THE ROLE OF MUSIC THEORY IN MUSIC PRODUCTION AND ENGINEERING

by

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THESIS ABSTRACT

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Due to technological advancements, the role of the musician has changed dramatically in the 20th and 21st centuries. For the composer or songwriter especially, it is becoming increasingly expected for them to have some familiarity with music production and engineering, so that they are able to provide a finished product to employers, clients, or listeners. One goal of a successful production or engineered recording is to most effectively portray the recorded material. Music theory, and specifically analysis, has the ability to reveal important or expressive characteristics in a musical work. The relationship between musical analysis and production is explored to discover how music analysis can provide a more effective and informed musical production or recording and how a consideration of music production elements, notably timbre and instrumentation, can help to better inform a musical analysis. Two supplemental MP3 files are included with this thesis to demonstrate proposed mixing guidelines derived from the analysis.

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INTRODUCTION

The role of the artist has changed dramatically since the development of technology and the globalization of media. The introduction and integration of computer technology have revolutionized numerous professions, and the Internet now provides content creators with a wide exposure that would have been previously impossible. What once required an ad agency, a publisher, a distributor, or a record label can now be done fairly independently using these new technologies.

Because of these advancements, the demands on modern-day artists or content creators are different, and more diverse than they were several decades ago. The visual artist, for example, is expected to be familiar with computer graphics, and perhaps photography and film. The writer is expected to have a wide-reaching voice by means of blogs, online articles, videos, and public commentary. The stylist or clothier is expected to have a substantial online portfolio. All artists, it could be argued, are also now expected to have a far-reaching presence via social media.

With the rise of independent artistry, there are many out there who have had to learn how to self-promote and market in order to reach their audience effectively. This is partly due to convenience, and partly due to necessity. Third-party services like promoters, marketing agencies, producers, and graphics designers are usually out of the financial reach of many independent artists. As a result, many have had to learn these skills themselves. The modern-day musician is no exception. “Technology changes the accessibility of music for artists, and every new invention gives a different type of person a different approach to music." (Muller 2014).

Today's musician is expected to be more than just a performer, a composer, or whatever his or her primary focus may be. As an example, performers are expected to also be able to promote themselves and effectively network, and in many cases, they are expected to know how to teach their craft. With traditional patronage virtually gone in the modern day, the composer is required to seek other avenues for composition, whether film scoring, game soundtracks, academic composition, or otherwise. In the present day, most of these avenues require a much broader skillset than simply knowing how to compose. Many are directly related to technologies that have become prominent in the past few decades, and these new advantages, as well as the new educational demands of artists and musicians, are a result of these newly developed technologies.

The changes in the music business resulting from digital technology are especially noticeable in the realm of popular music. Musicians of the past typically were dependent on exposure and selection by large corporations. Not only was this based on luck in many cases, but a record label might not always have the interests of the musicians as a primary concern. In many ways, new technologies and the demands they have brought with them have, for many artists, been a blessing rather than a burden. "…So technology and the Internet have changed the way we source and listen to music, but it has also changed the way music is produced. Where twenty years ago, aspiring artists would rely on corporate bigwigs to listen to their demo disc, the Internet has put some power back in the artist's hands." (Harrison 2014)

Nowadays, art in any medium is nearly inseparable from self-promotion, especially given the prominence of the independent artist or musician. The independent artist or composer is often expected to provide a completed or near-completed product

(including a finished recording) for the sake of personal promotion, whether they be independent film composers, commercial composers, video game composers, or otherwise. In recent years, the tasks of the composer or songwriter have become difficult to detach from music technology and production.

The modern-day songwriter or composer is almost always expected to have some familiarity with production tools, from those as rudimentary as notation software, to tools carrying out more complex tasks such as engineering, digital orchestration, scoring, and mixing. The expectation for a composer to provide a finished product themselves is becoming more common, especially for those working independently.

The use of digital samples and virtual instrumentation is becoming increasingly common as well, which requires certain skills to be able to use effectively, most of which are within the realm of engineering and production. The increased use of virtual instrumentation is due to both the high quality of modern virtual instruments, and the sometimes prohibitive cost of hiring and recording real musicians or acoustic sources. Thus, being able to use these tools is one of the most useful skills for the modern musician, and it is becoming more common to see the two (composition and virtual instrumentation) go together, perhaps eventually to the point where they are as inseparable as composition and theory, or performance and self-promotion.

Despite the fairly new developments in music technology and the educational requirements associated with them, some of the educational requirements of the composer remain constant. In many cases, knowing how to play an instrument, especially piano, helps immeasurably in writing and recording, especially when working with MIDI-driven virtual instruments. Knowing how to read, write, and create sheet music is

quite important as well. Knowledge of actual composition and orchestration is a necessary foundation for the successful composer, regardless of what tools are used to realize these compositions, and knowledge of music theory has remained very important and useful as long as people have been composing music.

Music theory's importance to the musician in general is partially due to its widespread application. Music theory, in fairly simple terms, is an understanding of a piece of music in itself. (By "music in itself," I am referring to the underlying concept of a song, which is represented by the transcribed score, by the chord chart, and by the recording in different ways.) It is an understanding of how music works, how it is or can be constructed, and how it can be explained. Traditionally, it is accepted that composition is nearly inseparable from music theory. Whether it is a composer using the tools of music theory to create, or a theorist analyzing compositions to discern compositional principles, the two generally go hand-in-hand. There is no doubt that JS Bach was aware of the rules of counterpoint, and that Mozart was aware of the nuances of sonata form and counterpoint (though they may have called such rules and nuances by different names). In fact, it could even be argued that before composers were seen as artists, they were seen as craftsmen, using the tools provided by music theory to create their compositions.

