip Tagg, "Towards a Sign Typology of Music," *Secondo convegno europeo di analisi musicale* (1992): 7.

to the differentiation between style and genre.[61] Although the focus of Moore's article is intriguing, the information relevant to this thesis is already provided. As previously stated, Fabbri, Tagg, and Meyer all agree on a system of superiority when discussing style and genre. The differences between the primary and secondary theories, arise when the discussion is separated between Pop music studies (the focus of this thesis) preferring genre rather than style.

Secondary Approach

The opposing view of Leonard Meyer is examined in Moore's article. Meyer situates genre as a subsidiary to style stating that "style is a replication of patterning, whether in human behavior or in the artifacts produced by human behavior, that results from a series of choices made within some set of constraints."[62] It can be argued that the constraints he is referring to is genre, relating to the previous diagram 1. Leonard Meyer's "Style and Music: Theory, History, and Ideology" provides definitions, examples, and rationale for musical style, thus avoiding any relation to genre and presenting what Moore explains is a musicological approach. However, similar to the previous authors, the concept of authority is present as well in Meyer's text. This supremacy is represented by the description of three specific layers for stylist analysis: laws, rules, and strategies. The superiority is subjective to a composer's preference. Although laws are defined in Meyer's article as absolutes, and therefore are not subject to change, the authority is preserved through the two remaining fields. Rules and strategies are subject to alterations. In the case of altering rules, Meyer provides the example of

[61] Moore, "Categorical Conventions in Music Discourse: Style and Genre," 434.

[62] Robert P. Morgan, "Style and Music: Theory, History, and Ideology by Leonard B. Meyer," *Music Perception: An Interdisciplinary Journal* 9, no.2 (winter 1991): 268.

Schoenberg's lenient use of common practice compositional rules when creating the twelve-tone system. However, composers such as Bach, Haydn, and Wagner would amend their strategies in order to accommodate the rules. The reasoning for laws, rules, and strategies enables the response to why certain traits are characteristic to a genre – or in Meyer's terms, a repertory.[63] Meyer describes his idea of patterning by classifying and identifying pieces of music which share many similar traits. These characteristics may include "melodic patterns, rhythmic grouping, harmonic progressions, textures, and timbres."[64] Although agreeing in some respects with a theorist approach when defining genre and style, the case studies found in chapter three of this thesis will focus on Meyer's identification of character traits; the ideology will be utilized for the sole purpose of selecting similar pieces of music for comparison.

In accordance with the ideas expressed, Pop music can be seen as a genre rather than a style - specifically a genre which encompasses stylistic traits. Characteristics such as the phonetic structure of a melody, the use of simple form structures, short songs, dance rhythms (disco, funk, upbeat), and the following of popular trends can all be distinguished as stylistic traits that create a genre. The phonetic structure examined in Keith Salley's article focuses on the phrasing and articulation of pop melodies, and the response of listeners. The same can be examined with guitar, bass, and drum styles of the genre. Guitar progressions are viewed by the rhythmic figures and chord progression. The more complex the chord progression the more complex the vocal line will be, moving away from the simplicity of popular "hooks" to the intricacy of jazz. Bass players are provided more freedom than the previous; roots of chords must be accented at the proper

[63] Ibid.
[64] Ibid.

beat. However, this idea can differ depending on the request of the producer and artist; chord extensions and walking bass lines are also present in pop.

Referring again to Moore's article, the idea of lyrical content creates classification and sub-categorization of music as genre or style. The article examines both White and Heavy Metal, but as seen, the same can be examined in Pop music. As we progress throughout this thesis, case studies analyzed in chapter three do not consider phonetic vocal melodies as decisive criteria for sub-categorization. Nor is lyrical content taken into account. The ideas expressed in Moore's article provide examples in determining his understanding of genre and style; melodies are not useful for this thesis view of the progression of Pop music in relation to technology. They do, however, offer criteria for musical revolution. Lyrical content of the late 1970s differed to that of the 1980s. Prior to understanding the reasoning behind the shift towards technological advancements, an understanding of popular culture – the political, societal, and cultural trends is necessary.

Popular Culture

Political

Much of Pop music derives from the search for self identity. The idea of self image precedes 1980 America; the movement can be found in 1975 Britain with a band called *The Sex Pistols* whose mission was to bring political awareness to the population and to rebel against the crown. The rebellious lyrical content presented by the Sex Pistols created a new genre of music: Punk Rock. This genre's main characteristics revolve around self identity; bad vocals and playability are of no concern as long as the message was received. Lack of rules in musical content relates to self identification. Bernard Holland examines the superficial styles and nihilistic antics of these so-called rebels as

methods of self identification. Artists of the 1980s such as Michael Jackson, Whitney Houston, Madonna, Cyndi Lauper, Boy George, and Nik Kershaw share the same need for self identity; however, in addition to their identification through personal style, music, and fashion, their messages were more of peace, love, sex, and narcotics. The political aspects surrounding 1970s music was also apparent with artists of the1980s, yet their goal was to test what was socially acceptable, to push the societal boundaries. This decade also witnessed an international repression of human rights and an economic recession affecting business and politics as well. The U.S. under Ronald Reagan's conservative administration, aided tycoons such as Donald Trump and Bill Gates to escape the crash of the stock exchange, and to profit from the population's technological desire. Kevin Mattison states that

> "Reagan's ideas of deregulation and supply-side economics started to villainize government and placed the unfettered corporation at the center of political power and legitimacy (while at the same time corporations underwent a massive process of vertical integration and mergers). But Reagan was more than a political leader. In his own way, Reagan sought not only to re-empower the private corporation but also to make this effort part of a new cultural era for America."[65]

Mattison believes that Corporate America was in control of the U.S. government throughout the 1980s. If so, an ironic struggle is happening throughout the music industry, yet the results are harmonious. As the demands of musicians for electronic instruments was rising (empowering

[65] Kevin Mattson, "Did Punk Matter?: Analyzing the Practices of a Youth Subculture During the 1980s, *American Studies* 42, no. 1 (Spring 2001): 78.

Corporate America), the search for self-identity and the revolting of said tycoons by musicians of the decade was also increasing.

Societal

As expressed in chapter one, the rise of the Simmons drum company was due to the high request for digital sounding percussion, representing sounds that responded to societal demands. The company expanded alongside the evolution of technology, desktop computers, advanced synthesizers, and guitar effects. Although a British company servicing the needs of English and American performers, the need for electronic percussion does expand to other countries. The countries accepting the new electronic devices were following similar social trends found in the U.S. and U.K. such as appearance, attitude, and identity. Pop music's main characteristic is following current societal trends, and while popular in the U.S and England, it did influence styles of rap music, and pop culture of other countries. André J. M. Prévos's article *The Evolution of French Rap Music and Hip Hop Culture in the 1980s and 1990s* examines rap music in France. Prévos states that though the trend was innovative in France, the "groups featured in Rapattitudes, the spark which started the rap explosion in France, clearly show that they borrowed heavily from their American counter-parts and models."[66] Pop music was also ever-evolving in Poland, the Orient, and Hispanic countries. Examining the international evolution of Pop music relates to its American roots, simplifying the area of research in this thesis. Due to the success of Pop music emerging from the U.S. and England, which was then imitated in other countries, focusing on the evolution of

[66] André J. M. Prévos, "The Evolution of French Rap Music and Hip Hop Culture in the 1980s and 1990s," *The French Review* 69, no. 5 (Apr., 1996): 716.

American and British pop music will, in turn, reflect the development of this genre in other countries.

Cultural

Perhaps the most culturally influential aspect in music of the 1980s is the visual affects of music videos resulting in the rise of MTV. The era of visual marketing has surpassed the notion for virtuosity, present in the 1970s. Will Straw supports this notion by stating that "music videos have made 'image' more important than the experience of music itself, with effects which were to be feared (for example, the potential difficulties for artists with poor 'images', the risk that theatricality and spectacle would take precedence over intrinsically 'musical' values, etc.)."[67] Furthermore "music videos would result in a diminishing of the interpretative liberty of the individual music listener, who would now have visual or narrative interpretations of song lyrics imposed on him/her, in what would amount to a semantic and affective impoverishment of the popular music experience."[68] Straw's article focuses on the effect of music videos in Rock music; however, the outcome is similar in Pop music. Chapter three will discuss the importance of *Billboard*`s chart. Songs were charted by air-play, video demands, and record sales; therefore, it can be stated that the information provided by Straw (concerning Rock music) is also relevant to Pop music because the songs follow the same charting criteria.

Both genres possessed similar qualities, yet attracted different persons. The Rock artists of the 1970s were viewed as musical Gods- the Jimmy Page's, Ian Paice's, Ozzy Osbourne's, and Neil Peart's- because of their talent. Music videos and MTV throughout

[67] Will Straw, "Music Video in Its Contexts: Popular Music and Post-Modernism in the 1980s," *Popular Music* 7, no. 3 (October 1988): 247.

[68] Ibid., 247.

the 1980s presented Rock artists as sex symbols confirming Straw's argument that image is worth more than talent. Music culture also changed due to the "new pop music mainstream in North America in the years 1982-83."[69] This mainstream was built on guidelines or characteristics; a formula for success. The main characteristics were songs of 3 to 5 minutes in length, dance rhythms (disco and R&B), and rock idioms (distorted guitars, synthesizers, some Rock artists utilized electronic percussion). The similarities in fashion between Pop and Rock artists were also similar: big hair, flashy torn clothing, and excessive jewellery. Straw explains that the issue of 1970s music culture was an artist's turnaround time. A successful album would be present on *Billboard's* chart for approximately 2 years; meanwhile the act would tour and write the following album. Although this might seem normal, the demographic which was purchasing albums (12-34)[70] was aging. The creation of music videos widened the age gap and provided the audience with visual musical stimulation which had not been present in the 1970s. This marketing strategy by record companies provided new trends and role models for fans, as well as increasing sales of instruments (odd-shaped guitars and electronic percussions due to their modernized looks) and merchandise. Corporate America controlled politics, created trends, and changed Pop music culture.

The relation between the political, societal, and cultural aspects of Pop music and electronic percussion can be briefly summarized as follows. The Reagan era in politics provided support to industries. Industries of the decade were focusing on technological advancements which coincides with the creation and evolution of electronic percussion. As for society, the demand for new and innovative sounds reflected the bizarre non-drum

[69] Ibid., 248.
[70] Ibid., 249.

sounding effects produced by electronic percussions of the time. Finally the cultural movement towards music videos placed a lot of stress on the image of a group or artist. As previously discussed, the search for self-identity and the testing of boundaries by artists such as Madonna, Def Leppard, Cyndi Lauper, and Boy George, presented a company such as Simmons with the challenge to create a visually impressive drum. The example of Simmons SDS-7 a futuristic non-traditional drum is shown in the appendix.

Though Moore's definition of genre will be utilized throughout the remainder of this thesis, stating that a piece of music is classified under a certain genre, necessitates guidelines. While this thesis is not aimed towards identifying which 1980s composition belongs to which genre, tools must be utilized in order to select pop songs-and their sub-genres- for analysis. Music is listed in charts, and no other chart was as reputable in the U.S in the 1980s as *Billboard* charts were; therefore the following chapter will use information available through the charts archives to determine genre and sub-genre classification.

Section Two: The Innovations

Technology

Chapter one presented the history of electronic percussion (modules, pads, cymbals, processors, etc). Chapter three will begin with a detailed description of the sonar qualities of acoustic percussions -focusing on components and assembly- to understand the aural differences between both spectrums of percussions. Prior to the discussion, a recap of the technological evolutions experienced by the *Pollard*, *Moog*, and *Simmons* electronic devices is required. As stated in the previous chapter, understanding why certain percussions were utilized requires us to place ourselves within the mind

frame of a producer of that era. We cannot begin to understand what was available then if we simply remain knowledgeable about today's technology; rather we must be able to broaden our mindset. Table 7 briefly describes the groundbreaking electronic percussive devices and some sonar qualities of each which will be compared to the acoustic qualities presented in chapter three. A direct link will also be made between the technologies below and the results of the case studies also found in the upcoming chapter.

Table 7: Technological Advancements

Year	Product and Technology	Impact on music
1973	**Moog 1130:** • Activated through the use of an external modular Moog analog synthesizer. • Provided sounds controlled mainly by synthesizer, with adjustments to scale and sensitivity on board.	• The unit is a single self contained drum with the trigger control on the inside. • It can produce drum sounds layered with the effect currently selected on the synthesizer. • The capability of performing digital sounding percussive effects as well as musical tones creates the possibility of producing either spatial or melodic sounding effects other than the typical synthesizer.
1976	**Pollard Syndrum:** • The first creation of a drum module that is not powered by a synthesizer. • It also consists of four drum pads which are controlled by individual channels of the module.	• The major impact on music was the creation of traditional electronic sounds such as: Spacesound,' 'Laser,' 'Bird Call' and 'Backwards Tom', and most important, 'Sweeping Doom', a sound which signifies electronic percussion, and can still be heard in present recordings. • The Syndrum provided

		drummers with sounds incapable of being produced by acoustic drums.
1980	**Simmons SDS-3:** • Marks the first mass produced electronic drum module. • Supplied with 4 channels, each supporting separate filters for click, decay, bend, pitch and noise, as discussed in chapter one.	• The 1980s introduced many technological advancements in music; in recording processes as well, thus creating recorded music. • As explained in the previous chapter Simmons relied on its capability of producing drums that sound somewhat like drums but with effects integrated. • The other advantage to the company's current and future drums was the lack of tuning issues and what that meant to recording.
1981	**Simmons SDS-V:** • Technology is similar to its predecessor, however, offering more channels as well as interchangeable channels.	• The addition of more pads, marketed the SDS-V as the world's first fully functional drum set; due in part by the new creation of a kick drum. • The main influence on music is the long awaited transition from acoustic drums with some electronic devices to a fully electronic drum. • The transition facilitated the recording process. • The advantage of recording electronic percussion will be explained later.
1983	**Simmons SDS-7:**	• The primary innovation was the expandable module due to the introduction of EPROM cards.

		• Although the sounds were superior to its predecessor, the SDS-7 flourished in live performances rather than recording sessions
1985	**Simmons SDS-9:**	• Featuring free-floating heads and a rim shot on the snare drum, the SDS-9 acknowledged the abilities of acoustic percussions with the desired space sounds provided from electronic drums. • The module also introduced onboard saving capabilities which were perfected in the successor model. • It also featured the first ever MIDI sequencer, which could alter the sounds provided by an external MIDI device. • An external footswitch could switch between banks of preset drum kits, efficiently and effectively. • Although the circuitry was still analog, the presence of a second skin function for the toms, would reproduce the authentic sound and response of a double-headed tom.
1988	**Simmons SDX:**	• Apart from the on board capabilities (described in chapter 1) the SDX provided the zone intelligent pads which would produce real time dynamics throughout a live recording or performance. • Previous models were dynamically challenged;

		therefore they could not reproduce the intensity present with acoustic drums. • Ballads could now incorporate electronic drums without the constant volume adjustment.
1989	**Simmons SDS-2000:**	• The technology found within the module laid the foundation for present models. • The adjustable tuning, reverb, and MIDI settings provided drummers as well as artists with the wide array of percussive effects and digital sounds.

Table 7 indicates the recording of drum tracks was less strenuous due to the integration of advanced technology. The advancements facilitated recording by eliminating the arduous and time consuming process of recording acoustic percussion. Firstly, immense amounts of time required for the setup of acoustic drums would affect studio time and price. Acoustic percussions entail patience and devotion from a sound engineer, contrary to electronic percussions. For example, when recording acoustic drums the microphone placement must be accounted for alongside line checks, securing a constant level throughout each track. Also, sound checking -assuring a decent sounding and tuned drum, gating and compressing- is necessary to prevent the track from distorting or “clipping”, which can, at times, be heard in final products if not dealt with initially. Finally, the editing and mixing process calls for hours of work; however, both acoustic and electronic percussions call for this vital task. The process requires a sound technician,

or engineer, to apply the proper amounts of effects (reverb, chorus, echo, etc.) to each track, and also to adjust volume controls for said tracks. When recording drums or percussion, each track represents an individual component of the drum kit. Furthermore, each channel must be cut in several places in order to prevent track bleeding, when a drum is picked up in another drum's microphone. Throughout the 1980s the use of analog or 2 inch tape presented the technician with many hours of mixing and editing, a process that is much more efficient with the digital recording processes of today's studios. Although, the brief explanation concerning the process for recording acoustic drums does not truly represent the strenuous work, it does cast an overview of the process which can easily be compared to the recording of electronic percussions.

The recording of electronic drums not only saves an artist time and money, it facilitates the sound technician's job. Throughout the 1980s the demand for anything innovative, eccentric, and effective propelled instrument manufacturers to release products which would respond to the demands of artists. Although these products were not cost efficient, the performances and recordings in turn would be. Figure 10 in the appendix is the Simmons SDS-3 module, and as we now know, it did not support an entire drum kit setup. What can be seen in the rear view of the module is the individual outputs of each channel, a feature which would be present throughout the core of electronic drums and percussions. These analog outputs send each track individually to the main console for recording. No need for microphone placement and track editing, since the only concern is volume controls, which can be managed by the drum module or the main board. However, musicians such as Phil Collins, preferred the sound of highly

processed acoustic drums- a process that requires many effects and parameters in order to obtain a sound similar to an electronic drum.

We must now address the question of what these electronic drums did for music?

This question can be answered simply by looking at the evolution of the product. Testimonials from Roland and Yamaha artists claim that their new innovations provide close-to-exact feel and stick reaction, a wide variety of near to authentic sounds, volume controls for live performances or practice sessions, and on board recording possibilities. However, we must examine these claims critically since these features reflect the technology of today and not necessarily the state of the technology then.

Electronic percussion exploded simply because it was new and innovative in a time where producers and artists wanted to move away from what was the rock era of the 1970s. Whether or not the production of new electronic devices sounded good or not, the idea was to utilize the sounds of the most recent inventions. Some effects that were popularized throughout the decade were dive-bombs and explosion effects, pads and leads, and pink noise. Effects which were enhanced through digital processors are reverbs, chorus, octave doublers, delays and decays, as well as harmonizers, phase shifters and flangers. Through the use of electronic percussion – encompassing the above mentioned effects- a trademark, exclusive to the 1980s pop music, was created. Artists and producers would utilize the production of the electronic percussion in order to produce more enticing dance beats than those of the disco era, in return promoting new music, new sounds, and ideally distancing the 1980s Pop music from the predecessor which was the 1970s.

Conclusion

To conclude, the primary definition of genre and style will be useful in the following chapter in regard to the upcoming case studies. It will become evident that the stylistic characteristics, alongside a new and innovative theory developed through thousands of transcriptions, facilitated the selection process, which in turn dictated the primary criteria for genre sub-categorization. The idea of sub-categorization and its benefits for the integration of electronic percussion influences on pop music will further be demonstrated and explained in chapter three. Moore and Fabbri's ideology of a hierarchy will shed light on the theories developed throughout the following chapter. Furthermore, the theories in the next chapter will also relate to the detailed analysis of the technological advancements which occurred throughout the 1980s as illustrated in the table in section two of this chapter. Not only are we attempting to identify the main criteria for sub-genre differentiation, but this in turn will prove the importance of electronic percussion to Pop music. An understanding of what technological advancements were present and the influence on recording techniques is required.

This chapter presented a balanced examination of style versus genre (in order to remain consistent with word association and definition) without the attempt of providing a definition for either. The description of the political, societal, and cultural activities of the 1980s explains causation for innovation. Finally, the chapter enumerates the specific and innovative advancements undertaken by the *Simmons Company*, establishing a clear time frame as to when an innovative device was created and its benefits. The two focal sections of this chapter present the necessary information required for the studies found in

chapter three. Firstly, by providing a possible but not exact definition to an ongoing ambiguity, the stylistic characteristics analyzed from one piece to the next can clearly be identified. Secondly, the identification of major technological benefits will provide reasoning for both the move from acoustic to electronic as well as the utilization of certain sounds. These sounds will be further analyzed alongside chapter three`s description of acoustic percussion`s sonar qualities providing an aural comparison of the features found in both types of percussion. These factors will aid in understanding the significant relationship between the creations of certain pop tunes and the emergence of specific technologies.

Chapter Three: The Theory and the Studies

The importance of electronic percussion in the evolution of 1980s recorded music is relatively unacknowledged in musicology. The term 'Pop' was used by musicologists as a substitute for 'popular', implying disposability and inferiority.[71] However, according to Chris Rojek, "by definition pop is a well-liked genre…pop is more well liked than many examples of…popular forms."[72] Rojek clearly defines the four main characteristics of pop music: general appeal, light entertainment, commercial imperatives, and personal identification. The following chapter will utilize these characteristics as well as other criteria (stylistic traits) to aid in the identification of Pop sub-genres. Sub-genres promote identities within a larger, generic group; the higher the number of sub-genres results in more pronounced development of a genre. However, the existence of many sub-genres should provoke curiosity. Furthermore, the classification of different sub-genres within musical charting schemas, should give rise to an investigation as to the how and the why these sub-genres exist. This chapter will attempt to identify a major contributor for sub-genre classification with a view to understanding the progression of 1980s Pop music as a result of percussion styles as well as the crucial influence of electronic percussion on this music.