Because of music theory's reach, it can potentially benefit many different musical fields, including performance, education, composition, and analysis. For the performer, music theory can reveal in greater clarity the important features of a composition, allowing the performer to be more mindful of them during their performance. The educator, of course, benefits from knowledge of theory because it allows him or her to explain how any given musical piece works. The reason why theory has such a reach is

because it is, essentially, the study of music in itself, as it exists in concept, idea, or on the page, so to speak. Furthering one's understanding of music theory can potentially benefit many other musically-related pursuits.

One might be inclined to ask: does music theory benefit engineering and production? With the huge variety of tools and techniques available to the modern-day engineer or producer, the act of music production and engineering has become an art form in itself, something that requires a trained ear, musical experience, and ideally, an understanding of the subject material that is being recorded and produced.

It seems natural that music theory would benefit engineering and production as well, and that an understanding of music production would benefit the analyst in that he or she becomes more aware of production-related elements, like timbre and instrumentation, during the process of analysis. This thesis is aimed at exploring this relationship between music analysis and music production/engineering. Before going further, a few important questions must be considered. The first question: What is the goal of the engineer and the producer? How are they different?

The producer is a bit like a musical director. A producer starts with a musical idea, a few chords or lyrics, or a vague shape (whether it is their own, or another's), and through mixing, layering, and instrumental techniques, distills and hones a musical idea to be most effective in its targeted musical genre. The producer is somewhere between a composer, orchestrator, and mix engineer, guiding the creation of the musical work as well as the recording process.

Richard James Burgess, an English producer, recording artist, composer, and author of *The Art of Music Production* and *The History of Music Production* is one of the

authorities regarding music production. He says, "Music production is the technological extension of composition and orchestration. It captures the fullness of a composition, its orchestration, and the performative intentions of the composer or composers. In its precision and inherent ability to capture cultural, individual, environmental, timbral and interpretive subtleties along with those of intonation, timing, intention, and meaning (except where amorphousness is specified), it is superior to written music and oral traditions. Music production is not only representational, but also an art in itself." (Burgess 2013, 5)

The producer is, essentially, an individual who looks for the intention of a song or composition, and pinpoints what elements make that musical work special, unique, or significant. Then, using the tools of arranging, orchestrating, mixing, and compositional techniques, the producer brings out these significant elements in the most effective way he or she can.

The role of the engineer sometimes overlaps with the role of the producer. The engineer is an individual tasked with the technical process of capturing a musical idea in the form of a recording, who then organizes and hones this recording in a way that most effectively reflects the original ideas and intentions of the performer or composer. While an engineer does not always make decisions about the musical arrangement, they are often responsible for the quality and polish of a mix. They are tasked with the technical process of capturing a recording so that it is as effective and evocative as possible for the listener. "A great mix is one that brings a production of a great song to its fullest potential by effectively manipulating the listener's emotions and focus." (Sarafin 2014)

While the engineer deals more with the technical process of recording, including choice of recording equipment, effects use, microphone placement technique, room acoustics, and so on, there is some overlap between the engineer and producer in that both are involved in the mixing process. As is the goal of the producer, the engineer makes decisions about recording and mixing with the intention of bringing out the significant, unique, and intended elements in a recording.

It is also important to note that not all styles of music are approached in the same way from a production and engineering standpoint. Art music or academic music is often approached very differently from an engineering standpoint, and this is reflective of the backgrounds of these styles. Art music, or as many would call music written in a classical style, was created long before recording technology existed, and was meant to exist as a finished product in acoustic format. The "mixing", if one could call it that, was done by the members of the ensemble and the instrument design, so that an acoustic performance of, for example, a string quartet, will be acoustically balanced for the listener without the aid of electronics. The structure of the composition, the design of the instruments, and the layout of the ensembles all contribute to a finished and balanced performance, since there was no other choice when these styles came into existence.

Because of the usually acoustically balanced nature of classical styles, most engineers seek to capture these performances in the most realistic, unaltered, and accurate way that they can. This usually requires a few pairs of very uncolored and accurate microphones, and very little is done in post-production to seriously alter the captured performance. The role of the "producer", in this case, would be more in the hands of the composer and the conductor or ensemble.

This differs greatly from the approach to recording and producing popular music styles. With the partial exception of some jazz styles, popular music exists as a product of technology, intended for media of technological playback such as vinyl, tape, CD, MP3, and so on. The music is written and distributed with the idea that its primary method of communication would be aided by recorded technology in some way, whether that means playing a live show with the singer and guitarist being amplified by a PA, or creating recordings with every instrument, regardless of natural acoustic volume, in perfect balance. A drum set and a singer, for example, are usually very unbalanced volume-wise, but these limitations are avoided because popular music came into being as a result of new technological advantages.

The engineers and producers, in this case, do not seek to capture the source material in as accurate a way as possible. Many average fans would probably feel appalled at hearing their favorite pop star singing with no enhancement or accompaniment whatsoever, and most bands, even while practicing for their own sake, need the aid of a PA to reach anything close to acoustic balance. The engineer and producer, in this case, do not try to capture these styles in as realistic a way as they can, but rather, in as *good* a way as they can. This is where the biggest distinction lies between the engineering of art music and popular music styles. Art music usually requires more precise and careful engineering, while the production of more modern and popular styles are more of a creative process, where there is more room to make decisions to alter or enhance the source material. In some styles, electronic dance music for example, the production, engineering and compositional process are merged. It is for all the above reasons that the music chosen for analysis in this thesis will be in a modern popular style.

Another important question must first be considered: What exactly is the purpose, or the goal of music theory, especially as it relates to engineering and production? What does it aim to do? Although this question could likely be discussed in hundreds of pages on its own, Steven Laitz and Christopher Bartlette summarize it well in the introduction to their textbook *Graduate Review of Tonal Theory* (Laitz and Bartlette 2010, 1-2):

> When we pay attention to something or someone, we observe, analyze, interpret, and decide whether (and how) to act. These actions are based on our abilities, our experience, our traditions, and our knowledge. Our actions are also based on hierarchy. Every moment of our lives is filled with an overwhelming amount of information. We choose what will get our attention: Is it safe to turn on the red light? Does the multivitamin supplement have enough calcium or too much vitamin B? How will I improve a flagging relationship?
>
> In music performance, many choices are made every second, most of which are subconscious, but plenty of which are conscious. In a moment of a clarinet piece, for example, there is an extraordinary number of simultaneous mechanical considerations. Lip pressure, articulation, breathing speed and pressure, finger placement, intonation, etc... There are many other types of analysis that accompany these mechanical elements and require study of the score itself, in order to consider the relationship between individual parts and the overall structure, as well as historical context and style, performance practice, and so on. How do we learn and memorize music? We analyze the score. We begin by grouping events and looking for patterns and their repetitions. We categorize and simplify in an effort to latch onto something we already know...

Some abilities are hardwired, such as seeing a line of pitches and knowing that if there are no gaps, then every consecutive step is to be played. When sight-reading, we do not stop and determine the name of each notated pitch and then find its corresponding location on the piano; instead, we group the pitches into a single, logical shape. We know from experience that when such lines of pitches occur, they are nearly always identifiable scales; we expect another example of a scale and play it immediately as such. If the pitches have unusual chromaticism, then we would return to the passage later and practice it. Another aspect of sight-reading is the ability to determine a hierarchy. For example, we might leave out less important, or nonstructural notes, in order to play only the notes that are necessary. Examples include removing octave doublings and thinning out a texture while maintaining a given sonority. These important abilities come from analysis and interpretation.

Analysis encourages us to attend actively to the music; we reflect and then make choices based on our reflection, which we then apply to performance... Analysis should illuminate a work's unique structure on the one hand and place that artwork within the wider musical context, comparing and revealing its underlying structure as conforming to more general and consistent tonal principles. This requires musicianship, opinion, creativity, and decisiveness. Analysis matures us, because active attention to a work's structure reveals subtle connections made between phrases, sections, and movements. We can also consider important deviations from expectation that are marked in our consciousness and rendered expressively in performance.

Although this definition is focused more on theory's role for the performer, theory does have use for the composer and the listener as well. It can effectively provide a road map for composing or understanding music, as well as interpreting it as a performer.

Perhaps music theory's role could be summed up as this: Music theory is the study of music in itself, as it exists in concept (as explained earlier). This allows us to understand the music at hand in great detail, and allows us to explain how and why musical features function in the way they do. Perhaps most important is that music theory can tell us what makes a certain musical work or group of notes special or significant. Studying Baroque-era fugue gives us great insight into the contrapuntal mechanisms that make that form of music so special. Studying Sonata theory gives us understanding into the narrative and well-balanced structure of sonata form and Classical-era conventions, which are some of the most significant and unique features of music from this era and style. Studying Romantic-era art songs gives us insight to the nature of phrasing and expressive melodic lines, which are perhaps the most noteworthy feature of this style of music. Perhaps it is as simple as a noteworthy artistic deviation from conventions, or a particularly expressive melodic line- it can be explained, in one way or another, by music theory.

This is perhaps one of the most important powers of music theory and analysis. It allows us to understand what makes a certain piece of music unique or special, and what features are significant. Nowadays, almost no currently existing music lies outside of its explanatory reach, either.

We can now consider how engineering/production and music theory work together: If music theory enables us to point out what makes music special and what features are significant, engineering and production might be able to take these noted features of a recorded musical work, and using different tools and techniques, bring out these special features in the most effective possible way, allowing the music, on its own expressive terms, to be as effective as possible for the listener. Furthermore, although it is not the primary focus of this thesis, we can also ask if the careful attention to timbre, instrumentation, and performance that is often considered by the engineer and producer can potentially aid in a more complete musical analysis (since timbre and instrumental texture is not as often considered in musical analysis as it is in production and mixing).

As intuitive as the combination may seem, there is very little, if any, literature considering the relationship between music analysis and music engineering/production. This thesis may be one of the first instances where we explore music theory's role in aiding engineering/production decisions, as well as music production's role in providing greater insight to the importance of timbre and instrumentation in musical analysis. Here, we will look at how the engineer, producer, and self-sufficient composer (often times one and the same, today) can benefit from music theory's analytical power, and how the analyst or theorist can benefit from knowledge of production and engineering techniques to give them a greater understanding of the timbral characteristics of a musical work.

Dr. Kofi Agawu, a prominent music theorist, author, and scholar, explains the importance of technology in regards to analysis. He says, "Analysis may bear a complex relationship to technology, but to ignore technological advancement in analytic representation is to subscribe to a form of irrationality…" (Agawu 2009, 6)

CHAPTER II

OUTLINE

The upcoming chapters of this thesis are as follows:

- Chapter III is a literary review. It is here that we will be "gathering the tools" so that they can be used in the following sections of the thesis. This section is split up into two parts: a music theory literature review, and an engineering/production literature review. The music theory literature chosen for review in this thesis will be directly applicable, and will be concerned with analyzing music and understanding musical significance and importance through analysis of tonal and popular music. From this literature, tools of analysis will be gathered for application in the following sections. The engineering/production literature is chosen for its focus on techniques used in engineering, mixing, and production to enhance the emphasis and interest of certain musical elements in a recording. After all of these sources are summarized, at the end of the literature review, the tools of analysis and mixing techniques will be noted and summarized for use later.
- Chapter IV is a gathering of the analytical tools used in the following analysis, and a brief explanation of them.
- Chapter V is an analysis of three chosen popular music works and their associated recordings. The works chosen are from three contrasting eras of musical style and engineering methodology, and are chosen for their high levels of composition, production, and arrangement, as well as engineering quality and market success. These works are:

a. **Here Comes The Sun**, written by George Harrison of The Beatles. Album: *Abbey Road*, 1969. Produced by George Martin, engineered by George Martin, Geoff Emerick, Phil McDonald.
b. **Thriller**, written by Michael Jackson. Album: *Thriller*, Nov 1982. Produced by Quincy Jones and Michael Jackson. Engineered by Bruce Swedien.
c. **Instant Crush,** written by Daft Punk and Julian Casablancas. Album: *Random Access Memories*, May 2013. Produced by Daft Punk (Thomas Bangalter, Guy-Manuel de Homem-Christo). Engineered by Mick Guzauski. Mastered by Bob Ludwig.