The chapter is divided into six main sections. The opening section discusses Pop drumming as a result of the stylistic properties from other genres. The influential characteristics of basic Afro-Cuban, Blues, Rock, and Funk percussion patterns, which

[71] Chris Rojek, *Popular Music, Popular Culture,* Los Angeles: Sage, 2011, 1.
[72] Ibid., 1-2.

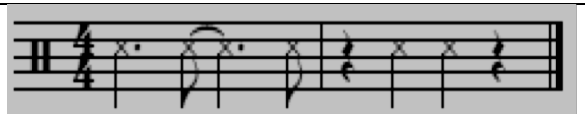
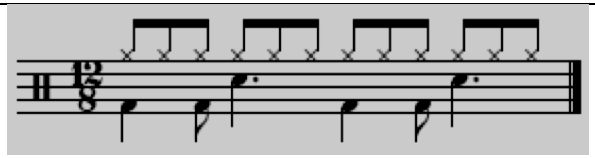
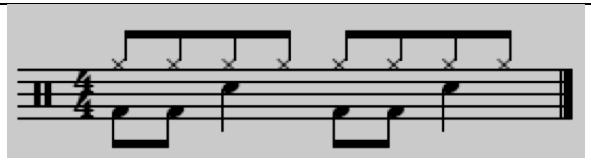
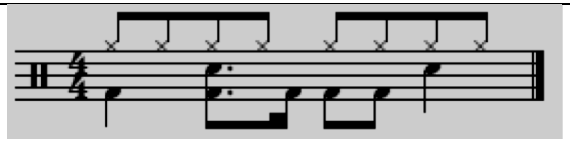
are illustrated in table 8, will provide a viable link to the drum partitions of famous 1980s Pop songs. Examining the characteristics of these drum patterns will provide causation, resulting from the fusing of many stylistic traits. Understanding these partitions will provide further background information concerning sub-genre classification which will be useful for the upcoming case studies. The second section will consider the technicalities of acoustic percussion. This discussion should provide readers with a basic understanding of the aural differences between electronic and acoustic percussion. Chapter two talks about the characteristics of Pop music and the percussions used were the result of self-identity and drums that no longer sound like drums. This section will provide reinforcement to that argument by explaining the differences between both percussions. Shell composition, cymbal manufacturing, skin balancing, and tuning are areas which will be compared to the options available within electronic percussions throughout the 1980s. Furthermore, the recording aspects such as equalizing, microphone placement, and quantizing of both percussion types will be examined. The third section of this chapter will demonstrate the methodologies utilized throughout the case studies. Dave Calton's Hook Theory and *Billboard's* archives are the two main databases referred to by my theory. Presented in two separate sub-sections, the parameters of the selection and comparison processes are thoroughly explained. An analysis of Bob Marley's *No Woman No* Cry and Cindarella's *Don't Know what you Got* are utilized in order to demonstrate the selection process. Although the examples used in this section do not reflect the case studies of this thesis, they are useful in defining the areas of the study. The fourth section entails the three case studies which will demonstrate the importance of electronic percussion, rather than acoustic, in 1980s Pop music. Each case study will

examine different instances within Pop music where the use of electronic versus acoustic percussion occurred. The first cases study compares two songs which were composed and released at nearly the same time. The second case study evaluates two songs which were released in two separate decades, and the final case study examines the use of one drum opposed to the other within the same band. Each will conclude that the electronic percussion was a major contributor to the band's *Billboard* classification. The fifth section will pool the results of the case studies and provide a generalized statement concerning the importance of electronic percussion on Pop music of the 1980s. The term "crossing over" will also be discussed as well as causation for the development of the technologies of electronic percussion. Ultimately a grand conclusion of the chapter will amass all the data concerning the evolution of Pop music of the 1980s due to the integration of electronic percussion.

Pop Drumming and Influential Patterns

The characteristics of 1980s pop drumming are subjective to the drummers' performing. However, an overall examination of similarities can categorize drumming patterns into various stylistic groups. Drum patterns are a fusion of many styles and genres. The professional drummer will flourish within a very saturated industry by virtue of his/her knowledge of many styles and genres. The most prominent styles consist of Afro-Cuban, Jazz, Rock, Metal, Funk, Blues or Shuffle, and Gospel or Hip Hop. However, much of pop drumming is an extension of the meshing of the following stylistic categories: Afro-Cuban, Blues, Rock, and Funk. In the case of 1980s pop music, each drummer would utilize his/her previous knowledge of these patterns in order to best suit the music at hand, thus achieving the characteristics which make up the genre. Table 8 will serve as a model to illustrate genres which are influential to the creation of drum patterns according to specific 1980s pop tunes; the transcriptions will reflect both patterns from the authentic to their integration into 1980s pop songs. The following cases can commonly be found in their respective genres and styles; however, there are exceptional cases which might fuse other styles together. The table illustrates the skeletal patterns common in music.

Table 8: Percussive Elements

Style	Transcription	Explanation
Afro-Cuban	 Transcribed from the percussion pattern present in Gloria Estefan's 1989 *Billboard Hot 100* hit "The Rhythm is Gonna Get You."	The Clave is the primary rhythmic pulse in Afro-Cuban music. Characteristics of Afro-Cuban percussion consist of the combination of many rhythmic pulses such as the Timbao, clave, cascara to name a few. The hierarchical rhythmic figure which liberates percussionists to improvise over a piece is the clave.
Blues (shuffle) or 12/8 pattern	 Michael Jackson's 1987 hit "The Way You Make Me Feel."	This traditional 12/8 blues drum pattern can be found on songs such as Jimi Hendrix's "Red House", and Blues legend Stevie Ray Vaughan's "Wall of Denial". The accenting of beats 2 and 4 provide the rhythmic stability for improvisers. The bass drum pattern mirrors the rhythmic figures of the bass, providing more support. The drummer's role here is to provide a clear layout of the 12-bar blues pattern; as a result, there may be a lack of ambiguity between the form and soloist.
Rock	 Def Leppard's pop-rock hit "Pour Some Sugar on Me."	Influenced from the Blues and Funk drumming, most rock drumming utilizes the accented snare strokes on beats 2 and 4. The bass drum patterns will always be subject to change; dependency is on the bass lines and the rhythmic figures performed by the bass player. This main characteristic can be found in songs such as "Paradise City" from Guns n' Roses, with some alteration to the bass drum pattern, and Valen Halen "Jump."
Funk	 Kool and the Gang's 1982 hit "Steppin' Out."	The Funk drum patterns share similarities to Rock and the Blues, also encompassing the strong 2 and 4 on the snare drum. However, the bass drum patterns tend to be more intricate than the previous 2 styles. They do not need to necessarily replicate the bass line but do tend to accent important punches found within bass lines. This exact pattern can be found on rock tracks such as Aerosmith's "Walk this Way," and authentic 1970s funk tunes such as Brother Johnson's "Get the Funk out of my Face."

Beginning with the Afro-Cuban rhythms, the famous Miami Sound Machine Orchestra, which accompanies international Latin-pop artist Gloria Estefan, respects its cultural roots presenting authentic Cuban rhythms within its pop arrangements. The percussion section, throughout the 1980s especially, utilized electronic triggers and samples to perform these rhythms, thereby bridging the gap between a native style of drumming and the percussions used in an ever-growing genre. This example demonstrates both the evolution of Pop music through a sub-genre which is Latin-Pop and through the utilization of electronics which aid in adapting without sacrificing these authentic rhythms to better fit with current trends.

As for the Blues, much of its characteristics –such as form, scales, harmonic progressions, and lyrical content- are present in much of rock and pop music; drum patterns are no different. Michael Jackson's song features a traditional 12/8 pattern; a time signature which throughout the 1980s was preferred for up-tempo pieces as well as pop ballads. Although an argument can be made for the use of influential material versus pure creativity, John Robison's drum track on the song bridged the historical work song (representing Jackson's roots) to 1980s Pop; furthermore the use of electronic parameters and drums properly situated the song atop *Billboard's Hot* charts. There is no formula for creating a 12/8 pattern; the options are near-endless. Yet the perfect representation of a blues drum pattern – similar to Jimi Hendrix, Wes Montgomery, and B.B King- performed on an electronic or programmed drum, surely indicate change and evolution on the grounds of composition and innovation. The Blues can also encompass swung eighth-notes; this is a characteristic drawn from Jazz, which will be discussed further throughout the chapter. The 1980s *Billboard* charts consisted of both top 40 Pop artists as well as

Rock bands and unlike the 1970s – where disco was the popular music, and Classic Rock considered satanic rituals- Rock music would also surpass much of Pop, leading to the consideration that Rock music was not as loud as the previous decade, or that Pop was getting louder. Regardless of the response, Rock music, different to both the 1970s and 1990s, infiltrated the pop realm. Rock was the live version of Pop, whereas Pop was a recorded music.

The case studies which follow, as well as the genre characteristics discussed in chapter two, will establish the characteristics responsible for the ever-growing popularity of rock bands throughout the decade. However, main characteristics of rock drumming must be analyzed in order to make better sense of the material to come. The table above features a transcription of a very common drum pattern which is often used in Rock. Drummers would simplify bass drum patterns in order to accent downbeats, mirror bass players' rhythmic figures, and time cymbal hits with downbeats, intensifying a section change or a specific punch. There are still instances where rock drummers will perform highly intricate drum parts. One example would be Neil Peart of the Canadian progressive Rock band *Rush* and Alex Van Halen of *Van Halen*. This thesis draws examples from rock bands that would eventually be sub-categorized as Pop though not those which remained true to their genre. As the following case studies will prove, the vast majority of the Rock acts, which were sub-categorized as Pop-Rock, evolved due to electronic percussion. However, an overview of the 1980s Pop genre at the present time will also indicate that these drum patterns would become the norm in Pop music due to their simplicity and efficiency, resulting in evolution primarily because of the innovative

nature of electronic drums, followed by the acceptance of both these devices and the nature of the drum beats.

Ultimately, Funk drum patterns, such as the pattern from Kool and the Gang's drummer, have roots in Fusion (Jazz and Rock), Pop, and Gospel. Therefore, the cyclical snare strokes on beats 2 and 4, which are apparent in Rock, is a concept that can be traced back to Funk and Disco music, and even further back to the Blues. The link between Funk drum patterns and Pop music can be seen in many songs such as: *Walk This Way* from Aerosmith and *Smooth Criminal* from Michael Jackson. Both acts have been labelled as either strictly Pop (including R&B), or a sub-genre of Pop. The drum pattern also consists of intricate bass drum patterns due to the technical Motown nature of the bass lines.

The examples provided in table 8 will give further insight as to the drumming patterns transcribed from the upcoming case studies. The information concerning these beats, as well as, more importantly, the technical evolution, will provide both a cause for sub-genre differentiation and a link between previous decades. The result will suggest a template for the evolution of Pop music. Therefore, specific guidelines have been created in order to select songs that share audible similarities, despite the fact that they have been categorized differently.

Acoustic Percussion

As discussed in both previous chapters, the desire for authentic sounding instruments throughout most of 1980s Pop is second to the unique tones produced by electronic percussions. One might ask, what are the specific aural differences between acoustic and electronic percussions? Furthermore, if digital parameters trigger the sound of an electronic module, what technology affects acoustic percussions? Chapter one discusses the electrical parameters (potentiometers, EPROM, MIDI, etc.) culpable for reproducing digital sounds. Whereas, this section will provide information concerning the craftsmanship and technology found in acoustic percussions. The information found in this chapter will represent the knowledge I have obtained over the many years I have worked within the industry as a touring musician and a drum technician. Drum companies such as Pearl, Tama, Gretsch, and DW, alongside the cymbal companies Paiste, Sabian, and Zildjian each execute a different method for ideal construction of percussions, as they each have different patents on allotted materials. Fortunately, working as a technician presented me the opportunity to work and examine each company's method of fabricating percussions.

Acoustic drums, unlike electronic devices, are made up of a frame, hardware, and skins. Cymbals are primarily constructed of copper, tin, and silver. The three following subsections will focus on the sonar qualities of shell composition, drum skins, and cymbal construction. Ultimately, the section will outline a comparison between the aural properties of electronic percussion (including its technology) and acoustic percussion. Comparing the two will offer some insight on what each percussion presents in terms of

sound, as well as why one supersedes the other in any given genre. Furthermore, differentiating between both percussions draws upon sound as well as practicality, which relates directly to the upcoming third case study.

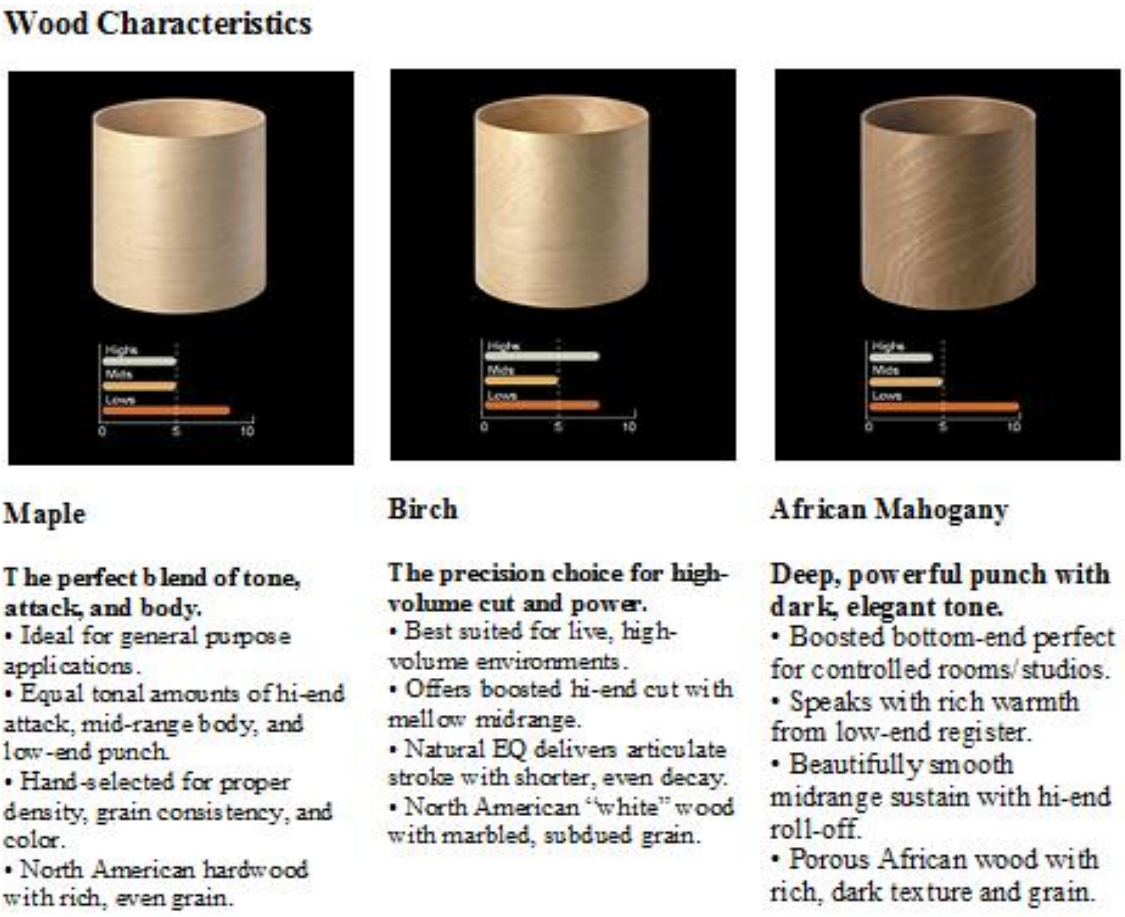
The frame of a drum is made of wood, fibreglass, steel, brass, and aluminium. Defining frame construction is a discussion that can equate to the length of this thesis. The sonar quality of acoustic percussions results from the number of plies (layered sheets of wood), the compression rate of those plies, stave drums (built like a barrel), solid shell, wood mixture, bearing edges, diameter and depth, and lacquer or wrap finish. While each of these components does affect sound, the discussion of frame (or shell) composition will be limited to woods utilized and shell thickness, with a view of their sonar characteristics.[73] The woods selected for the creation of shells range from Poplar, Oak, Bubinga, Mahogany, Maple, Birch, and Beech, each providing different tonal qualities specific to a performers needs. For the purpose of this section Maple, Birch and African Mahogany -representing the three most utilized woods- will be examined. Figure 7 displays some sonar parameters of Maple, Birch, and Mahogany. It also suggests the range of frequencies (highs, mids, and lows) and the wood that best represents. What can be summarized from this figure is the following,

> "Maple is an excellent choice for general purpose applications due to its smooth, warm, well rounded tone, with equal amounts of hi-end attack and mid-range body and an excellent low-end punch. Birch is known for its "naturally EQ'ed sound" that offers slightly boosted hi-end

[73] However, for further information concerning bearing edges and hardware see Pearl Drum, "Bearing Edge," *Pearl Drum,* Accessed July 16, 2014, http://pearldrum.com/products/kits/drumsets/masterworks/#bearing-edge. And Pearl Drum, "Drum Hardware," *Pearl Drum,* Accessed July 16, 2014, http://pearldrum.com/products/kits/drumsets/masterworks/#drum-hardware

> frequencies, a smooth, mellow mid-range and a deep low-end presence and is a great choice for any applications that require extra presence and cut. African Mahogany is the ideal choice when maximum warmth and low frequencies are a priority."[74]

Figure 7 Shell Construction [75]



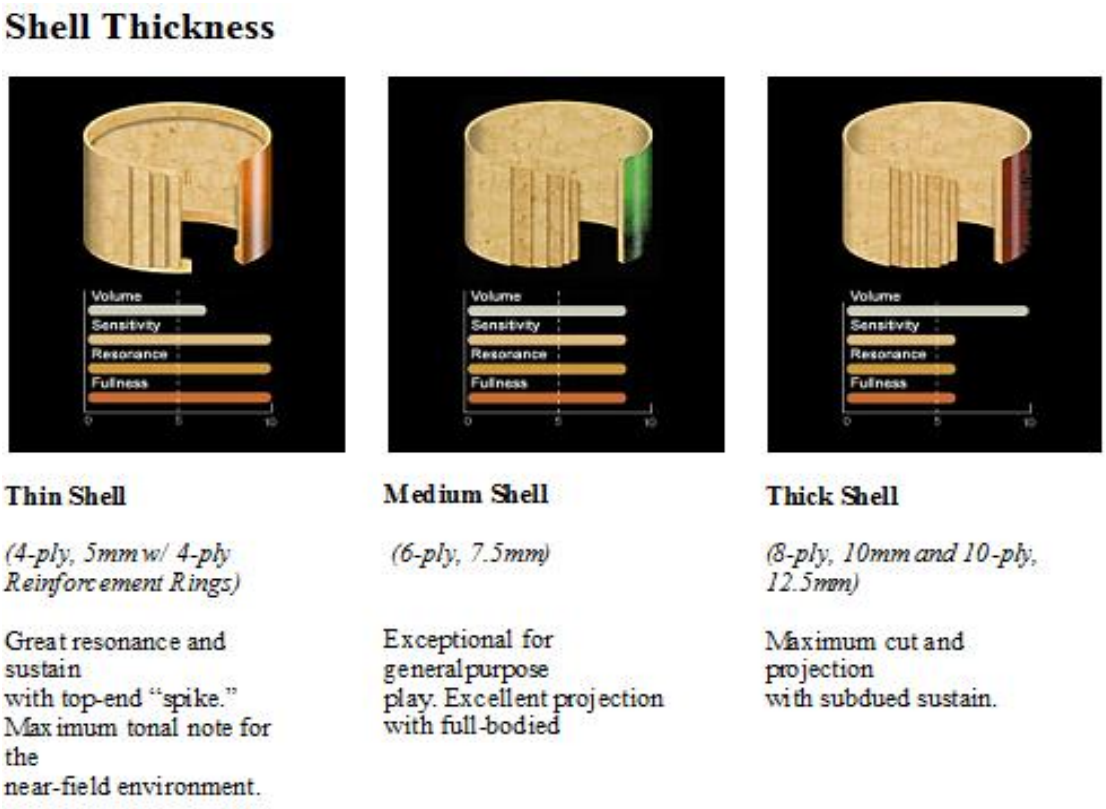
Each type of shell construction is suited for a specific sound, for example a metal drummer will benefit more from a Birch drum rather than a Mahogany drum, due to the tightness of the wood grain resulting in an increase of power which aids in "cutting through" the distortion guitars. The next step in shell construction is the thickness of each drum. The *Pearl Drum Company* prefers thicker shells for larger size percussions and

[74] Pearl Drum, "Wood Choices," *Pearl Drum*, Accessed July 16, 2014. http://pearldrum.com/products/kits/drumsets/masterworks/#wood-choices.