These three works will be first analyzed musically, using several applicable tools of musical analysis including Roman numeral analysis and Schenkerian analysis. Then, the form will be mapped out, as well as making note of the climaxes, high-points, and significant features. After this, the recording itself will be analyzed. Here, the production and engineering techniques will be noted, considering the nature of the arrangement as well. These techniques will then be mapped out and their use explained. After these two styles of analysis have been done, both the musical analysis and the analysis of the recording will be considered simultaneously: Are there any places in the piece where the significant musical features and the mixing/production techniques coincide? If so, do they contribute to furthering the expressive effectiveness of the recording and the arrangement?

- Chapter VI is a summary of the analytical findings. After these three works are analyzed in detail, the results of the analysis will be summarized- what could it mean? Are there any patterns connecting the musical and engineering analysis? Are there any similarities in the production decisions between all three? Can production and mixing techniques be determined or predicted using analytical tools of music theory? Do the timbral considerations provide a clearer analytical insight? After the summary of the analysis is done, guidelines will be proposed for mixing and production decisions, based on certain findings of a musical analysis. For example, "Is a recording more effective if the highest point on the *Urlinie* is emphasized by the engineer in his mix? ," and so on.
- Chapter VII is a small case study where these newly proposed techniques will be tested. I have provided a short cover version of "That's The Way," by Led Zeppelin. I have recorded and produced two arrangements, played for the recordings, mixed and mastered the recording, and Nate Farrell, a relative and friend of mine, has tracked vocals and acoustic guitar. After being recorded, the tracks were arranged in two ways:
    a. The first version of the recording is mixed and arranged similarly to the original. It will be a fairly straightforward style of mixing, which will simply consist of balancing the instrument levels and their equalization, as well as making sure the mix is balanced in its stereo placement. This will serve as the 'control' recording.
    b. The second version of the recording is mixed and arranged using the guidelines proposed from the music and recording analysis earlier in the

thesis. The piece is briefly analyzed for structural highpoints and features of significance, and these features are emphasized using various applicable mixing techniques.

In order to see whether these newly proposed techniques improve the recording or arrangement in any way, the two recordings are noted as "Version A" and "Version B", and played back-to-back for a number of listeners of widely ranging musical background. This is to test whether these newly proposed techniques offer anything valuable to the recording. The listeners' musical skill as well as specific likes and dislikes about each version are noted during the study.

From these results, it can be determined whether these techniques are effective at increasing the expressive effect of a recording. As an extension, it can then be determined whether music theory does indeed play a practical role in recording and production.

- Chapter VIII is a conclusion and summary of the thesis, the significance of the findings, and the potential impact of the findings and how others may find use in them.

CHAPTER III

LITERATURE REVIEW

In this chapter, relevant literature is briefly reviewed. The music analysis in the next section will be focused on finding features of significance in tonal and popular music. Thus, the music theory literature that I have chosen focuses on the subject of tonal and popular music analysis, as well as on the analysis of climactic moments and features of importance and significance. There are a number of different kinds of resources available regarding music engineering and production, but for the sake of this thesis, the ones chosen will be in regards to techniques used for providing emphasis in mixing and arrangement.

Chosen Music Theory Literature:

-*Song Means: Analyzing and Interpreting Recorded Popular Song* (Moore 2012)

Of all of the music theory resources here, this one is perhaps the most directly relevant. Dr. Allan F. Moore, professor of popular music at the University of Surrey, has aimed specifically at finding meaning in recorded popular song. In addition to typically-analyzed elements like rhythm, harmony, melody, and song structure, he also considers texture, sound field, vocal tone, and lyrics, things often neglected in traditional analysis, but nonetheless, quite important in the listening experience.

Each chapter of the book discusses a different analytical element of popular music, such as shape, form, delivery, style, and so on. A number of examples are used from various popular songs in a wide range of styles. Some of

the examples are shown loosely in the style of a Schenkerian reduction, and a handful of other academic analytical techniques are employed. Form is very thoroughly considered in this book. As a result, the analytical methods in this book can serve as the foundation for the analysis of the three chosen songs later in the thesis. Although little is said in this book about production techniques, Moore does talk about the historical context of certain musical styles and genres as well, and how the technology available has shaped them.

- *Structure and Style: The Study and Analysis of Musical Forms* (Stein 1979)

Although *Song Means* covers popular form in good detail, understanding the basics of form originating in art music is important for musical analysis as well. Form is present in one way or another in nearly all compositions, and in popular music, it is one of the more basic considerations while analyzing or writing a song. Although this book is aimed at art music, some forms, such as binary, ternary, theme and variations, and a few others, can be applied to popular music as well.

Theme and variations is especially applicable to electronic music, since there tends to be a recurring figure (often in the bass) that is varied upon over time using different instrumentation and production techniques. This book covers theme and variations, as well as other forms, in good detail.

-*Graduate Review of Tonal Theory* (Laitz and Bartlette 2010)

The three works chosen for analysis in this thesis are in the popular style,

and because of that, having a grasp of the basics of tonal theory is important for the analytical process. This book serves as a concise reference on many different topics of tonal theory, including Roman Numeral analysis, phrase types, the basics of counterpoint, sequences, and many others. Although most of these topics are fairly familiar to many academic musicians, the book serves as a great resource for reviewing certain topics within tonal theory. The book puts particular emphasis on phrases and phrase structure, and this is something that is usually important in popular music, especially music with prominent lead vocal parts.

-*Analysis of Tonal Music: A Schenkerian Approach*, 3rd ed. (Cadwallader and Gagne 2010)

Schenkerian analysis is one of the more useful and applicable analytical tools for tonal and popular music, and it is used later in this thesis as well as in a number of other analyses. It is usually beneficial to understand Schenkerian analysis while reading the analysis of many tonal works, and Cadwallader and Gagne's book provides a clear and explanatory introduction to Schenkerian analysis, as well as an explanation of the details of the theory later in the book.

-*Music as Discourse: Semiotic Adventures in Romantic Music* (Agawu, Music as Discourse 2009)

Kofi Agawu's book *Music as Discourse* generally focuses on the analysis of Romantic-era music. Romantic music tends to be driven by the melodic line, and often times, in the case of the art song, the accompaniment is usually

minimal, featuring one or two instruments. Even though Romantic-era music is different in many ways from modern popular music, it could be argued that the art song is the early predecessor of modern popular song. Both feature a fairly instrumentally simple accompaniment, with a great deal of importance placed on the sung melodic line and the poetic content of the text. Agawu's approach puts importance on musical significance, and since the goal is to find points of significance in the music, Agawu's analysis in this book can provide some examples for how to do this.

-“Structural 'Highpoints in Schumann's 'Dichterliebe'” (Agawu 1984)

Similar to his book *Music as Discourse*, Agawu's article focuses on what he calls “structural highpoints” in Schumann's *Dichterliebe*. As described above, the analysis of Romantic-era art song can be useful in that the same style of analysis could be applied to popular song with reasonable effectiveness. This article specifically focuses on high points in the music, and since this is one of the most important factors in my analyses, the analytical methods will be very useful later on.

<u>Chosen Engineering and Production Literature:</u>

-*Modern Recording Techniques*, 8th ed. (David Miles Huber 2014)

For many years, *Modern Recording Techniques* has been a standard choice of textbook and reference for recording and music engineering. First published in 1974, *Modern Recording Techniques* is now in its 8th edition, taking

into account the technological advancements in music technology and providing a thorough overview of every aspect of recording, starting from the acoustic properties of the source to the mastering and distribution of the final product.

A few of these chapters, consisting of approximately 200 pages in total, focus specifically on microphone placement, microphone choice, mixing techniques, and use of effects and signal processing, all of which are tools used to bring out certain elements of a mix in specific ways. These tools discussed in *Modern Recording Techniques* will be relevant and helpful to this thesis.

-*The Art of Mixing*, 2nd ed. (D. Gibson 2005)

This book differs from the others in that it focuses on the foundations of mixing. In the first chapter, the book discusses the nature of the source material that is being recorded, including the song structure, the melodies and themes, the rhythmic nature, and so on. It then discusses details such as placement in the stereo field, the function of the soundstage while mixing, and the importance of each individual feature of a song in regards to these details. In the later chapters, the techniques of recording and mixing more common instruments (vocals, drums, bass guitar, piano, and so on) is explained.

This book will be particularly useful in that it more carefully considers the nature of the music itself being recorded. Because the following sections will include both music analysis and analysis of a recording's engineering and production, a book that discusses both is potentially of benefit.

-*The Guide to MIDI Orchestration*, 4th ed. (Gilreath 2010)

In today's music mixing and production world, MIDI-triggered instruments and samples are becoming very common, to the point where they are a regular and often expected part of the music production landscape. A great deal of the more recent music to be released features various layers of digital instruments and tones, whether it is from a synthesizer or from samples of real acoustic sources. Many of these techniques are employed during places of musical importance, to give size, emphasis, or power to certain sections. This thesis deals with musical emphasis in mixing and production, and understanding techniques of MIDI orchestration and layering provides one with a very powerful tool as an engineer or producer.

-*The Home Studio Guide to Microphones* (Alldrin 1997)

In the search for sources describing emphasis techniques in engineering and production, it is always important to consider the basics of sound capture. Microphone choice and placement can make a very big difference in the resulting recording, and depending on what kind of effect the engineer or producer is intending, the microphones can be placed in a different arrangement. This also includes placement to emphasize certain features of a source, which is relevant to the goals of this thesis. The Home Studio Guide to Microphones contains information regarding microphone technology, microphone brands and models, and placement techniques. All of these can play an important role in the idea of recorded emphasis, and many engineers agree that the original point of capture at

the sound source is the most vital step in creating a high quality recording.

-*Mixers, Signal Processors, Microphones, and More* (B. Gibson 2005)

Bill Gibson's book covers the technical aspect of mixing and recording in a great deal of detail, and a number of mixing techniques and effects are discussed with thoroughness. The three most commonly used, and perhaps most useful effects (equalization, compression, and reverb/delay), are covered in the most detail, with each having its own large chapter dedicated to it. A DVD with many audio and video examples is also included, which is very helpful in regards to learning how each of these applied effects sounds in use.

This book will be particularly useful for my thesis, because during the mixing process while making the recording for the case study, equalization, compression, and reverb will be the tools used the most often. They are perhaps some of the most versatile and commonly used mixing tools, and the detail of explanation in the book as well as the audio examples have the potential to be very useful.

-*Creative Recording: Effects and Processors*, 2nd ed. (White 2003)

This book is different from the others in that it specifically covers effects and signal processors in detail. It does discuss tools explained in other books, but it also covers tools and effects not covered in great detail in the other resources, including enhancers, noise gates, modulation, vocoders, MIDI effects, and many others. Although more recently devised, and not as frequently used as the big

three (equalization, compression, and reverb/delay), some of the effects discussed in this book have a great deal of usefulness in the right application, and will very likely be considered during the analysis of the later two pieces chosen (the Michael Jackson and Daft Punk examples), as well as being used on the second version of the mix during the case study.