[75] Ibid.

thinner shells for smaller sized drums. Figure 8 illustrates the three types of shell thicknesses available for mass produced drums; custom drums and snare drums do not follow the same criteria. The “thin shell drums offer great resonance and maximum tone that can be most appreciated in near-field applications. Thick shells are extremely "efficient" and provide ultimate volume and projection. These drums are ideal for any application requiring high sound pressure levels with maximum cut. Medium thickness shells offer a very good compromise between volume and resonance and are ideal for general purpose applications.”[76]

Figure 8 Shell Thickness[77]



[76] Pearl Drum, “Shell,” *Pearl Drum*, Accessed July 16, 2014, http://pearldrum.com/products/kits/drumsets/masterworks/#shell.

[77] Ibid.

The thin shells are better suited Birch wood. The equalizing nature of the wood permits more resonance, therefore, creating thin shell Birch percussions, produces the ideal instrument for live performances which entail close microphone placement. The overtones projected by Birch drums are weak in comparison to Maple wood. They are, however, more controlled, therefore, can be altered by audio technology in order to project more power. Medium thickness shells are popular for all qualities of percussions. From beginner level to the expert class, 6 ply percussions provide good sounding and durable instruments. However, incorporated with a premium Maple, the medium shell now produces well balanced and powerful overtones; ideally used in studio situations and large venues. Thicker shells work well with the African Mahogany as well as larger sized drums. They produce darker tones which are well-suited for bass drums, gong drums, and floor toms.

Second only to shell composition, both drum skins (or drum heads) and drum tuning greatly affect the tone of a drum. Tuning drums is an art form which requires years of training to properly understand how to properly torque a drum head. In addition to this talent, understanding what drum skins to match to a specific shell in order to obtain a desired sound requires years of practice as well. The *Evans Drumheads Company* (or simply *Evans)* classifies drum heads in four categories: drum set, marching/corps, concert, and world. Each category corresponds to a different percussion group, resulting in different materials used as well as tuning methods. Table 9 discusses the composition of drum skins, as well as tips on tuning and tech talk. All that should be understood from this sub-section on drum skins is the texture and practicality; the response they have when struck.

Table 9 *Evans* Drum Skins[78]

Drumhead Anatomy

Ply
Drumheads are typically constructed from either one or two plies, or individual sheets, of material. A single-ply drumhead, while less durable than a two-ply head, will respond quickly at a wide range of dynamics and resonate freely. A two-ply drumhead will typically be more durable than a single-ply head. In addition to greater durability, two-ply heads offer an increase in the amount of audible attack and often a shorter sustain.

Finish
The finish of the drumhead is most often thought of purely from an aesthetic point of view, though there are often sonic characteristics that go hand-in-hand with specific finishes. Coated or Frosted finishes are said to add warmth to the tone of the heads, whereas uncoated heads tend to have more definition or attack. Coated batter heads also offer a texture that is ideal for brushes. Though most people use clear reso-side (bottom side) heads, the use of a head with some form of coating will further reduce overtones and result in a warmer sound.

Tips for Achieving a Great Sound

Head Choice
Choosing the right head is the first step to achieving a great sound with your drums. Rather than choosing whatever drumhead is available and then adding duct tape, gels or stickers to modify the sound, explore the options for drumheads that have overtone control built in. If you're a heavy hitter, explore the two-ply options available. If aesthetics are important, be sure to research the variety of finishes available.

Tuning
Before playing your drums, in practice or in performance, be sure to make sure that your drums are all in tune. When making adjustments to the tension of a head, be sure always to tune up to the desired tension, rather than tuning down. If you wish to lower the tension of a head, de-tension the rods below the desired amount, and then tune up to pitch.

Drumhead Terms

Most drumheads have three similar design features regardless of size, construction or intended use;

Flesh Hoop
The aluminum channel that holds the film and comes in direct contact with the counter hoop of the drum. The channel is filled with a durable epoxy to hold the film securely in place.

Collar
The portion of the drumhead between the flesh hoop and the playing surface. The collar is easily identified by the slope at the edge of the playing surface.

Playing Surface
The contact area of the drumhead. This space is where sticks/brushes/alternative sound sources will come in contact with the head. This is also the portion of the head that resonates when struck.

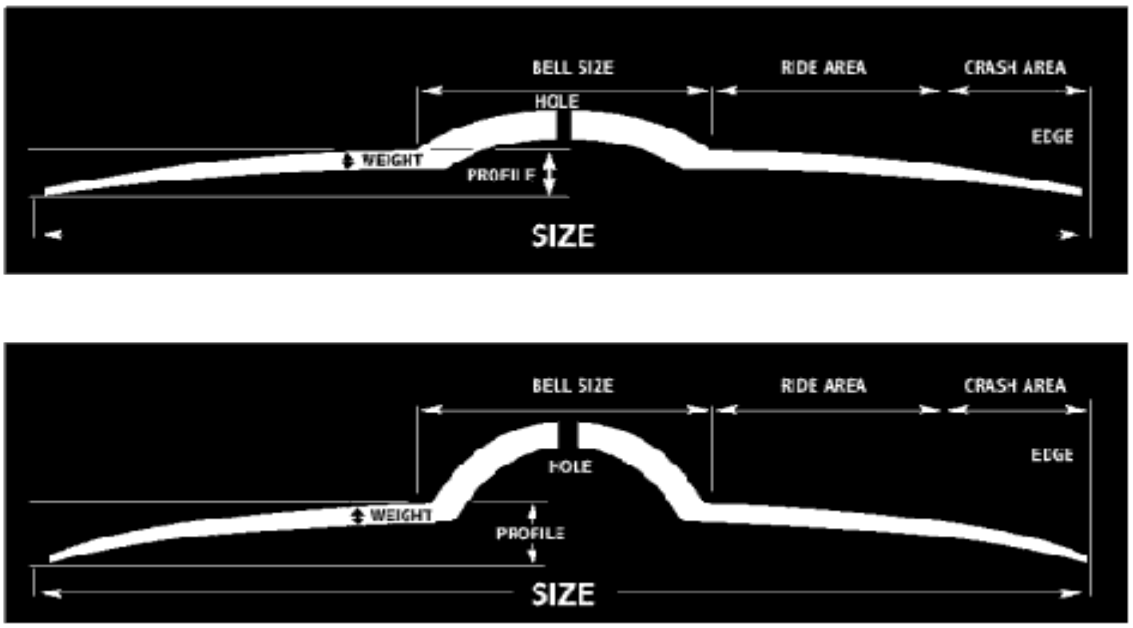
The most popular accessory to percussion is the cymbal family which entails crashes, rides, hi-hats, and accent cymbals. The crashes are thin cymbals which are found anywhere between thirteen to twenty inches in diameter. They do not have very large center bells and their sound grooves are very close to one another. Depending on the intonation of the crash (bright or dark) the cymbals natural decay or reverberation is respectively shorter or longer; another effect that is most common with crashes is the

[78] Evans Drumheads, "Snare Batter," *Evans Drumheads*, Accessed July 16, 2014, http://www.evansdrumheads.com/EvDrumsetSnareBatter.Page?ActiveId=3589.

choke effect, this is when a performer strikes the cymbal and quickly catches the cymbal avoiding any excess vibrations. The ride cymbal tends to be thicker than a crash cymbal and varies between twenty to twenty-four inches in diameter. It entails a large, thick bell which can be utilized for accents. The hi-hats (discussed in chapter one) encompass two opposing cymbals of equal diameters. In most hi-hats, the bottom cymbal is thick than the top, this provides easy playability (the hi-hats are placed on a pulley system, one cymbal is fixed in one position while the other moves up and down producing the open-closed effect). Furthermore, accent cymbals come in all shapes and sizes. The goal of these accessories is to produce “thrashing” sounds (metal upon metal, or tin garbage can effect).

Each cymbal begins as a cast of tin, copper, and silver, which is heated to into its shape. The master cymbal maker then needs to etch the cymbal (the process of creating sound grooves) prior to undergoing the process of cymbal tuning. These steps can be done in two ways depending on the price and quality of the cymbal. If the metal is of higher silver concentration, the cymbal has a higher valuation; therefore, the master cymbal maker will produce the entire cymbal by hand. If the cast is of higher copper and tin concentration, the cymbal is of lesser value and the process is continued by the use of specific machinery. The sonar differences between crashes, rides, hi-hats, and accent cymbals are represented by *Sabian Cymbals,* discussing the anatomy of cymbals in four categories: bell size, weight, profile and size as seen in table 10. Following the illustration is a brief definition of each category and the implications towards the sound.

Table 10 Cymbals[79]



"Bell Size

Cymbals with larger bells generally produce more overtones and greater volume than cymbals with smaller bells.

Weight

Weight greatly affects the volume, articulation, and overall sound and power of a cymbal. Thinner models respond fastest (vibrations move through the metal faster) and produce fuller sounds. Thinner crashes are explosive and full sounding. The sound of thinner rides is more tone than stick articulation. Thinner models are best suited for light to moderate volumes. Heavier models respond with bigger, louder sounds. Crashes have more attack and penetration, while hi-hats and rides have increased stick articulation, so the strokes you play are clearer. Medium weight models offer the most versatility, though mixing weights may be your answer to a great sounding set-up.

[79] Sabian, "Anatomy of a Cymbal," *Sabian*, Accessed July 16, 2014, http://sabian.com/en/pages/anatomy-of-a-cymbal.

> If you are playing hard and loud, medium to heavy weights are recommended. These are thicker, more durable cymbals designed to perform in louder situations. Heavier Cymbals = Increased Volume, Longer Sustain, and Higher Pitch.

Profile

> As the profile becomes higher, so does the pitch. Low pitch sounds blend with the music. High pitch sounds are more cutting and better for louder playing. Higher Profile = Higher Pitch, Brighter Response, and Increased Cut.

Size

> Larger cymbals generally have more volume, longer sustain and slower response than smaller cymbals. Bigger Cymbals = Increased Volume, Longer Sustain, and Bigger Sound."[80]

As previously discussed, the definitions provide a basis concerning the implications of shell composition, skins and tuning, and cymbals to the aural parameters of acoustic percussion. It must be understood that the technicalities of acoustic percussion and sound far exceed the explanations given. However, for the purpose of comparing acoustic and electronic percussion, the supplied information of this section, alongside the descriptions of chapter one is deemed sufficient. It has been stated in chapter one that the shell construction of electronic percussions consists of rubber or Kevlar pads, which did not produce any sounds unless they were connected to the drum module. The drum sounds encompassed within the module reproduce a mesh of drum sound effects (see table 1 on page 17). Acoustic drums cannot replicate these digital sounds; however, the natural projection of acoustic drums (produced by the circulating of sound waves within the drum), is not emulated by the technological advancements of the 1980s. When an acoustic percussion is struck there is an immediate chain reaction of sound that occurs. It

[80] Ibid.

begins with the sound of the stick (or hand) hitting the skin called the “attack” that produces a vibration, which resonates through the drum rim producing a wood to steel sound. This sound wave then travels through the body of the shell and rotates within that shell. The thinner the shell the more space there is within the drum which equates to more highs and volume; the opposite occurs with thicker shells, producing more punch and less volume. The pads of 1980s electronic percussions are hard, impacting playability and causing injuries. Furthermore, the natural rebound of a stick to a skin is less emphasized and exaggerated than that generated by rubber pads. Other sonar differences, such as cymbal reaction time, are more apparent on recordings. This is due to the magnitude of digital parameters applied to acoustic drum recordings. The 1980s can be identified as the decade which exhausted the use of reverb. The effect can be heard on many Rock recordings, specifically to snare drum tracks; narrowing the aural distance between electronic and acoustic drums. However, no amount of digital processes can replace the natural tone of cymbals. The main difference between electronic and acoustic cymbals can be heard by the emulation and replication of an acoustic hi-hat. Electronic percussions of the 1980s do not comprise of dual triggers, therefore, they cannot properly duplicate the motion of opening and closing a hi-hat. An acoustic hi-hat has multiple positions, each providing more or less air between the cymbals, which can be heard in recordings. Hypothetically, if a performer utilizes the hi-hat in six different positions, each one can be distinguished from the other. Due to the lack in technology of the 1980s, electronic hi-hats consisted on a rubber pad to strike, a foot-switch which activated the open hi-hat sound, and wires that connect the pad and foot-switch to the module. At best, the electronic percussion can reproduce a closed and open hi-hat sound. Most drummers

substitute the digital for the authentic, in order to perform the hi-hat in multiple positions. This statement might cause some confusion with the third case study and Rick Allen's accident. The case study states that his transition to electronic percussion is a major reason as to the bands change in *Billboard's* categorization. Yet, this section implies that drummers would incorporate acoustic cymbals to their electronic devices. Although this may be true in most cases, Rick Allen utilized foot-pedals to perform the hi-hats, snare, and to activate pre-recorded drum fills. Another advantage to acoustic cymbals is the ability to choke the cymbal. This function is not yet available on modules of the 1980s and can only be found as of the V-Drum era of the late 1990s. The innovation occurs at the time when performers are transitioning back to acoustic percussions, and the electronic percussion industry sales plummet, forcing companies such as *Roland* and *Yamaha* to produce technological advancements which do not hinder performance.

The recording of both acoustic and electronic devices undergoes similar treatments, such as editing (eliminating any background noise), quantizing (snapping the drum track to the metronome and making sure the performer is on beat), mixing (applying reverb, delays, etc.), and mastering (adjusting track volumes for the final product). Whichever alterations are done to percussion in studio, producers will always strive to release a product that fits the era in music. One might say that the acoustic percussions present many more advantages than the opposition, while that may ring true for some performers, 1980s Pop is about self-identity and innovation and less concern on the authenticity or playability of the instrument.

Classification Theory and Guidelines

The theory presented in this chapter is established in two ways. The first half presents a method in selecting songs which are similar in compositional aspects, yet categorized as different sub-genres of 1980s Pop music. This is the paradigm that derives from the "I've heard that before" experience which can be defined by Dave Carlton's Hook Theory. This generalized theory must adhere to specific guidelines in order to become a successful tool for selecting pieces for comparison. Determining if two pieces are analogous is dependent on multiple characteristics such as harmony, melody, time signatures, bass lines, and for the purpose of this paper, similar drum partitions; instrumentation and performance is a key sub-category in each. Discrepancies between both songs will be determined as relevant or non relevant to the study, always with the objective of comparison through compatibility. The second half of this theory is the comparison between the songs selected by the first half of this theory, trying to establish the reason or instrument responsible for the genre categorization. These rules derive from a process of elimination, resulting in the identification of the primary cause of sub-genre differentiation. Both parts of the theory are set into tables, focusing on the differences through the elimination of similarities. For the purpose of this paper the theory will be aimed at songs that share similarities but differ in regard to acoustic versus electronic percussion. The goal is to demonstrate how 1980s Pop music evolved and was classified as a result of percussions used. Ambiguities concerning genre classification remain due to the subjectivity of the listener; therefore, a credible method of cataloguing compositions is required. Companies such as *Billboard Music* and *U.S.A Top 100* were charts

specializing in the sorting of sub-genres.[81] A proper understanding regarding the criteria of *Billboard's* charts – including the *Hot 100*- will demonstrate the array of musical genres which are selected to make up this charting system.

The *Hot 100* is a U.S weekly singles chart that primarily focuses on air-time and sales. The songs most preferred by the listeners would make the list, ironically playing along the cultural and societal characteristics of genre. John Covach discusses the idea of stylistic crossover in his article "Jazz-Rock? Rock-Jazz? Stylistic Crossover in Late 1970's American Progressive Rock". He explains "crossover refers to the marketing of recordings as reflected by charts published in music industry magazines, and especially *Billboard*."[82] He adds that chart crossover is not a reliable indicator of musical style, moreover, a record can be linked to multiple charts and still be labelled a certain genre. This idea will reappear in case study three with the discussion of Def Leppard's genre identification; however, this idea can be argued due to many parameters which will be discussed further in the chapter. Other *Billboard* charts are divided into categories which reflect genre, overall popularity, and geographical or international settings. Pop music – the genre which this thesis is concerned with- encompasses three exclusive charts in addition to being present in all the overall popularity charts of the *Hot 100, Independent and Catalogue Albums,* and *On-Demand Songs*. The three exclusive charts which make up the Pop song category are *Pop Songs, Adult Contemporary,* and *Adult Pop Songs*. Charts which focus on albums of any genre and sales are the *Billboard 200* and the

[81] For the purpose of this thesis all chart entries and song classifications will be cited from the archives found at *Billboard Music*.

[82] John Covach, "Jazz-Rock? Rock Jazz? Stylistic Crossover in Late-1970s American Progressive Rock," *Expressions in Pop-Rock Music* (New York: Garland, 2000), 113.

Mainstream charts; furthermore, many artists were also featured on the UK's *Top 40* chart. Each of these charts undergoes treatment by the Nielsen Broadcast Data System in order to categorize properly each sale of a song or album. The data compiled by Billboard, BDM charts, *AllMusic* and *Rolling Stone* reviews, alongside the characteristics of genre and its relation to sub-genre, as previously discussed, will provide the categorisation terminology which properly represents the songs and artists who will be analyzed throughout these case studies.

Selecting Songs

How can one select songs for comparison, and where should one begin? Dave Carlton's repertoire of over 1300 popular music songs is a great resource.[83] His Hook Theory is a mathematical standpoint demonstrating the probability, through percentages, of the upcoming chord. With each changing chord a new bank of song titles appears, each supporting the same harmonic configuration. Searching for songs that were suspected of plagiarism as well as remakes of older songs may present the most similarities between two pieces of music; these remakes cannot be categorized under the same specific sub-genre. Transcriptions can be done of songs that demonstrate the previous idea of "I've heard that before," and of multiple songs by the same composer. Regardless of how the selections were done, the process which they will undergo is the same.

[83] For further information concerning Dave Carlton's Hook Theory please visit Christopher Sutton. "Learn music theory the fun way with Hooktheory," *Easy Ear Training*, Accessed January 13, 2014 http://www.easyeartraining.com/learn/learn-music-theory-the-fun-way-with-hooktheory.

First Half of Theory (Selection Process)

Firstly, the repertoire selection process (are they similar enough for part 2) in which the theory can be applied is dependent on specific factors. The pieces must have a combination of similar:

Primary
- -Harmonic progressions
  - Modality (chord extensions and chord colouring)
  - Rhythmic performance chords
- - Time signatures or perfect subdivisions of each other (¾ in place of 9/8)
- - Analogous drum partitions

Contrary to common practice, melodies as well as bass lines, when comparing 1980s Pop music, are of lesser importance to this first section; therefore, at this time, they will be considered as non-relevant. The following table illustrates the areas which must be analyzed. In order to proceed to the second half of the theory, all the areas must by filled in on this chart. Similarities will be eliminated leaving the differences to be examined further. If the majority of the fields are uncommon, proceeding to the second part is not useful and inconclusive; 2/3 of the areas examined must share similarities.

Table 11: Selection Process

Title and Artist	Song 1	Song 2
Harmony		

Modality Performance		
Time signature		
Drum Partitions		
Comparable?		

Harmony

The first characteristic which must be looked at is harmony or better yet, pop harmony. Although theorists such as Adorno believe "that for the expert listener …popular music should be uninteresting,"[84] a study conducted by Allan Moore, in the article "Patterns of Harmony," illustrates how Pop music harmony is an important determinant in distinguishing rock from pop.[85] Moore focuses on the lack of investigation of the progressions of Pop harmony in comparison to rock and soul music. While the study of Pop music harmony does impact the selection process of this thesis, it does not require further explanation of Moore's ideas; simply the understanding of the importance of Pop harmony suffices. The main points to grasp from Moore's article are the four

[84] Moore, "Categorical Conventions in Music Discourse: Style and Genre," 73.
[85] Ibid.

methods in which harmony can move (static, step, a third, or a fourth) and the cyclical or repeated nature of harmonic progressions.[86]

In genres such as jazz and fusion, the dense harmonic vocabulary (maj7, min7, min7b5, aug7, dim7, etc.), superior use of chord extensions (6^{th}, 7^{th}, 9^{th}, 11^{th}, $\#11^{th}$, 13^{th}), and advanced progressions (II, V, I- backdoor resolutions- Coltrane's Matrix, etc.) present issues which must be considered while juxtaposing two compositions. The vast selection of possibilities, due to the large number of chords with different extensions, provides multiple avenues for originality. Therefore relating or possibly even identifying two or more compositions through similar harmonic progressions may not be possible. Pop music harmony, however, relies on fewer chord voicings and extensions, condensing the number of harmonic options. With a limited choice of chords, Pop music composers have been known to "recycle" progressions from their own repertoire and those of others. The famous I- V- iv- IV major progression can be found in various compositions. Other genres (excluding jazz and fusion) encompass tunes composed from this harmonic figure, songs such as: A ha's "Take on Me," Bob Marley's "No Woman No Cry," and Cinderella's "Don't know what you Got". These three songs are classified as Pop music yet are sub-categorized as separate stylistic entities; each piece differs as a result of unique characteristics (modality, performance, and groove or drum partition) found in each sub-genre. Substitutions for this progression are the I-V-vi- ii, I-V7-vi-ii7, and the most famous I-VI-III-VII7 minor progression. The reutilization of progressions is not a sign of uneducated harmony, nor does it demonstrate a lack of musicianship. Quite the contrary; composers create simpler harmonies with a view to promote catchier melodies

[86] Ibid., 77.

(hooks) an essential factor in creating memorable songs. The phenomenon known as recycling is helpful when attempting to select tunes for assessment.

Table 12: Selection Process (Harmony)

Title and Artist	Song X	Song Y
Harmony	G, D, em, C	G, D, em, C
Modality	N/A	N/A
Performance	N/A	N/A
Time signature	N/A	N/A
Drum Partitions	N/A	N/A
Comparable?	Inconclusive	Inconclusive

Explaining how two or more pieces can be harmonically compared establishes the possibility of elimination required by the theory. Table 12 illustrates songs x and y sharing similar harmonic figures (I, V, iv, IV) yet without an examination of modal colouring or performance elimination caused by the similar context of chords they cannot undergo comparison. Furthermore, the following two areas (time signatures and drum

partitions) have not been analyzed; therefore, the reading does not present any variations and is deemed inconclusive. Results must indicate that two songs are closely enough related to produce accurate findings in the latter half of the theory.

According to Dave Carlton, professor at UC Berkley and creator of Hook Theory, there are a number of songs that have similar harmonic progressions due to the limited number of possibilities which are aurally acceptable. The enquiry returns to the idea of recycling specific chord progressions. Carlton developed his theory as reasoning of musical déjà-vu or the question, why a given song sounds familiar? This is the "where have I heard this before" response. His theory focuses on the harmonic analysis of 1300 pop songs narrowing in on: the frequency of chords in a given key, the probability and percentages of the following chord in any given progression, the modes in which the compositions are based, the common patterns found in Pop music, the preferred progressions, and an interactive computer program illustrating his results. The information gained is directed towards Pop music and is not applied to other genres such as Classical or Jazz.[87] Similar to this thesis, the article's data encompasses Pop songs ranked within *Billboard's Hot 100* chart. Harmony remains the primary source when searching for comparable songs. However, it is dependent on modality and performance.

Modality and Performance

Modality appears often in music, from the rock music of Led Zeppelin, the progressive music of Peter Gabriel, the pop rock entity of Heuy Lewis and the News, even the popular sound of Michael Jackson. Modes such as the Mixolydian, Dorian,

[87] Christopher Sutton. "Learn music theory the fun way with Hooktheory," *Easy Ear Training*, Accessed January 13, 2014 http://www.easyeartraining.com/learn/learn-music-theory-the-fun-way-with-hooktheory.

Aoelian, and at times Lydian scales can be useful when composing Pop music. Throughout the 1980s many artists began playing with modal colouring, Pop music would adopt these characteristics. Tunes such as Nik Kershaw's *The Riddle* would modulate keys and modes through chromatic passages within the same section providing an alternate view of Pop sounding music. The following table illustrates the relationship between chord extensions and the modes from which they derive. Each mode is situated on a different scale degree of a certain scale, in this case the C major scale. The table also demonstrates the harmonic function of these chords and the relevance in determining modes. Maj7 chords occur on scale degrees 1 and 4, min7 chords on 2, 3, and 6; while the intervallic construction of these chords seems identical, they promote different modal colouring.

Table 13: Modes

Key of C major (0 #'s)	Mode	Harmonic function
Scale Degree 1	(**Ionian**) scale (C-D-E-F-G-A-B-C)	Cmaj7, C6, C
Scale Degree 2	The D **Dorian** mode (D-E-F-G-A-B-C-D)	***ii minor 7 chord in the corresponding key*** (Dm7).
Scale Degree 3	The E **Phrygian** mode (E-F-G-A-B-C-D-E)	***iii minor 7 chord in the corresponding key*** (Em7).
Scale Degree 4	The F **Lydian** mode (F-G-A-B-C-D-E-F)	***IV major 7 chord in the corresponding key***(Fmaj7).

Scale Degree 5	The G **Mixolydian** mode (G-A-B-C-D-E-F-G)	***V dominant 7 chord in the corresponding key*** (G7).
Scale Degree 6	The A **Aeolian** mode (A-B-C-D-E-F-G-A)	***vi minor 7 chord in the corresponding key*** (Am7).
Scale Degree 7	The B **Locrian** mode (B-C-D-E-F-G-A-B)	***vii minor 7 flat 5 chord in the corresponding key*** (Bm7^{b}5).

The harmony produced by these scales presents new harmonic variations on simpler chord progressions. Searching for songs is not facilitated just by two similar modal configurations. As previously discussed, Marley's *No Woman No Cry* and Cinderella's *Don't know what you Got,* share similar harmonic and modal characteristics, but differ in genre classification. If a comparison were to be done of these two pieces, the results would be inconclusive. Discrepancies may result from style, groove, chord extensions, and vocal timbre.

Table 14: Selection Process (Modality)

Title and Artist	Song X	Song Y
Harmony	G6 (G major triad with an added scale degree 6, D7, em, C,	G, D, em, C,
Modality	Ionian, Mixolydian (this mode will be utilized when soloing over dom7 chords	Ionian, and other possibilities

Performance	N/A	N/A
Time signature	N/A	N/A
Drum Partitions	N/A	N/A
Comparable?	Inconclusive	Inconclusive

Also songs that differ in modal harmony are not impossible to compare, as will be demonstrated later in this chapter. If the harmonic progression is altered solely by modal colouring, and not affected by any other areas of comparison, a positive reading can still be done. Table 14 shows a song with progression of G6, D7, em, C, and the piece in comparison has G, D, em, C. While differing in modality, the harmonic colouring alone is not enough of a factor to alter the songs' classification.

Chord extensions alone do not distinguish genre; however, performance along with extensions might lean towards a favourable style. In the occurrence of two songs with unique rhythmic (or comping) patterns, style is now in question. In Marley versus Cinderella (table 15) both are composed from the I-V-vi-IV progression (in the keys of C major and A major respectively). At the surface the variance is caused by the performances of these chords. The swinging or "chucking" of the chords, characteristic of

reggae music, creates a conflict with the open straight accompaniment found in the opposing composition. If this was the sole difference between both pieces, the second half of this paradigm would be applied, determining the main factor for *Billboard's* categorization. Seeing how all areas of this primary section have not yet been observed, the readings would still be inconclusive.

Table 15: Selection Process (Performance)

Title and Artist	Bob Marley "No Woman No Cry"	Cinderella "Don't Know what you got"
Harmony	C, G/B, am, F (main riff)	A, E, f#m, D,
Modality	Ionian	Ionian, Aeolian
Performance	Reggae, chucking (guitar and organ)	Bar Chords, Straight strumming. (guitar and piano)
Time signature	N/A	N/A
Drum Partitions	N/A	N/A
Comparable?	Inconclusive	Inconclusive

In the case of swing rhythms, similar characteristics found in funk or jazz pieces, categorization results from differences of genres and the theory is not applicable. Albeit both songs (table 16) were to perform identical rhythmic patterns, similar chord extensions, and common harmony, allocation cannot yet be distinguished. Similarities become eradicated, creating a need for a more in-depth analysis of the remaining areas.

However, if there still exist several questions the theory fails, concluding that the two pieces are non-comparable. Not enough similarities can be found for comparison or to explain their different genre classification.

Time Signatures

Although relevant to the selection process, diversity between time signatures can occur but under strict guidelines. Remakes of songs at times can undergo time alterations, either from 4/4 to ¾, 5/4, 7/8, and even 12/8. When selecting pieces to analyze it is most helpful to search for similar time signatures or subdivisions. A piece which is in 4/4 time would be best compared to a similar song with a 2/4, 4/4, or 12/8 time signature. In each of these events a composer can opt out of adding or subtracting chords when covering another artist's song, keeping the harmonic progression in its original state. When dealing with two songs which are not remakes from one another, the rate of chord appearances may differ within the same time signature. These tunes might entail four chords in any given measure; the aim is to select a piece of music that mirrors these occurrences. In an eight-measure section with 4/4 time one piece might use one bar as a turn-around back to the top of the piece whereas another composer might stretch each chord to a bar's length, altering the rate of occurrences. Ambiguities when dealing with time signatures are common, especially with subdivisions. The option for more chord appearances is less probable in a piece with 4/4 time than one in 12/8. Time signatures can sometimes suggest style and composition. Throughout the 1980s and 1990s, ballads would more commonly than not be composed in compound meters (6/8, 9/8, 12/8). Therefore, a comparison between a straight pop song and a pop ballad can still be done, providing the rate of occurrences is similar. However, time signatures alone do not determine style;

other characteristics must be present for categorization to occur. Another determining factor is the way time signatures are dealt with by the performers. There is no one way to perform any given time signature. For that reason, the groove of a piece of music derives from specific characteristics which shape the genre. This thesis will focus on the percussionists' view and performance of the tunes brought into question.

Drum Partitions

The final required area concerns itself with the percussionist's partitions. As previously discussed, no two songs encompass identical drum parts. Bass drum patterns might be altered, fills and rolls might be timed differently and played on different pieces of the percussion kit, and accents will change from one song to the next. Similarities must be deciphered through hi-hat patterns, snare hits, and the generalized feel or groove between two songs; the criteria concerning cycles and patterns which is discussed in Moore's article share similarities to the cyclical nature of drum beats. Each genre, at a beginner's level, has guidelines that aid in understanding what is required in order to perform properly a style; the transcriptions provided at the beginning of this chapter illustrate the basic patterns. As a performer's skill level increases these guidelines become tools which are built from rudiments. Many drum books such as David Garibaldi's *Future Sounds*, Carmine Appice's *Pop Drumming*, and Gary Chester's *The New Breed's Vol.I & II*, provide convincing exercises in their respective expertise. Due to exercises such as these, the examining and transcribing of drum patterns in Pop music and its sub-genre present similar patterns. Furthermore, Pop music of the 1980s was also dependent on sound production and as discussed in previous chapters, producers raced to the opportunity of applying the innovative to their music. However, the focus will be on

the practicality of the drummer, not solely the production. These drum lines might be similar for only eight, four, two, or even at times one bar. Nevertheless, the presence of this similarity provides the rationale for compatibility both in the selection process and even comparison.

Table 16: Selection Process (Drum Partitions)

Title and Artist	Bob Marley "No Woman No Cry"	Cinderella "Don't Know what you got"
Harmony	C, G/B, am, F (main riff)	A, E, f#m, D,
Modality	Ionian	Ionian, Aeolian
Performance	Reggae, chucking (guitar and organ)	Bar Chords, Straight strumming. (guitar and piano)
Time signature	4/4	4/4
Drum Partitions	Hi-hats on upbeat, rim shots and snare shots on two and four, bass drum on 2 and 4	Hi-hats on down beat, snare on 2 and 4.
Comparable?	Not Comparable	

If we return to *No Woman No Cry* and *Don't Know What you Got*, the table can now be completed and a conclusion concerning the selection process can be formulated. The table indicates that due to multiple discrepancies, these two hit songs of the 1980s cannot be further evaluated. With the aid of *Billboard's* archives, these two songs were categorized as different genres. However if we were to select two songs from similar genres, the similarities would be definite, resulting in the application of the latter half of this theory (examples will be shown later in this chapter).

Second half of theory (Comparison Process)

Once compatibility is reached, other areas must be examined in order to establish the criteria of categorization. Questions such as why two similar songs are classified under different genres? And what is the criteria and rationale for categorization? Identifying the instruments which were used in performance may also reveal interesting facets as to categorization. The second part of this theory will search the melody, harmony, bass lines, drum partitions, and the instruments each for similarities. As in the first section, all identical aspects will be identified and according to the paradigm, a sole difference should become apparent. This unique quality will complete the criteria for categorization. Apart from this hypothesis, genre characteristics of each tune will conclude the process of elimination. The final field of the following table will determine whether the recordings are of acoustic or electronic percussion. The result will establish the important link between the evolution of Pop music throughout the 1980s and the integration and technological advancements of electronic percussion at that time.

The following table illustrates the areas which will be examined. As in the first section, melody and/or bass lines alone cannot determine sub-genre classification. Both

are inputted into the table in order to demonstrate characteristics of each sub-genre. The two parameters yield more significant information if the theory is applied to different genres.

Table 17: Comparison Process

Title and Artist	Song x	Song y
Melody, performance & Instrument		
Harmony, performance & Instrument		
Bass Lines & performance		
Drum Partitions		
Drums Used Acoustic versus		

Electric		

For example if the focus was to differentiate the characteristics between Metal and Jazz, the melodic lines would indicate the specific characteristics of both genres. The harsh raspy vocal melodies found in Metal would not be transferred over to Jazz. The walking bass, lines not apparent in Metal, are the backbone and a primary requirement of Jazz bass players. The purpose of this second table is therefore to indicate which of the areas is responsible for the sub-categorization of Pop music.

Melody and its Instruments

The focus of melody throughout this second section is to demonstrate some characteristics to the sub-genre in which it belongs to. As mentioned in the first half of the thesis, melody itself cannot determine a sub-genre, though it is a decisive characteristic when discussing alternate genres such as Metal, Country, and Funk. For the purpose of this paper's theory, the instrument responsible for the melody is of greater importance as it aids to determine the instrument performing the harmony. This instrument normally does not perform both the melody and harmony, especially in the case of vocal melodies. Solo artists such as guitarist Stanley Jordan is an exception. Identifying the melodic from the harmonic in 1980s music is a fundamental procedure. Although it might seem a simple process, the harmonic ornamentations found in genres, such as pop rock, can interfere with melodic ideas. Furthermore, recording methods do not aid in differentiating the two. The doubling of guitars or pianos is crucial in providing

a dense sound during a time where recording units were transitioning from analogue to digital, producing thinner sounding products.

The previous discussion about selecting possible candidates for comparison introduced the notion of searching for plagiarized tunes. The examples illustrate the importance of melody when investigating cases of plagiarism. In the event two pieces were selected due to copy infringement, the melody will be classified in the table as similar and therefore can be eliminated as a cause of categorization. Transcriptions of melodic fragments can assist in the argument to demonstrate similarities propelled by plagiarism.

Table 18: Comparison Process (Melody)

Title and Artist	Song x	Song y
Melody, performance & Instrument	Melody is in C major, performed by male vocalist, (include short transcription if needed)	Melody is in Bb major, Performed by female vocalist, subject of a plagiarism case.
Harmony, performance & Instrument	N/A	N/A
Bass Lines & performance	N/A	N/A
Drum Partitions	N/A	N/A

Drums Used Acoustic versus Electric	N/A	N/A

A definitive cause for classification cannot yet be established. As stated, melody alone cannot determine sub-genre classification; further investigation of the remaining fields must be completed in order to identify the cause of categorization.

Harmony and its Instruments

As previously explained in the section dealing with the selection process, harmony is composed of chord progressions, chordal extensions, and rhythmic performance. Exclusive to 1980s Pop music, the harmonic progressions will undergo similar examination. The previous section utilized harmony as the main characteristic for selecting compatible songs. In this section, harmony (and all its relative components) cannot solely determine a sub-genre. Rhythmic diversity might differentiate two songs yet it cannot sub-classify a song, nor can a chord's extensions. It is not a valid characteristic for differentiation in this half of the argument. For example the ways in which chords are presented in Whitney Houston's *How Will I Know* differ from those in Genesis's *Throwing it all Away*, yet both songs are classified as Adult Contemporary (Pop) music.

Table 19: Comparison Process (Harmony)

Title and Artist	Song x	Song y
Melody, performance & Instrument	N/A	N/A
Harmony, performance & Instrument	Established in first section as similar, keyboard	Established similar
Bass Lines & performance	N/A	N/A
Drum Partitions	N/A	N/A
Drums Used Acoustic versus Electric	N/A	N/A

The chart illustrates how harmony has become less important throughout the second half of the study. It has been determined previously that when comparable songs reach this stage the harmony is similar. In the event of a famous pop remake, the rhythmic and modal differences might heighten a listener's interest. The harmonic differences alone

will not change the context of the tune or *Billboard's* classification. The harmony will simply be restated as similar due to its importance in the first section. However, the instruments performing the accompaniment will demonstrate some characteristics of its respective sub-genre. The saw lead synthesizer found in Van Halen's "Jump" exhibits 1980s characteristics of rock music accompaniment; the genre has grown to be known as Hair Metal. The acoustic guitar was also another indicator of genre, as the ideal choice for power-ballads of the decade. Pop music encompasses many accompanying instruments such as piano, synthesisers (pad, saw, and filter), guitars, and at times mandolin. The differentiation of instrumentation alone will not identify the sub-genre; however, together with other characteristics of that style, might distinguish which factor took precedent when categorizing a piece. In the following example both songs have similar harmony (which can be seen from the results of section one) and different instruments.

Bass Lines

Discussing bass lines might lead many to believe that the popular root to fifth pattern is present in most musical styles. The 1980s did adapt the concept in many Pop music compositions; however, the compositions do encompass specific bass patterns which are primary characteristics of other musical eras and genres. Jazz music adopted the walking bass line which can be heard in jazz standards. The characteristics of this quarter-note line playing through chord tones and chromatic notes illustrate key characteristics necessary for Jazz performance. The disco era of the 1970s also demanded specific bass lines which can be heard in music of Earth Wind and Fire. These bass

patterns derived from walking and Motown bass lines.[88] Both jazz and disco were categorized because of characteristics which did include specific bass patterns, yet while Pop music might incorporate some of these bass patterns, it did not create unique styles. An example is Michael Jackson's early 1980s music; disco bass lines were heard in songs such as *Wanna Be Startin' Somethin'* and *The Girl is Mine*. Bass instrumentation can entail synth, acoustic, and upright bass depending on the request of the producer. The variety of bass options indicates the importance of technological advancements throughout the decade. 1980s recorded music ushered in the need to incorporate these advancements throughout its productions. The instruments used for bass partitions are of interest, not for categorization but with a view to establish the introduction and importance of electronics in Pop music; this phenomenon will be further explored in the final section of the table. Artists who displayed this trend include Michael Jackson, Whitney Houston, Phil Collins, and Genesis. They would utilize these advancements such as synth bass and combine them with bass ideas from past generations. As a principal factor in 1970s dance music (disco, R&B, etc.), bass lines throughout the 1980s, especially Pop music, would integrate these ideas from previous generations. The following chart illustrates the fact that bass lines cannot be the sole determining characteristic in categorizing Pop music. Both songs x and y contain different bass lines which can be a result of different genres, different vocal melodies, or similar harmony, drum patterns, and song y can be a remake of song x. At the moment all that can be documented is that both songs differ in bass patterns.

[88] For more information see James Jamerson, *Standing in the Shadows of Motown: The Life and Music of Legendary Bassist James Jamerson*, (Wynnewood: Dr. Licks Publishing, 1989).

Table 20: Comparison Process (Bass Lines)

Title and Artist	Song x	Song y
Melody, performance & Instrument	N/A	N/A
Harmony, performance & Instrument	N/A	N/A
Bass Lines & performance	Synth Bass lines, play through the harmonic changes between root fifth and walking lines.	Electric bass lines, Motown patterns.
Drum Partitions	N/A	N/A
Drums Used Acoustic versus Electric	N/A	N/A

As previously discussed in the first section of the theory, bass lines are non-relevant in the selection process. While it has been determined that some genres of the 1970s were

dependent on bass patterns, these lines are also non-relevant to the study in this second half. Bass lines will differ from one tune to the next creating a vagueness between musical examples, thus causing too many ambiguities when determining cause for categorization. For this reason bass lines can vary from one tune to the next without creating loopholes in the theory.

Drum Partitions

At this stage, drum partitions maintain their similarities from the selection process. There has been no change of information from the previous section. Drum beats are simply analyzed according to patterns found in each section disregarding any "fills" and "punches", as previously discussed. The table will indicate if the similarities are relevant to the study. Should there be any discrepancies identified in the selection half of the theory, the categorization process will provide a detailed description signifying if the effect of drum partitions are relevant to classification in their respective case studies. Furthermore, the drum partitions will be analyzed according to what stylistic characteristics they have derived from. In doing so a link to previous genres is created; a progression is achieved. The link will provide information solely about the partition's influence to the music; another step must be taken in order to conclude accurately if evolution has occurred. The drums utilized for each candidate must be examined.