Other Noteworthy Literature:

Although it would be very difficult to discuss all of the literature out there on the topics of popular music analysis and engineering/production techniques, there are other literary sources available that are worth mentioning. John Covach has written a good deal of literature regarding the analysis and history of popular music, especially in American Rock. His book *What's That Sound?: An Introduction to Rock and Its History* (Covach and Flory 2015) focuses on the Rock style. Three of Covach's other publications *Sounding Out Pop: Analytical Essays in Popular Music* (Covach and Spicer 2010), *Traditions, Institutions, and American Popular Music: A special issue of the journal Contemporary Music Review (Contemporary Music Review, Vol. 19, Part 1)* (Covach and Everett 2000), and *American Rock and the Classical Music Tradition: A special issue of the journal Contemporary Music Review* (Covach and Everett 2000) are collections of scholarly articles regarding popular music, and have a fairly wide breadth within the topic of popular music.

Ken Stephenson has also written about American Rock music in his book *What to Listen For in Rock: A Stylistic Analysis* (Stephenson 2002), which presents a guided

analysis of chosen Rock recordings. Additional relevant sources on the analysis of popular music include *Studying Popular Music* (Middleton 1990), *Popular Music Studies* (Shepherd 1997), *Popular Music in Theory: An Introduction* (Negus 1996), and *Interpreting Popular Music* (Brackett 2000) are all relevant sources for further reading as well.

Regarding production and engineering, *Repeated Takes: A Short History of Recording and its Effects on Music* (Chanan 2000), *History of Music Production* (Burgess 2014), *The Art of Music Production* (Burgess 2013), *Music Theory for Computer Musicians* (Hewitt 2008), and *The Quincy Jones Legacy Series: Q on Producing: The Soul and Science of Mastering Music and Work* (Gibson and Jones 2010) are a number of other relevant literary sources.

CHAPTER IV

GATHERING THE ANALYTICAL TOOLS

Now that a number of relevant sources have been briefly reviewed, the most applicable and useful information within these sources can be gathered and summarized here, to provide a sort of analytical toolset, preparing for the musical analyses in the following sections. The most relevant information in the above sources has been distilled, and this section will provide an explanation and outline as to how the following analyses will work. In the later analysis section of the thesis, the musical analysis will be the first consideration, so that is a good place to start in our gathering of tools beforehand.

To get a more complete picture of a song or piece of music during analysis, one of the effective ways to do so is begin by considering the overarching or large-scale facts first, and then work from big to small. The first step in this is to consider the perhaps biggest and most overarching detail of the work: what is the actual background of the composition, its composer, and the composer's time period and country? Knowing when and where a song or piece of music was written can say perhaps more about the style and techniques used than any other fact about the piece. This makes it a good place to begin.

In his book *Song Means: Analyzing and Interpreting Recorded Popular Song*, Moore describes style as follows: "Style is generally understood as a certain group of musical features as a result of a number of different factors, whether it is political or sociological, technology used in the musical process, and the overall evolution of style in general, being inter-reactive to other style that exists… Style is, in part, subjective as well. It often operates at multiple levels, even down to the independent musicians providing some unique stylistic features to create a more diverse and complicated whole

if they are collaborating." (Moore 2012, 119)

There is a vast variety of literary sources regarding different musical periods, musical traditions of different countries and cultures, and different genres and styles of music. There are not many very thorough literary sources that cover every musical genre of different eras and nationalities, so finding the most relevant source largely depends on what piece of music has been chosen as a focus.

Moore's book has a large chapter dedicated to historical background in popular music, and it provides a concise but descriptive background of many different popular styles, ranging from the beginning of the 20th century to today in the early 21st century. Depending on the artist chosen for analysis, literary sources might be found not just regarding a certain era or style, but the specific popular artist themselves. With The Beatles, for example, there are a number of sources discussing their music specifically,[1] although with the chosen Michael Jackson and Daft Punk songs, finding literary sources focusing specifically on those artists or songs might not be as easily done. Regardless, knowing the historical and stylistic roots of an artist's genre and era can still provide useful insight to the musical content.

Understanding the technological limitations of the production and engineering during a certain era can provide some insight to the construction of the recorded song as well. Multitrack recording was very limited in the 50's and 60's, and use of stereo was also fairly new during this time. Because of the limited number of tracks available, it is less common that you would find a dense, multi-layered recording during the 50's or

[1] *The Cambridge Companion to the Beatles* (Womack 2009), *The Beatles, Popular Music and Society: A Thousand Voices* (Inglis 2000), *The Beatles' Abbey Road Medley: Extended Forms in Popular Music* (MacFarlane 2007), and *The Beatles as Musicians* (Everett 1999) are all good literary sources that discuss the music of The Beatles. Most of the literature focuses on historical details, while Everett does include some musical analysis in his books.

early 60's, although it was not entirely impossible. In the 70's and 80's, use of 24+ tracks became standard, and it is around this time that we can expect to see a more instrumentally dense song.

Instrumentation is another feature worth noting, as it generally affects the content of the musical work. For example, you would likely find less contrapuntal content in a solo violin work compared to a solo piano work, due to the very nature of the instruments. Instrumentation is, in some cases, associated with the era the piece or song was written as well. Technological advancements mean, of course, that one would never hear an electric guitar in an original 19th century work, and use of the synthesizer and computer-generated instruments especially has been associated with the most recent three decades.

After considering stylistic features, historical context, and instrumentation, we can move to the next largest feature, which is form. All experience necessarily includes temporal change, and part of what makes music unique as an art form is that it must do the same, albeit to different extents depending on the piece. Form is, essentially, how music develops or grows over a large scale. The analysis of musical form essentially asks "What is the story arc of this piece or song? What is the long-term progression? What is the framework?"

Usually but not always, a song or piece's framework can be represented by an established and understood form. Many modern popular songs resemble the structure of 19th century art songs, and may perhaps resemble binary, rounded binary, rondo, sonata-allegro, and so on. Moore's book *Song Means* discusses form, although not in as much detail as other sources do. Stein's book *Structure and Style: The Study and Analysis of*

Musical Forms discusses forms in detail, as they apply to art music and classical music, although the description is thorough enough that they can be applied to the analysis of popular music as well.