Drums Utilized in 1980s Recorded Music

The main contention of this theory rests on the following criteria. Apart from advanced guitar and synthesizer effects, electronic percussion remains the iconic technological advancement of the decade. As argued in the previous chapters, electronic drums brought about a new wave of percussion, composition, and performance

capabilities. As the final criteria required for categorization, the drums and percussions utilized in recorded music will demonstrate the argument presented in this thesis. Prior to the 1980s, only acoustic percussions were available. The turn of the decade ushered in the invention of the new phenomenon and consequently Pop music would change forever. The final section of the table will indicate if the acoustic or electronic drums were recorded. The use of samples and triggered drums will also be indicated. In the event of triggers, the table will indicate if acoustic drums were used and if the sound was activated through a synthesizer. Finally, a description of the technology will convey the benefits and influence of the technology on the music.

Table 21: Comparison Process (Drum Partitions)

Title and Artist	Song x	Song y
Melody, performance & Instrument	N/A	N/A
Harmony, performance & Instrument	N/A	N/A
Bass Lines & performance	N/A	N/A
Drum Partitions	N/A	N/A
Drums Used Acoustic versus Electric	Acoustic, No triggers.	Acoustic, No triggers

Percussions used on a recording alone, cannot determine categorization, as is the case in previous areas. Classification will only be established with the completion of the table if

and where a sole difference emerges. If the percussion used on a recording represents the sole dissimilarity between both pieces, then it can be understood as the primary cause for categorization. For the purpose of this thesis, differences found in this category will be further examined. The results will indicate the principal rationale for classification. Since the main objective is the observation of percussion throughout Pop music of the 1980s, similarities in this section will not occur nor should they be present when applying this theory to other instruments throughout the genre. The argument will demonstrate the vital importance of electronic percussion, in collaboration with some similarities in other areas, as the principal characteristic for sub-categorisation in 1980s Adult Contemporary or Pop music.

Case Studies

The following case studies will be analysed, then classified in each of the above areas. The songs utilized in the second half of the theory will reflect the results of the selection process. The use of plagiarism cases, transcriptions, and finally –the famous case of Rick Allen's tragedy- are examined for this analytical process. Once the analysis is complete, we can establish that evolution in percussion was a major contributor to the evolution and success of 1980's Pop and its sub-genres.

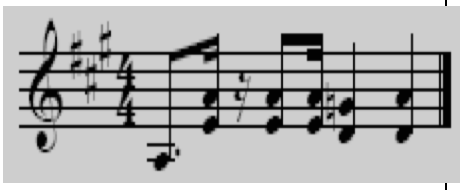
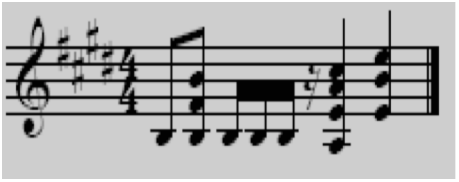
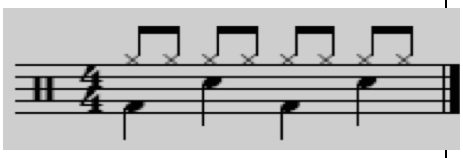
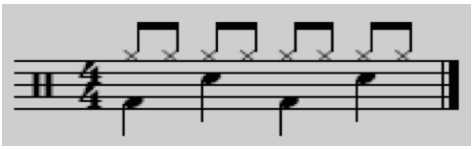
Case Study #1

Selection Process

The first case study examines the relationship between the songs "I Want a New Drug," by Huey Lewis and the News and "Ghostbusters," by Ray Parker Jr. in the attempt to describe and illustrate the determining factor as to the classification of musical

genre or style. Lewis' track was released in January 1984, followed by Parker's song in May of that year. Apart from being released within the same year, a plagiarism case was filed against Parker's "Ghostbusters," which included a melody similar to Lewis' track. Due to the situation concerning these two pieces of music, the court case will simply confirm the ideas expressed through the selection process; the melody in both songs is understood to be closely related. Through all the similarities, both pieces have been on *Billboard's Hot 100* chart and classified as adult contemporary. They have, however, been sub-categorized differently. The purpose of this case study is to identify the main reason for this ambiguity: why were they categorized differently if they are essentially the same song, according to a plagiarism case?

Table 22: Selection Process (Lewis and Parker)

Title and Artist	**"I Want a New Drug"- *Huey Lewis and the News***	**"Ghostbusters"- *Ray Parker Jr.***
Harmony	A major A- G- D main chord progression	E major B - A - E main chord progression
Modality	Ionian with some suspended chords and the E minor chord on the dominant present A Mixolydian	Ionian and Mixolydian modes due to the presence of D naturals over B chords.
Performance		
Time signature	4/4	4/4
Drum Partitions	Identical main drum patterns 	Identical main drum patterns 
Comparable ?	Yes	

According to the selection process table, the main chord progression of both pieces share similar harmonies. There are melodic guitar lines accompanying the vocal melody and harmonic progressions; however, the study pertains simply to harmonic progressions. Lewis' track presents an E minor chord which in the key of A major indicates a brief transition from the Ionian to Mixolydian mode. The "Ghostbusters" theme illustrates a key of E major, yet presents many D naturals throughout the melody and bass lines indicating the Mixolydian mode. The comparison portion of the theory examines how the bass line actually alters the chords inputted within the above chart. The progression has a different harmonic function. Lewis' progression is I-bvii-V opposed to Parker's V-vi-I. However the intervallic pattern between the roots is identical; the separation is whole tone and perfect 5th intervals. The performance or rhythmic figures in both pieces present a strong emphasis of beats 3 and 4 which can be seen in the table. In both scenarios, chords of quarter-note values are struck on these beats. The downbeat of beat 1, in both songs, is occupied by a single note which is followed by a chord on the upbeat regardless of rhythmic subdivisions. In Lewis' intro and interludes (the same part) the chord is struck on the "and" of beat one whereas Parker preferred the last sixteenth note of that beat. The second beat differs between both songs. The first tune has two chords played on the weakest sixteenth beat (beat e – a); Parker simply "palm mutes" [89] the first three sixteenth notes of that beat. The rhythmic diversity is of such miniscule value that the majority of the measure shares similar if not identical rhythmic patterns. Furthermore the instrument performing throughout the intro of Lewis' "I Want a New Drug" is an

[89] Palm muting: muting of strings with the palm of the picking hand. L.C. Hansberger, *Essential Dictionary of Definitions: Handy Guide* (London: Alfred Publishing Co., Inc.), 147.

overdrive guitar. The verses change in rhythmic patterns; a synthesizer is restating the intro chords found in the intro on beats 3 and 4. Parker's piece also uses an overdrive guitar performing the chord progression, yet his verses share the same rhythmic figures as the intro and interlude. The choruses in both songs occupy a smart portion in each piece creating a sole focus on the main riffs of each piece. The time signatures are identical, which leads to the idea of drum partitions sharing some similarities.

The transcription in table 22 depicts the drum parts as exact replications of each other (keep in mind, the focal points are snare hits, hi-hat patterns and the entirety of drum grooves; fills and punches are exempted). The erratic chorus in each song cause some discrepancies as to the drum pattern; however, the focal point is on the entirety of the pattern. A more detailed analysis of the drum partition can be found in the following section. The explanations, transcriptions, and completion of the table along with the plagiarism case confirm the selection process, thus identifying these pieces as legitimate candidates for comparison.

Comparison Process

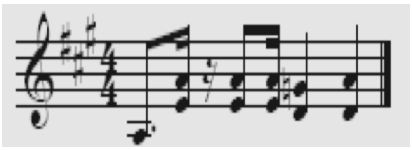
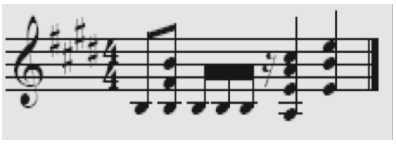
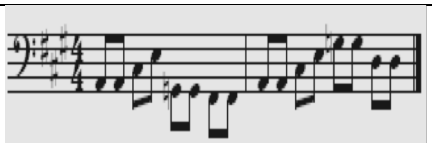
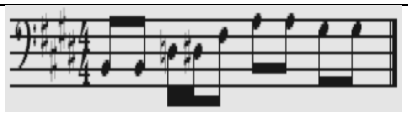
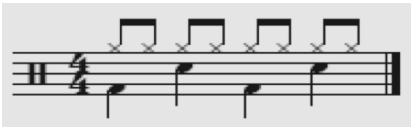
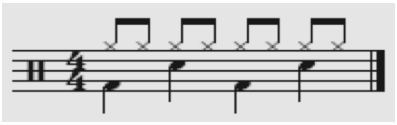
The following portion of the case study will further examine other aspects of both songs. The melody, while not very important for classification, does indicate intervallic similarities. While Lewis' arguments throughout his plagiarism case have not been discussed publically in much detail, some parallelism is apparent. As previously discussed, the harmonies between both pieces share numerous similarities. The root notes of chord progressions present identical intervallic movement over different harmonic functions. Overdrive guitars are preferred in each recording and the rhythmic figures utilized by the performers are debatably identical. It has been argued in this thesis that

bass lines are not significant for categorization yet the examination of both lines creates further identification of similarities. The table presents transcription of the two-bar bass pattern found throughout most of “I Got a New Drug”. Encompassing an eight-note walking bass line, the line begins with two repeated A’s on the first beat of the first measure representing the tonic of the key. The second beat outlines the third and fifth of the tonic triad followed by a leap down to the flattened seventh, or Mixolydian, on beat three which resolves to an F#. The second measure mirrors beats one and two. The third beat is a reoccurrence of G natural up the octave, now resolving on a D. The rhythmic discrepancy to Parker’s “Ghostbusters” does not hide the obvious reproduction of bass figures. The intent is not to assume that Parker purposely composed these bass lines from material stolen or copied from Lewis. The goal is to identify every possible similarity whether relevant or not to the cause of categorization. Keep in mind the different harmonic function of Parker’s progression. This one-bar bass line is also an eight-note walking line entailing sixteenth notes on beat two. It begins on dominant B followed by three sixteenth notes presenting the flattened third (Mixolydian), natural third, and fifth of the dominant chord. Beat 3 entails an A which is repeated resolving to G #. Examining the intervallic motion of both bass lines demonstrates the similarities necessary for my theory’s process of elimination. Beats one, in both cases, ascend a third to beat two which ascends another third to the fifth on the upbeat. The perfect interval ascends another third (or descends a sixth) before resolving down chromatically. The second measure of Lewis’ piece mirrors Parker’s throughout the first three beats before resolving down a fourth. The similarities promote elimination and are therefore a criteria to mitigate against categorization.

The drum partitions examined in the previous half of the case study remain unaltered. The drum lines are identical and therefore reiterated in the table below. The drum patterns are arguably- according to the opening table of the chapter and many training drum books- Rock drum beats. The previous descriptions of Rock drum beats explain the reason for the simplicity of the kick drum, the cyclical snare strokes on beats 2 and 4, and the constant eighth-note hi-hat pattern, all characteristics of Rock, concurring with the pop-rock image of Huey Lewis and the News. Moreover, the duplication of this pattern, although very elementary and popular amongst producers, establishes a dependency of Pop on Rock. Other characteristics such as distorted guitars, block chord harmonies, and screeching vocals are noteworthy; however, the focus of this paper is on percussion and the significant characteristics which it provides. The second half of the percussive theory concerns itself with the instrument recorded, acoustic versus electronic. Huey Lewis' track entails acoustic drums which have been processed through some electronic triggers, the snare drum in particular. The acoustic drum entity is preserved by the remainder of the drum kit (cymbals, hi-hat, toms, and bass drum). The introduction of these electronic parameters truly establishes this act as a key pioneer for pop-rock. The drum pattern performed confirms rock origins; meanwhile the integration of electronic percussive devices, entails –significantly- a grasp of pop characteristics which provide listeners with both old and innovative. Ray Parker's composition requires the electronic drum sound or table-top percussion. The percussion tracks project the characteristics of electronic percussion discussed in the previous chapters. However, the drum pattern is a mirror image of Lewis' track, providing the listener with a rock feel on a pop song. The differentiation in categorization, which is demonstrated in the following

table, results from the influence that electronic drums versus electronic devices had on pop music; the utilization of electronic percussions results in popularity, record sales, air-time, and fans as the result of providing listeners with characteristics that represent pop. The devices still entailed acoustic sounding percussion, presenting a middle ground between pop and rock characteristics, whereas the opposite utilize the partition as the bridge to previous styles, and the instrument to please the listeners. As previously mentioned, the songs were released within months from each other; there lie many similarities between both pieces yet there remains the differentiation in sub-genre categorization. Evolution can be explained as the result of two near-identical pieces, differing by the percussions used, on drum partitions that mirror each other. Pop depends on rock for drum patterns, yet in return utilizes the sounds that are common to pop, accommodating a larger group of individuals. Without the electronic device, the pattern remains a simple rock beat which does not fit with pop music parameters. Evolution can only be completed by the integration of something new and innovative: electronic percussion. Furthermore, the devices available at this time were not acknowledged for their authentic reproduction of acoustic drums; rather, the recording of rock drum beats with space, delay, and digital sounding percussions would provide the songs an opportunity to compete with the music of the 1980s.

Table 23: Comparison Process (Lewis and Parker)

Title and Artist	**"I Want a New Drug"- *Huey Lewis and the News***	**"Ghostbusters"- *Ray Parker Jr.***
Melody, performance & Instrument	Vocals, similarities were based on the plagiarism case and concern intervallic motion.	Vocals
Harmony, performance & Instrument	Ionian with some suspended chords and the E minor chord on the dominant present A Mixolydian Overdrive guitars 	Ionian and Mixolydian modes due to the presence of D naturals over B chords. Overdrive guitars 
Bass Lines & performance		
Drum Partitions	Identical main drum patterns 	Identical main drum patterns 
Drums Used Acoustic versus Electric	Acoustic, Some snare triggers.	Electronic percussion

As argued and illustrated in the previous table, the main parameter which features no sonar or recorded similarities is the percussions used during the recording process. Evolution is therefore achieved by taking an aspect from Rock, altering it with electronic percussion; the result is a pop song. The introduction of electronic percussion is appreciated by the listeners and categorizes music much differently through *Billboard* and *Top UK*. Though this is one scenario, the idea of percussions influencing categorization has become pivotal. The cause for sub-categorization between both these songs is now without doubt indisputable; electronic percussion facilitates playability. One performer can now have access to a larger database of sounds. As a result, fewer musicians are required for live performances. Furthermore, the quality of sound produced by electronic percussions does not change from studio to venue. Pop music can now be performed live, utilizing sounds that prior to portable drum modules could only be achieved in studio situations. Performers can now reproduce the recording quality of an album in a live situation. The return of acoustic preference throughout the 1990s saw the demise of electronic percussion sounds, yet the ideals of studio quality in live performances would be transmitted to the production of better drum microphones, triggers, and rack mounts. Furthermore, at the time of Parker's tune, electronic percussion was used in order to compose a song that fits with the 1980s pop genre, a movie soundtrack, and a Billboard hit, maintaining and even enhancing the demand for electronic percussion for future artists.

Case Study #2

The following study analyzes the differences found between two similar songs listed on two diverse *Billboard* charts. The constraints of popular music will be respected throughout the study; however, the search for compatibility expands from dissimilar sub-genres to separate chart listings. This case study will include a popular song from the 1980s as well as one from the 1970s. The goal is to demonstrate the evolution of Pop music from one decade to the next. The focus remains on the advancements made by percussion. The first tune is from the American fusion group Steely Dan who released the song entitled "Pretzel Logic" in 1974.[90] "Brooklyn Blues" is the second track recorded by Barry Manilow in 1987[91]. Dave Carlton's Hook Theory assists in the selection of these two pieces.

[90] Billboard, "Steely Dan," *Billboard*, Accessed January 19, 2014, http://www.billboard.com/artist/280446/steely-dan/biography.

[91] Billboard, "Barry Manilow," *Billboard*, Accessed January 19, 2014http://www.billboard.com/artist/280721/barry-manilow/biography.

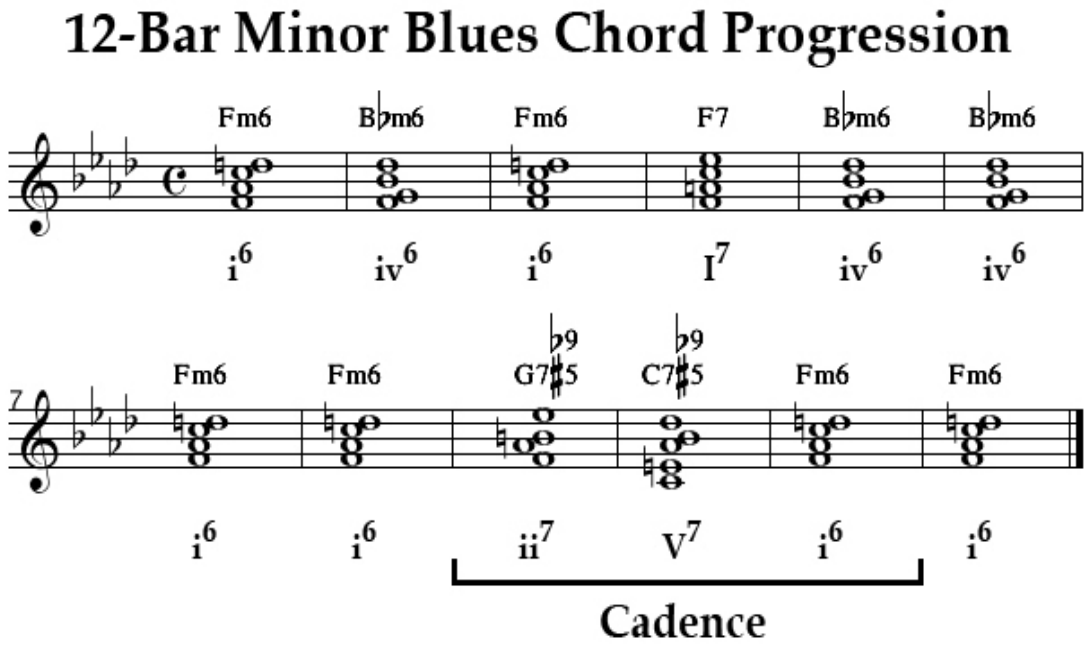
Selection Process

Table 24: Selection Process (Dan and Manilow)

Title and Artist	***Pretzel Logic*- Steely Dan**	***Brooklyn Blues*- Barry Manilow**
Harmony	A minor 12-bar minor blues. With a prolonged blues form	Eminor 20-bar blues based on 16-bar concepts Same prolonged blues form
Modality	Aoelian, Ionian,	Aoelian, Ionian
Performance	Verse plays on the down and up beats of beat 2 keeping with a shuffle feel.	Loose composing rhythm with shuffle hits on down and up beats of beat 4
Time signature	4/4	4/4
Drum Partitions	Swung eighth-notes on hi-hat, Snare on beats two and four, bass drum playing on downbeats and the last triplet on each strong beat.	Triplet and swung eighth-notes on hi-hat. Snare of two and four, bass drum on the downbeat of each strong beat.
Comparable?	Yes	

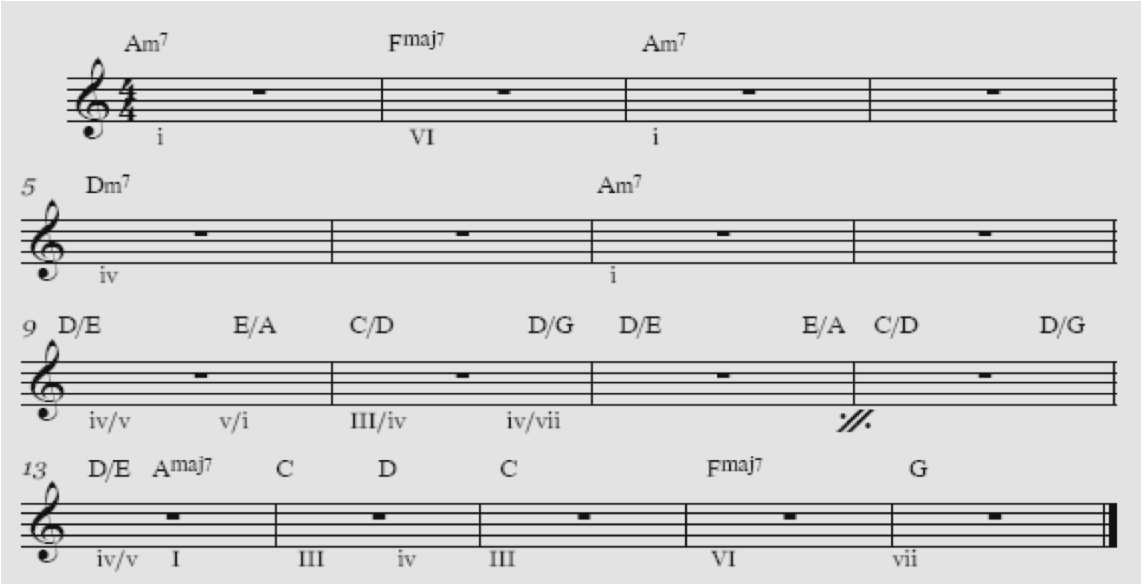
The selection process, demonstrated by table 24, shows that the two songs are comparable material for the next section. The selection process will be discussed in detail throughout this section. Unlike the first case study which outlined each parameter individually, table 24 will be used as a reference to the upcoming information concerning the harmonic progressions and drum partitions. In the absence of a plagiarism case, similarities are not as obvious as in the preceding case study. The chord progression of each piece differs. The harmonic figures found in “Pretzel Logic” outline a blues progression that has been altered according to harmonic functions; IV chords switched for vi chords, slash chords, and V (dominant) for vii chords. The 12 bar form traditional to the Blues has also been extended in the piece. Figure 10 illustrates a traditional 12-bar blues progression which will be compared to the extended 16-bar blues progression found in figure 12.

Figure 9: Standard Blues Progression[92]



The 12-bar Blues pattern can be found within the following chord progression:

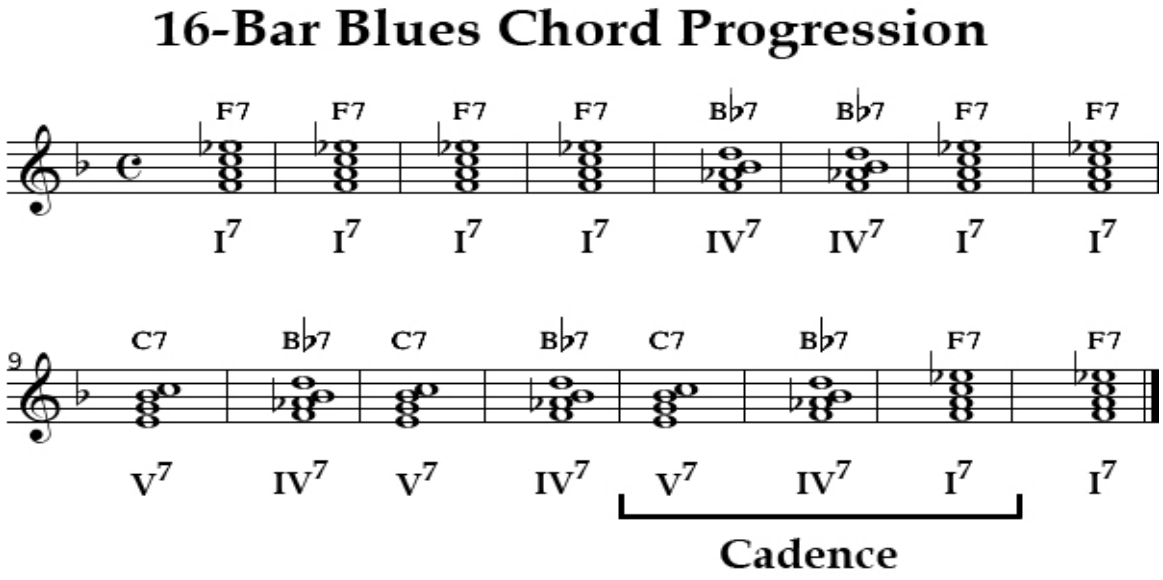
Figure 10: Pretzel Logic Progression



[92] Music at Virginia Tech, "Standard Blues Progressions," *Virginia Tech*, Accessed January 20, 2014, http://www.music.vt.edu/MUSICDICTIONARY/appendix/blues/Bluesprogression.html.

The progression begins on a tonic chord followed by a subdominant substitution VI chord (iv- VI). The following four measures mirror the original minor Blues progression proceeded by subdominant to dominant prolongation. The last five measures share similarities to the original Blues form. The D/E, iv, and VI chords substitute the ii7 chord while the vii chord acts in place of the V7 chord creating a "turn around" to the beginning of the progression. Manilow's composition follows a similar Blues progression. He also extends the traditional form to an altered 20-bar Blues progression stemmed from a sixteen-bar template. The following example demonstrates the harmonic functions in the 16-bar Blues form.

Figure 11: Standard 16-Bar Blues Progression[93]



Chord substitutions are also found within Manilow's piece, altering the traditional Blues form. The example above is a 16-bar Blues form. The prolongation of tonic material

[93] Ibid.

through the first four (sometimes eight) measures is characteristic of the 16-bar form. The last eight measures prolong sub-dominant harmonic functions. Manilow's Blues progression seems unclear. It begins in measure 11which also introduces a prominent shuffle pattern; it concludes 20 bars later within the first ending (see appendix for chart). The Em7 chord in measure 11 is prolonged for eight measures with some chromaticism due to tri-tone substitutions such as the F^{13} chord in measure 16. The first instance of the A^7 sub-dominant arrives on measure 18's last eight-note. The dominant function arrives mid-way in measure 19 on the $B^{7(\#9)}$ resolving back to tonic in measure 19. The 20-bar pattern shares the same prolongation traits as does the 16-bar form. As mentioned, the 16-bar pattern prolongs tonic for an extra four measures; the 20-bar pattern can be seen as prolonging sub-dominant and dominant material for an extra four measures in comparison to the previous. The following measures are set up as slash chords resolving to their respective tonic; in return this promotes the VI^{maj7} sub-dominant to VII^7 Dominant turn-around in the final measures:

Measures 23-24: F/G resolving to C^{maj7} (IV^9 to I progression),
Measures 25 -26: E^b/F resolving to B^{bmaj7} (IV^9 to I progression),
Measure 27: B^{7sus} to B^7 resolving to C^{maj7} (within the key of e minor).

The final four measures of the pattern alternate between the C^{maj7} (VI) and $B^{6/9}$ (VII). Replacement chords, similar to the previous song, are utilized for modal colouring and differentiation. Harmonically both pieces make use of Jazz extensions and intricate resolutions. Minor Blues present several possible modes. The complexity of examining the mode from which each chord derives is not beneficial to this study, since it does not

affect categorization. Furthermore the remaining areas relate directly to percussion. Both pieces entail a triplet feel shuffle over 4/4 time signature.

The presence of 12 individual pulses in one measure creates multiple possibilities for rhythmic ideas. Steely Dan's organist Michael Omartian emphasizes chord changes on the first and last triplet of beat two, thus accentuating the driving shuffle beat performed by the rest of the rhythm section. Barry Manilow's organist Randy Kerber highlights a similar shuffle feel emphasizing the first and last triplet of beats two and four. The constant triplet feel is reflected in the drum partitions. The hi-hat pattern in "Pretzel Logic" entails a triplet pulse, striking on the first and last triplet of each beat. A similar pattern, altered by the pauses on the beats in which the snare is struck, encompasses the partition of Manilow's tune. The accented snare strokes in "Pretzel Logic," are placed on beats two and four of each bar, creating a forward motion due to the grace notes struck on the last triplet prior to each accent. The Manilow piece simply accents beats two and four. The bass drum aids with the delivery of a shuffle pattern intended by Steely Dan. The drum is hit on the down beats of one and three, also preceded by a pulse on the final triplet from the previous beat. The latter piece simply hits on downbeats one and three. Due to similarities in each category, both pieces prove compatible to proceed to the second aspect of the argument.

Comparison Process

The melodies in both songs share primary characteristics of Blues music such as call and response and pitch.[94] Other characteristics such as rhythmic figures, tempo, and

[94] Francis Davis, *The History of the Blues: The Roots, The Music, The People* (Cambridge: Da Capo Press, 2003), 32.

lyrical content alone cannot deliver the Blues. Donald Fagen of Steely Dan outlines the A minor pentatonic scale within his vocal melody yet rarely in its entirety resulting in no clear resolution from the top to the bottom of the scale (see appendix figure 46). The melody is guided by a swung eighth-note rhythm assisting the production of a shuffle pattern. The vocal melody in “Brooklyn Blues”, presents the pitches of the E minor pentatonic scale. Manilow prefers to showcase the scale in its entirety during the responses of the verses. Throughout his choruses he incorporates them more frequently (appendix figure 46). He also makes expansive use of triplets throughout his vocal melody. In doing so, Manilow mirrors rhythmic figures apparent in the drum partition.

Table 25: Comparison Process (Dan and Manilow)

Title and Artist	**Pretzel Logic-*Steely Dan***	**Brooklyn Blues-*Barry Manilow***
Melody, performance & Instrument	Vocals using the shuffle Rhythm as means for rhythm. The swung eighth-notes. A minor pentatonic and Call and Answer. See appendix	Vocals using triplets to perform the shuffle feel. E minor pentatonic and Call and Answer.
Harmony, performance & Instrument	Same as in the selection process. Creating similarities. Performed by organ (synthesizer of the 1970s)	Same as selection process. Performed on a synthesizer
Bass Lines & performance	Electric bass, Performing swung 8ths throughout verses and dotted quarter to eighth-note rhythms accenting with rhythm section.	Synth bass, performing constant swung eighth-notes throughout verses and chorus. Few triplets and breaks
Drum Partitions	Swung eighth-notes on hi-hat, Snare on beats two and four, bass drum playing on downbeats and the last triplet on each strong beat.	Triplet and swung eighth-notes on hi-hat. Snare of two and four, bass drum on the downbeat of each strong beat.
Drums Used Acoustic versus Electric	Acoustic	Electronic

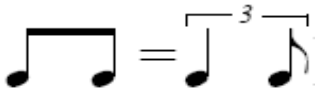
Bass Lines

The harmony has not been altered from the selection process. Different concepts of the minor Blues scale are the framework for both compositions, along with prolonged forms. Bass lines, as argued in this thesis, are non-decisive material for categorization. However, as in the first case study, they shed light on another similarity; the patterns relate. Steely Dan's shuffle groove throughout "Pretzel Logic" benefits from a constant eighth-note bass line which plays the root of the tonic chord. It passes through the fifth of the chord on the last eighth-note of the measure, followed by a return to the root of the next measure. The choruses differ from the verses, encompassing the dotted quarter to eighth-note pattern. "Brooklyn Blues" presents a parallel rhythmic figure throughout the vast portion of the song. Furthermore, the ambiguities present on beat four in "Pretzel Logic" are apparent in this piece also. However, triplets, chord tones, and chromatics take precedent to the perfect fifth interval.

Conclusions (drum partitions and percussive instrumentation)

The guidelines created to analyze drum partitions present many similarities in the necessary fields. Dissimilarities have also been distinguished. "Pretzel Logic" entails a hi-hat pattern, which promotes the swung eighth-note rhythm presented in figure 10, mirroring the bass player. An examination of said rhythm demonstrates the subdivisions necessary in order to achieve proper performance of the swung eighth-note. This phenomenon is apparent in jazz, and while the concept might seem uncanny, it can be simplified as performing the first and last notes in a triplet grouping.

Figure 12: Swung Eighth-notes



The simplification of the swung eighth-note presents a link between the hi-hat patterns performed in both pieces. The pattern in Manilow's piece emphasizes a 12/8 shuffle. Achieving the groove is the effect of performing groupings of three eighth-notes over every downbeat in a measure. The snare patterns in both pieces are accented on beats two and four. "Pretzel Logic" emphasizes the shuffle more than "Brooklyn Blues" through the use of grace notes prior to an accented snare shot. Bass drum patterns, as mentioned, prefer strong beats in the measure (one and three) with the occasional upbeat of beat four, found in Steely Dan's piece. Ultimately the ambiguities can be expressed as minor details in a grander picture. The hi-hat patterns in both are dependent on the eight-note triplet regardless of variation. Snare shots are prominent to beats two and four while bass drum patterns arrive on the opposed down beats. Both patterns can be superimposed onto either song without affecting the intended shuffle groove. Both pieces make use of the harmonic characteristic of the Blues, while, preserving the famous drum pattern discussed at the beginning of this chapter. It is important to note that the percussions used to perform these grooves do affect categorization. While the grooves might be similar, the powerful attack of an acoustic drum recording could drown the soft spoken Barry Manilow. The similarities found in melody, harmony, bass lines, and drum partitions are now eliminated as a cause for categorization. Both pieces are classified in *Billboard's Hot 100* and *Adult Contemporary* charts, a significant difference affecting classification are the percussions used in recording. The table illustrates both songs utilizing different percussion. The result is acoustic versus electronic. Significantly, the electronic percussion provides

Manilow with the option of attracting both fans of the Blues – providing the shuffle pattern previously discussed- and aficionados of Pop. Both table top and full electronic drums were available for the 1987 release of Manilow's album *Swing Street*. As discussed in chapter one, the use of this technology provided ideal options for recording and performing. The SDX featured digital options which were not available prior to this year –specifically, better sounding cymbals, which can clearly be heard by the hi-hat throughout the recording of "Brooklyn Blues." Similar to the previous case study, it becomes evident that the influence of electronic percussion impacts playability, personnel, and sound. Although both songs come from different decades as well as musical eras, the influence of electronic percussion can be seen due to the similarities shared between both candidates. As long as the guidelines are respected, the theory –that technological advancement contributes to the evolution of Pop music- can be applied to any instrument.

Case Study #3

The final study does not rely on the selection process. This study will focus on one pop-metal band affected by a tragic event. Def Leppard is a British band representative of a Metal/Rock/Pop fusion of 1980s music. The study will briefly examine the band's earlier records, focusing on the charts in which their songs were listed prior to the 1984 tragedy. Furthermore, an analysis of the recordings –both albums and singles- completed post 1984, provides proper reasoning for achieving Pop music status. The previous case studies examined similarities in order to identify the sole difference; this final case study will do the same. However it will not focus on the same areas of analysis as earlier tests. It will also search for the sole criteria for altering sub-

categorizations within the same act. One might argue that compositional elements might alter, therefore leading to different sub-genres. Although that might provide some insight, the archives presented by *Billboard* and *Rolling Stone* will classify songs considered as metal and those presented as power-ballads within the same chart. The cultural and societal concepts presented in chapter 2 respective to genre and the characteristics, which imply genre, will clarify Def Leppard's popularity.

Def Leppard

Although categorized as a Rock and Metal act during the early part of the 1980s, record sales, MTV airtime, and global popularity confer the characteristics of the Pop music genre on this group. The study aims to provide the final insight as to the importance of electronic percussion to the development of 1980s Pop music. Def Leppard's original line up entailed Rick Savage, Peter Willis, Joe Elliott, Steve Clark, and Rick Allen. The group's success was in part due to the ever growing popularity of MTV and video clips. An examination of the band's albums in relation to the specific charts in which each compilation was classified will shed light on the group's musical transition towards Pop categorization, thereby reinforcing this idea of evolution.

Albums and Hit Singles pre 1984

The band's first full album entitled *On Through the Night* was released in 1980, capping off at number 51 on *Billboard's* chart that year. According to author David Fricke of *Rolling Stone Magazine*, "displaying a wisdom beyond their years, Def Leppard take the timeworn basics of heavy metal, give them a punky Eighties overhaul and come up with, uh, heavy melody. *On through the Night* is awfully impressive for a band

making its vinyl debut."[95] Throughout the album, listeners are provided with the hard hitting acoustic drum patterns, intricate guitar melodies, and the impressive vocal range, all characteristic of Classic Rock. However, lyrical content -emphasizing sex and drugs- increased tempos and double-time rhythmic feels which can be heard in much of early punk music such as The Ramones, distances the sound of Def Leppard from other acts evolving from 1970s roots. The instant successful reaction to their debut album, would influence the group's second album in 1981entitled *High and Dry.*

Def Leppard's first platinum album charted at number 38 on *Billboard*, featuring their first single entitled "Bringin' on the Heartbreak" , which listed at number 61 on *Billboard's Hot 100.* Although the band's image was not one to fit with the traditional Pop star such as Pat Benetar or even Whitney Houston, the positive reaction from fans and the massive air play, does signify popularity. In order for this case study to solidify the arguments expressed in this chapter, Def Leppard must appear on charts that are specific to the Pop genre and the reasons for their inductee must reflect on characteristics previously discussed as well as the influence of electronic percussion. The following album *Pyromania*, released in 1983, was their largest success to that date. Spearheaded by singles, such as "Rock of Ages" and "Photograph", the album would reach multi-platinum status charting off at #2 on *Billboard's 200.* Both singles also reached top position on *Billboard's Mainstream Rock* charts.

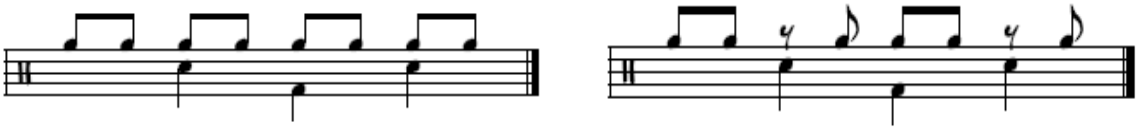
[95]David Fricke, "On Through The Night," *Rolling Stone*, June 26, 1980, http://www.rollingstone.com/music/albumreviews/on-through-the-night-19800626#ixzz2y8uEA6vs .

1984

1984 marks a tragic year for Def Leppard, specifically for drummer Rick Allen. This thesis also argues that this year -1984- also marks the keystone moment in the band's transition from strictly Metal and Rock music to Pop influenced music, thus revealing the importance of this case study. This study is presented in order to show genre differentiation within one musical act without relying on different compositional elements. According to *Rolling Stone* "drummer Rick Allen lost his left arm in a New Year's Eve car accident after he attempted to pass another driver at high speed. Surgeons reattached the limb, but after infection set in, it was amputated."[96] A typical drummer performs with the utilization of four limbs. Some drummers are dominant on the right side of the body and others the left; however, there are some who are ambidextrous. Rick Allen falls under the first category of drummers who are right-side dependant. The loss of his left arm seemed, to many, the end of his career, while Allen optimised his dominant side. Although determined to get back behind his acoustic setup, Allen realized that the fluidity he once had could no longer be represented without the interruption of his leading hand in order to play his snare drum. The following example represents two simple drum patterns, entailing snare hits on beats 2 and 4, bass drum on beat 3, and eighth-note hi-hat patterns.

[96] "Def Leppard Biography," *Rolling Stone,* Accessed January 20, 2014, http://www.rollingstone.com/music/artists/def-leppard/biography#ixzz2yP8p9BTQ.

Figure 13: Comparing Drum Patterns



Performed with both arms

Performed with one arm

The left figure presents an uninterrupted hi-hat pattern with a snare being struck simultaneously with the opposing arm. The right figure presents, what is intentionally, the same partition; however, the hi-hat pattern is now disrupted by the striking of the snare drum. This issue occurs naturally while performing with one arm. Alternating between one drum -accustomed to performing steady pulses- to that which is struck occasionally will disrupt the steady pulse of that primary drum. Here lies Allen's issue with acoustic drums of the 1980s. In order for his career to continue, the need for an alternative to acoustic drums became apparent. The timeframe presented in both chapters one and two concerning the creation of innovative electronic percussion places the Simmons SDS-7 as the newest invention at that time. With the EPROM cards at a drummer's disposal, interchanging sounds from one drum channel to the next is greatly facilitated, compared to previous and competing models, each with limitations of each track representing a specific drum. Simmons would create a drum set for Allen which would include more foot pedals, thereby allowing the snare duties as well as pre-recorded drum samples, to be performed by his left foot. Significantly, Allen would perform on this hybrid drum set throughout the remainder of the 1980s.

Hysteria and the Result of its Success

The next album released by Def Leppard in 1987 was their best selling album of all-time. “The band finally completed work on the long-awaited *Hysteria*, which spun off six Top 20 singles: "Animal" (#19, 1987; and their first Top 40 hit in the U.K.), "Hysteria" (#10, 1988), "Pour Some Sugar on Me" (#2, 1988), "Love Bites" (#1, 1988), "Armageddon It" (#3, 1988), and "Rocket" (#12, 1989).”[97] Though Def Leppard would tour for the final years of the decade until a later album release in the early part of the 1990s, this thesis is only concerned with the accomplishments achieved throughout the 1980s. The main area in question is the reasoning for the different categorization of this album compared to its predecessors. *AllMusic* and *Rolling Stone* both classify *Hysteria* as a Pop-Rock album, yet the band was still keeping true to their Rock and Metal influences from their previous records. The idea of chart crossover provides a plausible argument for this situation, and according to the definition provided by John Covach, Def Leppard are staying true to their Metal roots. One may begin to wonder if the Pop genre, and its fans, is widening their range of what is acceptable to the genre. All though this rings true in Covach’s writings and stylistic crossover is inevitable, certain parameters might supersede this concept. At this time the band was still working with legendary producer Robert John “Mutt” Lange – who was also present on the band’s first two albums. The band’s characteristics did not change; Def Leppard still consisted of powerful vocal ranges, intricate guitar lines (featuring many new guitar effects as well as solos), and the intensity of the band was still present. However, the one major change was Allen’s use of electronic percussion. The album was also competing with the likes of other great rock

[97] Ibid.

albums such as *Appetite for Destruction,* by Guns N' Roses and *OU812* from Van Halen. Ironically, these were the only other rock albums to reach number one that year, appealing to Covach's theory of crossover. Each band was equally popular, producing number one hits which featured rock characteristics. Yet, Def Leppard was the only band of the three that listed on Pop charts.