Looking closer at increasingly smaller details, the next step after form would be to consider the structure of individual sections or melodic phrases, followed by the harmonic and rhythmic analysis. As a metaphor, music analysis can be compared to storytelling or literature. If form is to be compared to the "story arc", melodic, harmonic and rhythmic analysis can be compared to "paragraph and sentence structure". Laitz and Bartlette's *Graduate Review of Tonal Theory* stands out as having a particularly good summary of phrase structures (like periods and sentences, for example), and especially in music that is very reliant on its melodic content, like much of the songs of The Beatles, understanding the structure of the phrases is important.

The next step would be to consider the harmonic analysis, and an analysis of small melodic or rhythmic motives, changes of time signature, use of chromaticism on a small-scale, and so on. Of course, understanding the basics of harmonic and motivic analysis will be very helpful. For the readers less familiar with these analytical techniques, Laitz and Bartlette's *Graduate Review of Tonal Theory* provides a concise but informative explanation of these techniques.

Perhaps the finest details of a musical analysis are the contrapuntal and text considerations. If form could be equated to story arc, and melodic/harmonic/rhythmic analysis could be equated to sentence and paragraph structure, counterpoint and text painting would be like spelling and punctuation. (Counterpoint is capable of making sense of very small musical details, but also exists on a larger scale within a composition

as well.) Understanding where an important melodic note resolves to or from can reveal, in part, why a certain part of a melody or overall song has certain expressiveness or meaning. *Graduate Review of Tonal Theory* also provides some basic explanation of counterpoint, which is likely sufficient for the analysis of popular music. If one desires a more thorough understanding of counterpoint, the time-honored "Study of Counterpoint" from Johann Joseph Fux's *Gradus Ad Parnassum* is always a great place to continue, and Harold Owen's *Modal and Tonal Counterpoint: From Josquin to Stravinsky* (Owen 1992) also provides detailed explanations of the use of counterpoint throughout different eras and styles.

Schenkerian analysis, the last analytical technique mentioned here, works well to reveal large-scale, medium-scale, and small-scale details, and this makes it one of the most useful analytical tools for both popular music and tonal art music. Schenkerian analysis is fairly broad, and can be applied to a number of different styles. Its use changes somewhat depending on what it is being applied to, and there are literary sources available often for the specific application of Schenkerian analysis to certain genres. Cadwallader and Gagné's *Analysis of Tonal Music: A Schenkerian Approach* provides a good foundation for the understanding of Schenkerian theory, while Agawu's "Structural Highpoints in Schumann's 'Dichterliebe'" is more focused on songs in the 19th century, which is more directly applicable to the analysis of popular music of the 20th century.

"Structural Highpoints in Schumann's 'Dichterliebe'" focuses specifically on points of musical significance and expressiveness, such as a simple melodic peak, a point of textural culmination, a point of greater harmonic tension, and so on. In ordinary Schenkerian analysis, sometimes the most important or meaningful points in a melody

are reduced out fairly early on in the analytical process. Composer and theorist Arnold Schoenberg understood this problem with Schenkerian analysis. After seeing Heinrich Schenker's analysis of Beethoven's 3rd symphony, he responded, "Where are all my favorite notes?" Because the main goal of the analysis in this thesis is to find the greatest points of musical significance, the techniques discussed in Agawu's article will be kept in consideration, and will serve as a foil to the Schenkerian analysis.[2]

Finally, after the music is mostly analyzed, the text can be considered to see if there are any conscious compositional decisions as a result of the text's content. Not all songwriters will "word-paint" with the text, but there are many that would at the very least loosely associate the text with the musical content. In these cases, understanding the text can help solidify understanding of the expressive intention of the music.

Now that the required tools for the musical analysis have been briefly discussed and gathered, the tools used in the analysis of the mixing and production will be gathered and briefly explained, as this will be the next section following the musical analyses later in the thesis. Like in the musical analysis, the analysis of the recording is best done by first looking at historical context, then the larger details, and finally, the smaller details. Analyzing a recording is a bit more free-form because it does not have a set of established theories or analytical techniques in the same way music theory does, so providing more detail in the following explanation is necessary so that the readers can best understand the approach in the following analyses.

One of the most unique things that recording technology brought to the musical world is the ability to capture a specific performance for use in listening as many times as

[2] In his online article "Schenkerian Analysis and Popular Music", Cristobal L. Garcia Gallardo effectively explains some of the strengths and weaknesses of applying Schenkerian analysis to popular music.

desired. Before that, a performance would have had to be heard by means of a live performer. Private listening experiences would have been rare (unless the work was for a solo performer, and played by the listener himself), and the fine details and nuances of a performance would have been somewhat less important in some contexts, because the performance would be fleeting, with each individual performance itself varying and existing as a slightly different interpretation.

With recording technology, one specific performance would be captured and able to be listened to many times. This created a new demand on the performer, and was one of the many reasons why improvisatory and flexible Romantic-style playing was replaced in favor of more exact interpretations. Essentially, the demands of recording are part of the reason the general playing style in art music went from Alfred Cortot to Sviatoslav Richter, so to speak.

Recording gives us the ability to capture a specific performance, so the first considerations while listening to a recorded popular song are the performance aspects themselves. This is something not covered in academic music analysis, but is nonetheless very important to consider. The producer and engineer, then, usually achieve the best results when the performer is in the best possible state for performance. I was lucky enough to meet Roger Glover, an experienced music producer and the bassist of pioneering British hard rock band Deep Purple. He gave me a great piece of advice regarding production: The primary role of the producer is to make the artists feel as comfortable and natural as possible. When they feel comfortable, they are able to produce their best work.

Roger Glover's advice, coming from a place of long-time experience, demonstrates the importance of the actual performance during recording, and as part of the recording analysis, this is going to be the first consideration. Here are some questions to consider: Is the singer singing loudly and powerfully, or is the singer singing in a more personal and intimate way? Is it more conversational-style singing like many Beatles songs are, or is it more lyrical and poetic, like the art songs of the 19th century? Does the singer sound relaxed and loose like many of the vocal tracks by Jimi Hendrix, or does the singer sound high-energy and precise like Michael Jackson? These sorts of considerations can give us good ideas to both the intended overall mood of a song, as well as important specific passages and notes. The same, of course, goes for the instrumentalists as well.