Through a decade in which artists were searching for innovation and companies were pushing technological boundaries, it is highly significant- though not coincidental- that the band's bestselling album would come after Allen's accident. The argument here is that the album's Pop status may be heavily influenced by the transition from acoustic to electronic. Moreover, the band's strict hard rock fan base would also change as a result of the album. *Rolling Stone's* review of the album indicates "long time fans and some critics found it disappointingly 'poppish', on the verge of 'bubblegum.' That change in direction no doubt contributed to it selling over 16 million copies worldwide and topping the U.S. LPs chart for six weeks."[98] The review slightly hinders crossover due to the fact that the fan base nor the genre is affected by crossover, the music is still true to the bands original genre. Def Leppard combines the electronic percussions featured in much of 1980s Pop music with the likes of distortion guitars and "face melting guitar solos," characteristics of Rock and Metal. As discussed in previous chapters, 1980s Pop music became accustomed to the sounds of electronic percussion and/ or electronic drum sampling. The combination of this trait with Metal and Rock characteristics results as the major factor contributing to the bands sudden fall in their Metal fans while -ironically-, selling more albums. Furthermore, authors such as David Metzer, and David Fricke suggest that the

[98]Ibid.

rise in popularity is due to the shift in focus from male fans to female fans- creating an increase in interest towards the 'power ballad' style.

The Power Ballad

The power ballad played on the differences between Pop and Rock's boundaries. David Metzer's article describes the stylistic characteristics of the song and its alterations between the 1970s and 1980s. Traits that pertain to the power ballad are lyrical content (love and loss primarily), slower tempos, heavy hitting drum patterns, escalating dynamics throughout the song, and the verse/chorus song structure.[99] The latter two is what Metzer describes as the transition to Pop music. This transition, as previously mentioned, is geared towards the female reaction to a band's music. "The strutting, screeching singers and, of course, long solos on the phallic guitar in Heavy Metal affirm established notions of masculinity," bringing women to praise these so-called rock Gods.[100] Although this may be true for Rock music, a similar phenomenon can be applied to Pop artists. The identity established by a Rock performer is clearly described in Metzer and Fricke's article, yet the dress of Pop icons was still an attempt at self identity, and artists such as Madonna, Cyndi Lauper, and Boy George utilized their image in order to stand out. Nonetheless, these artists music awarded them with high chart positions and multi-platinum albums. Appearance may be a valid reason for popularity, yet the music they compose, whether it be a power ballad or a top 40 hit, will please a listener's ear even throughout this MTV era.

In the case of Def Leppard, power ballads are present on a number of their albums; however, none more reputable than their number one single of all time "Love

[99] David Metzer, "The Power Ballad," *Popular Music* 31, no 3 (2012): 438.
[100] Ibid., 449.

Bites". Apart from having a number one selling album, a wider fan base which according to Metzer, is now designated to the female metal fans, and a so-called transition to Pop music, *Rolling Stone* and *AllMusic* classify *Hysteria* as the band's first Pop-Rock album. The argument stands that Def Leppard did compose power ballads as well as a multi-platinum album prior to Allen's injury; yet none were more memorable and profitable prior to this album.

Rick Allen and Simmons Drums

The analysis of Def Leppard's first four albums yields the following information: the band's popularity increased chronologically, resulting in higher rankings from one album to the next on *Billboard's 200*. Each album produced more hit singles which also charted higher than the previous with *Hysteria* providing listeners with the most singles and the band's longest lasting number one hit. Significantly, the album was also the first recorded attempt at utilizing electronic percussion. The Simmons Company created a custom drum kit for Rick Allen permitting him to utilize his left foot to trigger sampled sounds as a replacement for his amputated left arm. The production was ultimately similar from album to album as a result of the same producer, resulting in compositional techniques not different enough to affect sub-genre classification. Therefore, Def Leppard's situation presents further evidence to support the thesis. The band's previous success is incontrovertible within the thesis, since it is the reasoning for their Pop categorization which is -in turn- useful -even necessary- to this paper. Examples provided from other authors present many hypotheses. In each, the band had already accomplished

the said feat without obtaining Pop recognition; in the case of MTV popularity, Def Leppard's song "Photograph" was often played on MTV and yet neither the album, nor the song, ever became listed as some sort of Pop genre or sub-genre. The argument presented by Fricke concerning image and sex appeal does not provide enough reason for genre differentiation, seeing how *Billboard* states that by their first video clips on MTV "the musicians were already blessed with photogenic good looks, but they also crafted a series of innovative, exciting videos that made them into stars."[101] Finally, the characteristics of power ballads and their influence on Rock and Pop music do not present a decisive reasoning due to the band's previous release of the power ballad. A determining factor which accounts for Def Leppard's *Hysteria* categorization and the songs encompassed within is the sudden urgency to utilize electronic percussion through the latter part of the 1980s. Although Allen does return to a specialized acoustic drum set by the 1990s – in part due to the distancing of the electronic sounding modules of the 1980s as described in chapter one- the characteristic sound of electronic percussion throughout the 1980s presents yet again a plausible rationale for the album's appearances on Pop charts (whether US or UK) and its acceptance by listeners other than the metal appreciators as did their previous albums.

One final important but crucial note should be mentioned here. Due to the advanced technology of the SDS-7 drum set – EPROM and MIDI- Def Leppard was capable of taking advantage of these devices. If the SDS-V was still the industry standard, the lack of inputs for excessive foot pedals as well as the limited preset sounds would not have enabled the computing of a snare sound through an input that was

[101] "Def Leppard," http://www.billboard.com/artist/300687/def-leppard/biography.

designed, for example, to be a tom sound or a hi-hat. The EPROM technology of the SDS-7 allowed for the cards to provide pre-recorded samples as well as the luxury of interchanging them to any desired input. The alterations made by Simmons were simply to be able to recognize a foot pedal in place of a rubber pad, which can be done by the inversion of polarity within the trigger. Causation, however, must be brought into question. Was the technology founded because of Allen's dreadful accident or were electronic drum companies progressing due to the issues which surrounded playability?

The history of electronic percussion outlined in Matt Dean's book does not insinuate or address this causation for technological advancements. Yet, if we examine the technologies added to the SDS-7, in comparison to its predecessor -which includes independent channel technology, EPROM, foot switches, and external memory- the advancements facilitate practicality for Rick Allen. Since Allen is a sponsor of *Simmons* drums, it can be assumed that his injury might have provoked the investigation and creation of the SDS-7's technologies. In the relm of acoustic percussions, many famous percussionists work alongside their sponsored companies to produce innovative wood blends and/or cymbal sounds. These companies then build upon these findings to create other product lines. An example of this is the collaboration between Dennis Chambers and both *Zildjian Cymbals* and *Pearl Drums.* The "Crash of Doom" was created as a crash ride with dark overtones for his Fusion tours. Meanwhile, Chambers is also working with *Pearl* to create the "Reference Series," featuring shells that have been tested for the ideal wood blend for each different size drum. The same can be question in the case of Allen and *Simmons*. Therefore, the presumption that causation for

technological advancements, post SDS-7, may have resulted from personal demands of drummers.

This case study thus concludes that, due to the previous points, a significant factor for genre differentiation with the same band is due in part to the transition from acoustic to electronic percussion, which in turn resulted from the available technology at the given time. The evolution of technological advancements in percussion is due to causation, crucial to the evolution and success of the music.

Drum Partitions

Apart from the technology that influenced Allen's return behind a drum kit, the band's Pop-Metal, or even Pop-Rock status, with respect to drum partitions, was also subject to specific stylistic characteristics. The Rock drum partition transcribed at the beginning of this chapter is a one-bar drum statement from the band's hit single "Pour Some Sugar on Me." While the intensity of the music screams Rock and Metal, as well as the presence of a bass drum mirroring the bass line, the sound produced by Allen's SDS-7, the latter year of the 1980s featured the SDS-9, was characteristic to sounds found in acts such as Genesis, Madonna, Duran Duran, and Whitney Houston.

Results and Conclusions

According to the information revealed by each case study, the influence percussion had on the evolution of popular music was twofold: the percussion influenced

the drum partition and its characteristics and more importantly, the drums utilized and their impact. The beginning of the chapter provided general information concerning some percussion styles that may have influenced Pop drummers. These traits can be found in much of the Pop repertoire, which, as previously explained, creates a bridge between the genre from which the stylistic components derive and Pop. This creation, or better yet, fusing of two musics, is a representation of something new. While the presence of other characteristics is necessary in order to create a genre, the influence of the drum partition is sufficient in presenting the signature of one genre within another. Furthermore, the discussion concerning the aural differences between electronic and acoustic percussion, provides the reader with a basic understanding of each drums technologies and limitations.

The second half of this chapter, however, has established the evidence to show that electronic percussion had an indelible influence on the music. Examining music categorization, the devices utilized in each recording, and the impact on the music all lead to this conclusion. In doing so, the first two case studies examined the sole factor in categorization, when it came to analyzing two pieces which were audibly similar. The differentiation in *Billboard's* categorization enhanced change, therefore, providing a possibility for evolution. The advancement in percussion technology supplied musicians with sampled options other than the typical acoustic drum, thus altering what was the norm of 1980s Pop, giving it an ever-changing rather than static nature. These ever-evolving devices were accepted and put to use in Pop which –as we have seen in chapter two- was responsive to the cultural, social, and political desires for change and liberation. Further examination of music post 1990 will demonstrate the transition back to acoustic

percussion; thus proving, yet again, that if 1980s Pop had not accepted the characteristic sounds of the electronics produced at that time, the music would not entail the over-exaggerated snare pads, deep bass drums, and digital claps as well as digital effects and swoosh sounds. Electronic drum companies would also not have attempted to produce electronic drums that sound authentic, which is the technology we have today. The acceptance and audible support of critics and fans facilitated the transition from acoustic to electronic percussion. Ultimately electronic percussion significantly and indisputably influenced the norm of what was to be expected of the decade's Pop music, thus presenting that bridge, or link, with much music that incorporated electronic percussion.

Thus, we can clearly see that electronic percussions have not only been featured in music since its creation in 1971 but the generations of electronic percussions have directly influenced the improvement and production of the music. However, a brief examination of causation may conclude that the technologies may have been created for innovation, but -perhaps- excelled due to personal demands of famous drummers. We are therefore able to conclude that electronic percussion will always remain both popular and crucial during times of innovation.

Conclusion

The previous chapters have discussed the significant relationship between the emergence and innovation of electronic percussion and its impact on 1980s Pop music. The detailed history demonstrates how electronic percussion elements contributed to and impacted on the music which began to use these devices. This thesis has put forward a seamless timeline which demonstrates the important watersheds within a genre, whether they be compositional, political, societal, or cultural. Using the definition of genre as opposed to style, through consultation of the literature of Franco Fabbri, Allan Moore, and Leonard Meyer, I evolved a superiority system which in turn formed the framework for the analysis in chapter three. Furthermore, the timeline supplied in the latter half of chapter two, not only outlined the technological advancements from one generation percussion unit to the next, but also began to demonstrate the important and undeniable relationship between 1980s Pop music and electronic percussion.

The second part of my theory designed and utilized in two segments: the selection and comparison processes. The usefulness of these parts relates to the sub-categorization differences of each piece, which allows for the selection of two songs that share sufficient similarities to be categorized within the same vast term of genre, while still displaying a crucial dissimilarity which in turn situates each piece of music in a different sub-category. I believe that discrepancies on a sub-genre level provide important information that demands further analysis. In doing so, we see that songs which utilize different percussive elements, underneath harmonic and melodic similarities, alter a

composition's categorization. Moreover, these percussive influences result from drum partitions which foster the stylistic characteristics of the 1980s Pop genre.

This genre has been analyzed throughout the thesis as the consequence of the search for self-identity; musically this investigation derives from analysing successful stylistic traits from previous genres and creating a collage that responds to the requirements of listeners. As a performer, using information from previous music experiences –whether it be genres, performances, or training- provides creative innovation for future music, resulting in yet another search for self-identity. Finally, I would like to expand on the reasoning behind the methodologies used in each chapter with a view to reinforce the conclusion that the influence of electronic percussions on 1980s music was pivotal.

Concluding Methodology (Drummer or Listener?)

The detailed description of the history, development, and present state of electronic percussions, provides knowledge of what was and is available in terms of technology. The timeline relates directly to the table of technological innovations discussed in chapter two. As we progress from one chapter to the next, imagine a funnel effect, beginning with the vast history of electronic drums, followed by specific innovations available through novelties, one generation to the next. Ultimately, the case studies conducted in the third chapter reflected the advancements that were most commonly used. Apart from the historical evidence is the identification of the percussion's influence to drum partitions, and therefore, the effects of percussion on the music. Playability always remains the determining factor in the transition to electronic

devices. The conclusion that we can draw from the popular adaptation of these devices throughout the 1980s, was the lack of performance interference. Although this thesis demonstrates -repeatedly- the necessary shift towards innovation, resulting in the evolution of Pop music, and the practicality issues between acoustic and electronic percussions, if percussionists had felt that their talent or performance was at any point jeopardized, other methods of producing authentic sounds of the decade -such as table-top percussion- would have been explored.

The methodology I employed was to extract the necessary information concerning genre -in itself- a difficult task, given the many approaches to this term. Definitions from Franco Fabbri presented the use of sets which focus on several characteristics in order to explain genre. While a definite explanation for genre or style is yet to be agreed upon, the ideas expressed in Fabbri's article have influenced other scholarly writers. In terms of 1980s Pop music, Chris Rojek speaks of the political, cultural, and societal influences on genre, along with technology, supporting each through selective criteria, similar to those discussed in chapter two. These conditions which create the foundation of genre directly link to Fabbri's theory of sets; sub-factors within each criteria will alter focus, yet any combination of the sets will result in a genre. This is true -though not exclusive- to Pop. Furthermore, the technology implemented in the genre derives from the advancements discussed in chapter one and of course also rests on the importance of aural acceptance. Simply put, in order for electronic percussion to have been identified and credited as a necessary stylistic trait of Pop, the sounds produced by the device as well as the "oumff" it supplied to the music must be acknowledged by the listener. This paradigm presented three possible questions: were electronic percussions utilized solely due to their

playability? Were they accepted as the result of the 1980s Pop authenticity? Or were they accepted because they were innovative? The information provided within chapter two affirms a combination of the three with slight nuances. I have explained how the introduction of electronic percussions was due to the search for innovation. Meanwhile, expressing those innovations needed to be both effective and efficient; playability as well as the ability to provide listeners with a satisfying product in turn resulted in popularity and success for an artist.

Final Words

In conclusion, the innovations brought to the genre by electronic percussions, were measured by their importance to a song's chart categorization. Both arguments which I used provided sufficient data when selecting songs for comparison as well as the comparison process itself. The chapter introduced "Hook Theory" as a crucial tool in the development of my thesis. Dave Carlton's mass library of Pop transcriptions facilitated the analysis of similarities between Pop songs. Selecting two musical works for comparative analysis creates a universal link between songs of a common genre; as well it provides a basis for investigating differences. These differences -in turn- suggest reasons for sub-categorization. Furthermore, since differences influence the music, the comparison process is especially useful to identify the muse. The result of each case study reinforces the main contention -that the significant difference which accounted for categorization was the percussions used. While the use of electronic or acoustic percussions does not in itself prove musical development, the influence of the percussions used undeniably does impact drum partitions. Patterns performed on electronic drums require, in the case of Phil Collins, enhanced stroke precision leading to slightly simpler

drum patterns; simplicity leaves room for accuracy. These "simpler" less complex patterns support many musical layers. For instance, bands from the 1970s did not depend on sampled tracks, since the sound was produced by live musicians, thus resulting in a less saturated sound. However, Pop music from the 1980s included all innovations, including samples, synth bass, multiple synthesizer partitions, and doubled guitar lines. The relative void provided by drum patterns avoids over-saturated electronic sounds, in turn producing easy listening music.

Huey Lewis' track incorporates synth as does Ray Parker's song, yet the prominence of electronic percussion makes the latter the more recognizable of the two. Lewis's track is featured on his hit selling album *Sports* which grossed 10 million copies. The hit single itself attained "Gold" recognition, according to the Recording *Industry Association of America* (RIAA)[102], which accounts for 500,000 – 999,999 copies sold.[103] Parker's album won "Platinum" recognition on the RIAA chart, achieving over 1,000,000 copies sold.[104] Moreover, this album tracked two versions of the single, thus gaining the "Gold" recognition awarded by the RIAA. Furthermore, Parker's track peaked at number one on all *Billboard Pop* charts. I state this in order to illustrate the cultural acceptance of

[102] The RIAA's shipment statistics for the recorded music industry include key formats (CDs, cassettes, downloads etc.), and both the number of units and dollar values are included as well. This data is our estimate of the size of the U.S. recorded music industry based on data collected directly from the major music companies (which create and/or distribute about 85% of the music sold in the U.S.), and estimates where possible for the remaining parts of the market.

[103] RIAA, "Gold and Platinum Searchable Database," *Recording Industry Association of America*, Accessed March 5, 2014 http://riaa.com/goldandplatinumdata.php?resultpage=1&table=SEARCH_RESULTS&action=&title=&artist=Huey%20Lewis&format=SINGLE&debutLP=&startMonth=1&endMonth=1&startYear=1958&endYear=2008&sort=Artist&perPage=25.

[104] Ibid., http://www.riaa.com/goldandplatinumdata.php?artist=%22Ghostbusters%22.

these electronic devices, and I utilize record sales as additional evidence to support the conclusions of this case study.

The second case study analyzed two Pop songs from different decades, examining the effects of electronic percussion. Barry Manilow utilized these devices to popularize his swing style song. The comparison to Steely Dan's tune emphasizes Manilow's need for popularity, thus reinforcing the argument of the characteristic importance of electronic percussion to Pop music of the 1980s. The influence of electronic percussion should be apparent by both the openness of drum partitions, and furthermore, the ever-growing subliminal demand for the electronic drum sound featured in Pop.

Ultimately, the final case study demonstrated the effect of electronic percussion on a music act's status. Def Leppard transitioned from a Hair Metal or possibly even a Heavy Metal 1980s act to a Pop Metal act, largely because of Rick Allen's necessary transition to electronic percussion, as the band's noteworthy change. Although, John Covach's study of chart crossover, raises some debate, the research presented in the thesis explains the importance of electronic percussion as a forerunning stylist characteristic of the genre. The influence of the technologies available at that time, indicate primitive knowledge of technology within music; nevertheless, Pop music has not departed from this characteristic trait. Present day Pop artists still utilize electronic enhancements in terms of percussion; samples, triggers, or full percussive setups still remain important. Therefore, it is apparent that Pop music may not achieve international recognition without the influence of electronic percussions on drum partitions, authenticity, and composition.

As a former touring performer as well as studio musician, I have had the luxury of working with many electronic devices, yet none predate the V-drum era. Therefore research and links were created by examining archived user manuals, blogs, time frames, and dates. Although the timelines are accurate, the presence of more secondary sources might reveal further information on the importance of instrumentation and playability to genre. Also, the theories constructed in chapter three could result in better findings on a wider scale. The chapter encompasses only three instances in which electronic percussions truly influenced the evolution of Pop music; further research featuring numerous case studies must be conducted in order to expand and reinforce the argument surrounding the importance of electronic percussion to the composition of Pop music.

At the doctoral level, further research, including interviews with product representatives as well as musicians from the 1980s, will provide further information and insights to the importance of this instrumentation to 1980s Pop. Moreover, the influence of self-identity and instrumentation, in this case the influence of electronic percussions image, will further prove the importance of these devices to a genre so in tune with "image" as is shown by the widespread popularity of MTV and music videos. Another area of study which should be further examined is causation for creating these devices in relation to the artists who were performing them. Nevertheless, this initial study that instrumentation impacts genre may lead to additional research –in areas such as the introduction of odd shaped electric guitars and basses, keytars, digital processing, and vocal correction. For the present, though, we can conclude that the innovations in electronic percussions which were available by the early 1980s shaped, impacted, and enhanced the Pop music genre of the decade in crucial, undeniable, essential ways.

Appendix

Electronic drums and their modules

Figure 14: Pollard Syndrum Module

[105]

[105] Matrix, "Matrixsynth: Syndrum Quad Vintage Analog Drum Machine with Custom Wood Sides," *MatrixSynth* (blog), last modified March 28, 2011, http://www.matrixsynth.com/2011/03/syndrum-quad-vintage-analog-drum.html.

Figure 15: Simmons SDS-IV 2 Channel Module

The SDS Combo
Two Channel
Drum Synthesizer

Unique features:

Instant heavy drum sounds
Natural wood finish drum pads
Tensionable heads for accurate response
Inputs for external triggering (via microphone)
Mono or stereo output
Foot-switch sockets for most functions

The SDS Combo has been developed from its big brother, the four channel SDS3, and can provide a similar range of percussive sounds - Heavy Tom Toms, Bass Drums, Cymbals, Thunder Boards, Steel Drums, Star Wars and an almost unlimited variety of sounds and effects. All the sounds can be triggered by the special Premier Drum Pads or from an external percussive sound (e.g. Snare Drum or Tom Tom) via a microphone. The addition of foot switches for control of decay (like Hi-hat), pitch and external microphone on/off, makes the SDS Combo the most versatile small drum synthesizer on the market.

For further information please contact:

MUSICAID
ARKAY SOUND LTD.

176, Hatfield Road, St. Albans, Hertfordshire, AL1 4JG Telephone: (0727) 33868 Telex: 264854 Cespia G [106]

[106] "Simmons Drum Synth," *Simmons*, accessed March 29, 2014, http://www.simmons.synth.net/sds34.

Figure 16: Simmons SDS-3 4 Channel Module

[107]

[107] "Simmons Drum Synth," *Simmons*, accessed March 29, 2014, http://www.simmons.synth.net/sds34.

The Simmons SDS3 Drum Synthesizer

Unique Features:

External triggering

Run generator

No leakage of sound

No impact click

The SDS 3 is a four channel polyphonic synthesizer capable of producing an almost infinite variety of percussion sounds - Tom Tom's, Bass, Drums, Cymbals, Timpani, Bells, Gongs, Cow Bells, Vibes, Repeating patterns, Random Tones, Thunder, Jumbo Jets and thousands of indescribable sounds. The synthesizer pads feel and react like a real drum, with shells and tensionable heads, specially made for the synthesizer by the Premier Drum Co.

Unique Drum Triggering

The SDS 3 is unique in that all the sounds it produces can be 'triggered' by an existing drum kit (just place a mike over the top head and away you go!!) - reinforcing the kit sound with the synthesizer as you play, and because the synthesizer can be tuned to any pitch this allows you to instantly re-tune your kit to any pitch (i.e. make your 8'' Tom Tom sound like a 24'' Bass drum, a Cow Bell, or a Snare drum).

Also available is the SDS 4 - a simplified version of the mark 3 with two channels. The facilities include bend up and bend down, decay, impact click, pitch variation, tonal noise control and extra wave shape control giving fine adjustment over tonal characteristics. Similar to the SDS 3 it can be triggered from the pads or through external microphones.

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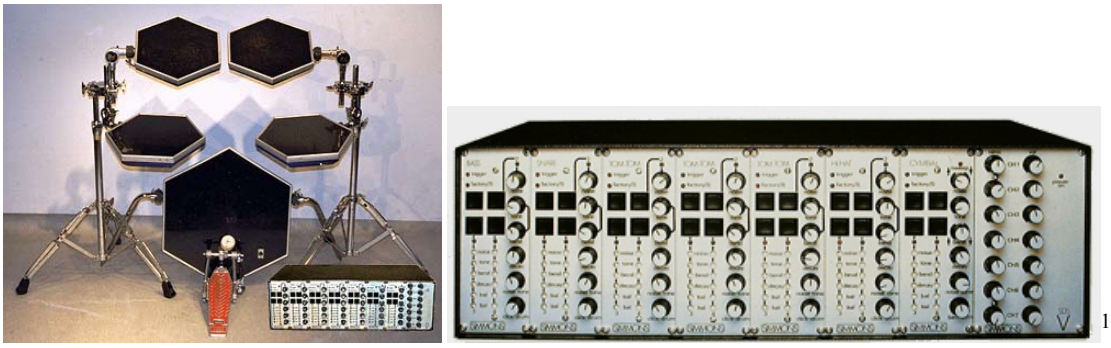
176, Hatfield Road, St. Albans, Hertfordshire, AL1 4JG Telephone: (0727) 33868 [108]

[108] Ibid.

Figure 17: Simmons SDS-3 Module

[109]

Figure 18: Simmons SDS-V Drum and Module


[110]

[109]"Simmons Electronic Drums – The Virtual Museum – Brains – SDS-IV ," *Simmons*, Accessed March 29.2014, http://www.simmonsmuseum.com/?area=devices&view=details&id=10.

Figure 19: Roland TD-20 Drum

[111]

[110] "Simmons Drum Synth," *Simmons*, accessed March 29, 2014, http://www.simmons.synth.net/sdsv.

[111] "TD-20K," *Roland,* Accessed March 29, 2014 , http://www.roland.com/products/en/TD-20K/.

Figure 20: Roland TD-20 Module

112

Figure 21: Roland TD-20 Module (Rear View)

113

[112] "Roland TD-20 Percussion Sound Module," *Musician's Friend,* Accessed March 29, 2014, http://www.musiciansfriend.com/drums-percussion/roland-td-20-percussion-sound-module.

[113] Ibid.

Figure 22: Yamaha DTXtreme III Drum

[114]

[114] Yamaha DTXtreme III Special Set," *Zikinf,* Accessed March 29, 2014, https://www.zikinf.com/materiel/yamaha-dtxtreme-iii-special-set,7070

Figure 23: Yamaha DTXtreme III Module

[115]

Figure 24: Yamaha DTXtreme III Module (Rear View)

[116]

[115] "DTXtreme III Module," *Audiofanzine*, Accessed March 29, 2014, http://fr.audiofanzine.com/module-de-sons-pour-batterie-electronique/yamaha/dtxtreme-3-module/.

[116] Ibid.

Figure 25: SuperNATURAL

How it Works: SuperNATURAL processes many elements to model convincingly the behavior of acoustic instruments:

- It processes your playing input faster than ever before.
- It captures detailed sensing information, such as rim shot strength and the player's position on the pad.
- The sound engine produces sounds that respond and change smoothly and dynamically.

Together, these elements create an authentic 'behavioral reaction', or to put it another way, the drums play and feel just how you'd expect them to. There are three distinct stages to modeling this behavioral reaction:

1. How the pad or cymbal physically feels when you hit it. For example, the Roland mesh head has a more natural feel when the drum stick hits it, responding with an acoustic like bounce and rebound that feels natural.
2. The sensing within the pad is high quality and accurately detects hit strength, position and interval (i.e. the time between each hit). This information is then sent to the module.
3. The sound engine within the module processes all of the information sent by the pad and then recreates the sound accurately and smoothly. This is the key to ensuring the transition in volume and tone is dynamic and natural.

Because the sound engine processes the player's input very quickly, it means that every stroke can be processed individually. Therefore, dynamics, such as ghost notes, flams, buzz rolls and rim shots feel far more realistic. This removes the 'machine gun' effect associated with previous digital drum kits, where every hit can sound the same as the last.[117]

[117] Roland Blog, "SuperNATURAL Technology for Top Electronic Drum Kits," *Roland* (blog), May 16, 2013, http://www.rolandus.com/blog/2013/05/16/v-drums-with-supernatural-technology/.

Drum machines and samplers

Figure 26: Chamberlin Rhythmate

[118]

Figure 27: Wurlitzer Sideman

[119]

[118] Matrix, "Matrixsynth: Sylvia Massy's Chamberlin Rhythmate Model 40," *MatrixSynth* (blog), last modified June 21, 2011, http://www.matrixsynth.com/2011/06/sylvia-massys-chamberlin-rhythmate.html.

[119] Matrix, "Matrixsynth: Wurlitzer Sideman," *MatrixSynth* (blog), last modified January 26, 2012, http://www.matrixsynth.com/2012/01/vintage-wurlitzer-sideman-tube-drum.html.

Figure 28: Acetone R-1

120

Figure 29: Acetone FR-1

121

[120] Gordon Reid, "The History of Roland," *Sound On Sound,* Last Modified November 2004, https://www.soundonsound.com/sos/nov04/articles/roland.html.

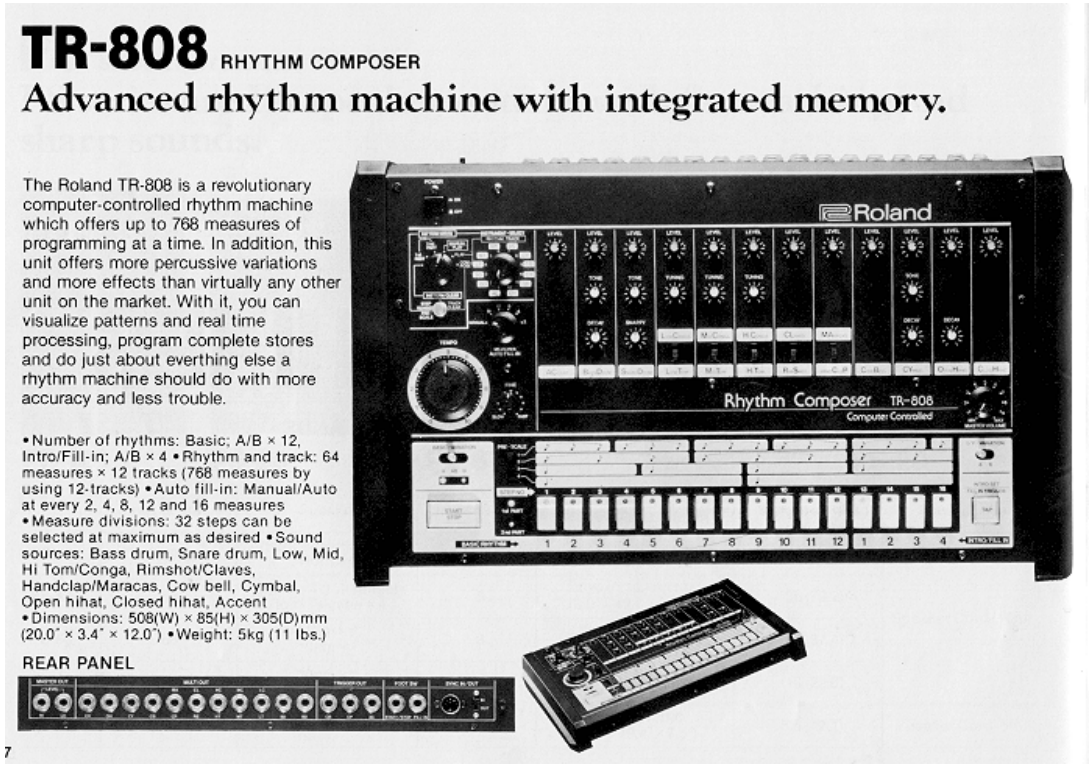
[121] Matrix, "Matrixsynth: Everything Synth," *MatrixSynth,* last modified September 29, 2013, http://www.matrixsynth.com/2013_09_29_archive.html.

Figure 30: Linn LM-1

122

[122] Lolski, "Classic Synth Series: LM-1 & LinnDrum," *Stoney Roads* (blog), August 4, 2012, http://stoneyroads.com/classic-synth-series-lm-1-linndrum/.

Figure 31: Roland TR-808



[123]

Figure 32: Roland TR-909

[124]

[123] Dr. Strangelove, "Is The 808 Back In Business?," *Jaxlore* (blog), Janurary 15, 2014, http://jaxlore.com/?p=3939.

Figure 33: E-mu SP-1200

[125]

[124] "TR-909," *Synthfind*, accessed March 29, 2014, http://www.synthfind.com/2010/10/page/15/.

[125] Matrix, "Matrixsynth: Everything Synth," *MatrixSynth,* last modified September 29, 2013, http://www.matrixsynth.com/2010/10/emu-systems-sp-1200-sampling-drum.html.

Figure 34: Roland SPD-S

126

Figure 35: Roland SPD-SX

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128

[126] "SPD-S," *Roland,* Accessed, March 29, 2014 ,http://www.roland.com/products/en/SPD-S/.

[127] Ibid., http://www.rolandus.com/products/details/1177.

Figure 36: SPD-S compared to SPD-SX

SPD-S

Sampling Pad

Add Sampling to Any Percussion Setup!

Overview | Details | **Specifications** | Option | Support

Pads	Built-in Pads: 9
Maximum Polyphony	8 voices
Sampling Mode	Fine/Standard/Long
Sampling Frequency	44.1 kHz
Input Level	Line : -10 dBu, Mic: -50 dBu
Input Impedance	10 k ohms (LINE/MIC)
Output Level	Output: -10 dBu
Output Impedance	Output: 1 k ohms, Headphones: 47 ohms * 0 dBu = 0.775 Vrms
Memory	Patches: 128, Waves (User): 399 (Pre-loaded Sound 181), Card: 500
Maximum Sampling Time	12 min. approx. (Internal Memory, Long Mode)
Effects	Multi-Effects (30 Type) + Ambience (System)
Display	16 characters, 1 line (backlit LCD)
Connectors	Output Jacks(L/Mono, R, 1/4 inch phone type), Input Jacks (L/Mono, R, 1/4 inch phone type) *LINE/MIC selectable, Headphones Jack (Stereo 1/4 inch phone type), Trigger Input Jack (1/4 inch TRS phone type), Expression Pedal Jack (1/4 inch TRS phone type), MIDI Connectors (IN, OUT), Footswitch Jack (1/4 inch TRS phone type), CompactFlash Card Slot
Power Supply	DC 9V AC Adaptor

129

[128] Ibid.
[129] Ibid., http://www.roland.com/products/en/SPD-S/.

SPD-SX

Sampling Pad

The Ultimate Percussive Sampling Instrument

Overview Details **Specifications** Option Support

Pads	Built-in Pads: 9 (with LED Indicators) * Two external trigger inputs are provided, allowing you to connect up to four Pads.
Maximum Polyphony	20 voices * Maximum polyphony becomes 16 voices according as an operating state.
Number of Recordable Wave Data	10,000 * Including preload wave data.
Sampling Time (Total time for all wave data)	Approx. 180 min. in stereo (360 min. in mono) * Since the internal memory included with the SPD-SX contains preload data, the available sampling time will be less than the time above.
Data Format	16-bit linear PCM (WAV/AIFF)
Sampling Frequency	44.1 kHz
Kits	100
Kit Chain	8 chains (20 steps per chain)
Effects	Master Effects (21 Types) Equalizer Kit Effect 1 (20 Types) Kit Effect 2 (20 Types)
Display	Graphic LCD 128 x 64 dots
Connectors	PHONES jack (Stereo 1/4-inch phone type) MASTER OUT jacks (L/MONO, R) (1/4-inch phone type) SUB OUT jacks (L/MONO, R) (1/4-inch phone type) AUDIO IN jacks (L/MONO, R) (1/4-inch phone type) (with LINE-MIC GAIN control) TRIG IN jacks (1/2, 3/4) (1/4-inch TRS phone type) FOOT SW jack (1/2) (1/4-inch TRS phone type) MIDI connectors (IN, OUT) DC IN jack COMPUTER connector USB MEMORY connector
Interface	Hi-Speed USB (USB-MIDI, USB-AUDIO, USB Mass Storage Class, USB Flash Drive)
Power Supply	DC 9 V (AC Adaptor)

130

[130] Ibid., http://www.roland.com/products/en/SPD-SX/.

Electronic Percussion and Self Contained Drums

Figure 37: Pollard Syndrum CSM

[131]

Figure 38: Star Industries Synare

[132]

Figure 39: Synare Tympani


[133]

[131] "Sydrum CSM," *Wordpress* (blog), Accessed March 29, 2014, http://laurmau5.wordpress.com/tag/pollard-syndrum/.

[132]"Synare," *Wordpress* (blog), Accessed March 29, 2014, http://laurmau5.wordpress.com/tag/pollard-syndrum/.

[133] Matrix, "Matrixsynth: Everything Synth," *MatrixSynth,* last modified September 29, 2013, http://www.matrixsynth.com/2011/12/synare-tympani.html

Figure 40: Roland PAD-8

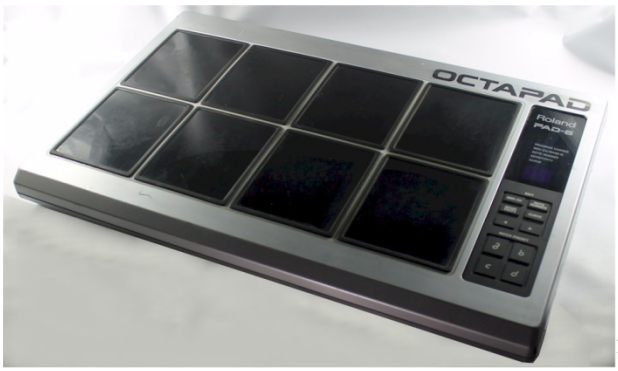

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Figure 41: Roland SPD-30

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[134] "Roland Pad-8" *Sound on Sound* (blog), Accessed March 29, 2014, http://www.soundonsound.com/sos/sep01/articles/qa0901.asp

[135] "SPD-30," *Roland,* Accessed March 29, 2014 , http://www.roland.com/products/en/SPD-30/.

Figure 42: Roland HPD-15

136

Figure 43: Roland HPD-10

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[136] Ibid., http://www.roland.com/products/en/HPD-15/.
[137] Ibid., http://www.roland.com/products/en/HPD-10/.

Figure 44: Roland HPD-20

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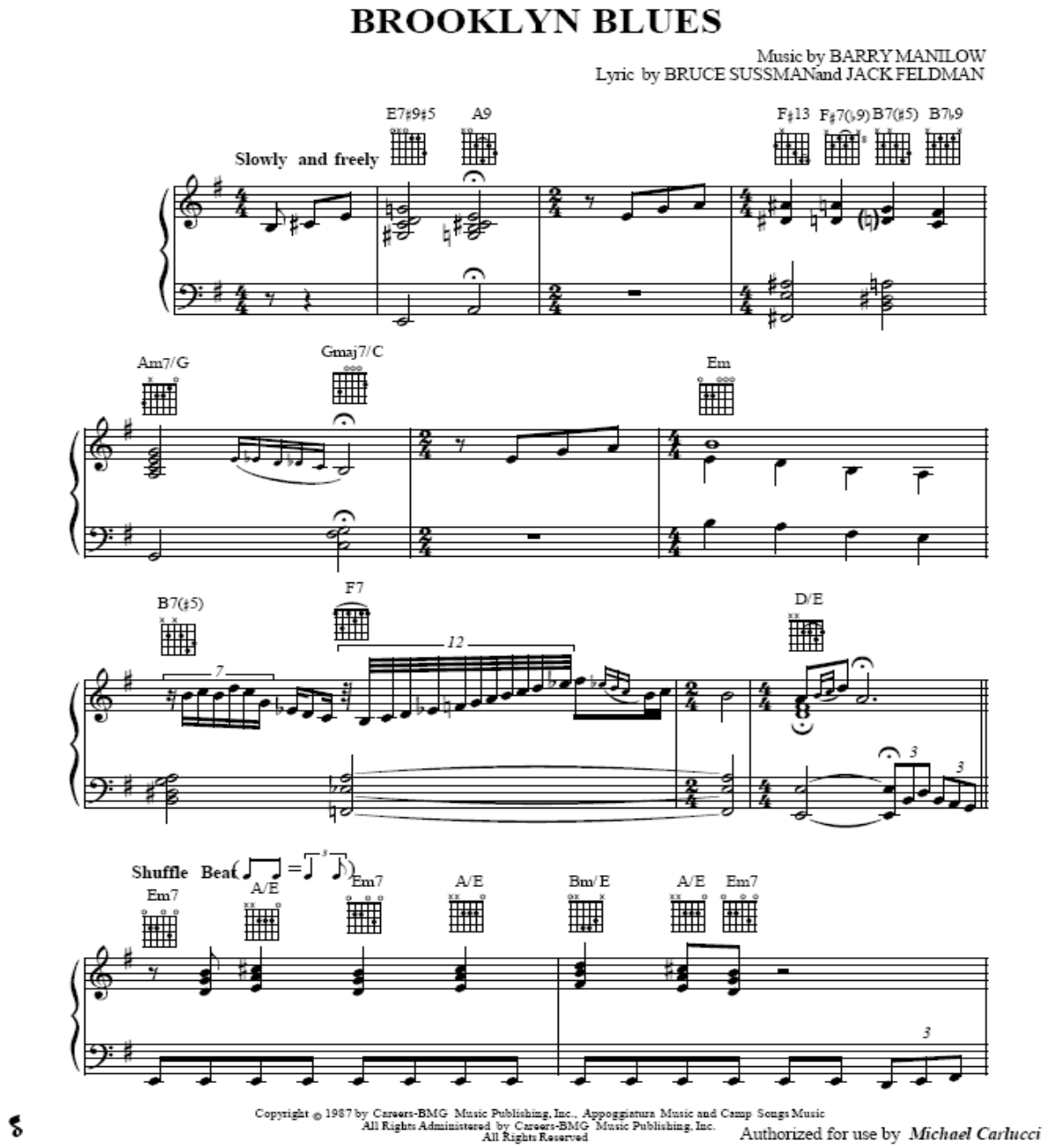
[138] Ibid., Ibid., http://www.roland.com/products/en/HPD-20/.

Figure 45: Brooklyn Blues



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