Historical context also plays an important role in understanding a specific recording. In the 20th century, recording technology has seen a great deal of evolution in a relatively short amount of time. Because of this, every decade has a noticeably different quality and recorded character. Although experiments in stereo recording date back to as early as the 30's, mass-produced music media in stereo did not become commonplace until the late 50's and early 60's, and it would be much more common to hear mono recordings before this time.

The limitations of both vinyl and magnetic tape meant that the timbre and harmonic content of recordings before the invention of the CD would have been different from the timbre of modern, digitally recorded music. The use of vacuum tubes was also much more prominent earlier on in recording technology. Eventually, FET's (Field-effect transformers) provided a more reliable and inexpensive alternative to vacuum tubes, and nowadays, a great deal of recording technology is more fully electronic and transformer-

less, providing the most clear and uncolored sound so far devised.

Magnetic tape, vacuum tubes, FET's, and vinyl technology all contribute to the coloration of a recording. The reduction or softening of high-frequency treble content is usually the most easily audible difference between older and newer recordings. Most of the limitations of older recording and playback technology resulted in a loss of high-frequency and low-frequency content, resulting in more of a focus in the midrange, and as a result, contributing to the 'warmth' many describe with older recordings. Tape, tubes, and FET technology also can alter the frequency curves and harmonic content of a signal, potentially giving a recorded signal a certain thickness or character that many engineers are fond of in certain applications.

As a result of these technologically-dependent timbral characteristics, it would be unlikely that you would find an older recording with a thunderous kick drum or bass guitar, or crystal clear cymbals and acoustic guitars. With pre-1990's technology, it would be very difficult to achieve the same extreme high and low frequency content that digital recordings are capable of. These technological differences will, as a matter of necessity, affect the overall character of the finished recording, depending on what era they were produced in. The differences became less noticeable after the 90's, and instead, the versatility of digital recording software saw more prominent evolution. As a result, in today's recorded soundscape, it is becoming much easier, and much more common, to hear digitally created sounds and effects that would not normally be heard naturally. As a result, if a modern recording (let's say, electronic dance music, for example) uses powerful and punchy kick drums to achieve a strong rhythmic effect, it would be illogical to compare this specific characteristic to recordings that were produced 40 years earlier-

In a way, analyzing a recording is similar to analyzing a composition: taking the specific example on its own terms, in historical context, will provide a clearer understanding to its significance. Beethoven might not sound chromatic compared to Hugo Wolf, but for his time, Beethoven was a revolutionary composer. Likewise, the stereophonic experiments of the later Beatles albums might not sound wild compared to the sort of music produced today, but during the early days of mass-produced stereo recordings, it would have been new and interesting for many people.

Each producer and engineer also has a certain preference for what they consider to be a great sound. Some producers might prefer loud and compressed-sounding recordings, while others prefer more natural and unmodified recordings. Some might prefer the coloration and unique quirks of older analog technology, while others might prefer the clarity and flexibility of digital technology. Perhaps the best way to understand the style or preferences of a certain producer or engineer would be to look at their entire body of work, and find what similarities a majority of their work seems to have.

Like in songwriting and composing, engineering and production also went through trends. When stereophonic recording became more common, producers would sometimes wildly experiment with this, occasionally putting a vocal line way off to the side in one speaker, use dramatic panning effects, and so on. After the early 70's, this became much less common. The 80's saw some of the most recognizable production and engineering trends: lots of reverb, use of the synthesizer, big shotgun-style snare drums, and so on. As an extension of this, the recording equipment used is going to be affected by the era as well. One would be less likely to hear a synthesizer in a recording produced in the 70's compared to the 80's.

Moore's *Song Means* discusses, in good detail, the nature of the performance itself, and briefly discusses the influence of technology as well. For a more detailed look at the history of music production and recording technology, *The History of Music Production* by Richard James Burgess is useful (Burgess 2014). The historical context and the nature of the performance are perhaps the biggest features of understanding a recording. Looking closer, one can look at the details of the instrumental or orchestral arrangement, the effects used, and the details of the mix itself.

Orchestration or instrumentation is also considered during a music analysis, but in terms of production and mixing, knowing when instruments are being used (and what their function is) is just as important as what instruments are being used. To show this in an analysis, a graph using measure numbers could be used to show the entry and exit of certain instruments. The reason why the placement of an instrument is so important in production is because using instruments to reinforce or double musical content is one of the most commonly used and effective techniques employed by the producer or engineer. During a chorus, for example, there are almost always harmonies reinforcing the vocal line (obviously). During an important section, there might be brief instrumental interjections, such as short guitar riffs, horn sections, special percussion, and so on, with the purpose of reinforcing important musical content. Doubling is very common as well- to provide more reinforcement, the engineer might record two performances of the same part and layer them on top of each other, creating more thickness and emphasis. In the actual recording analysis, understanding the entry and exit points of certain instruments is perhaps one of the best ways to pinpoint important musical passages. Moore's *Song Means* does also discuss the role of instrumentation in popular music, although Gilreath's

Guide to MIDI Orchestration is even more relevant in understanding this. Although perhaps unexpected based on the title, this book has a wide range of application. Essentially, MIDI orchestration and actual acoustic orchestration have a lot of the same sonic applications, but MIDI orchestration would be aimed at the producer, while acoustic orchestration would more be aimed at the composer intending to work with real performers. The book does a good job to explain how certain sounds and instruments can be used to reinforce certain parts of a recording, and in the following analysis, it provides good insight to the role of the instruments in the recordings.

Next, the details of the mix and the techniques and effects used will be considered in the following analyses. Huber's *Modern Recording Techniques* is considered a standard textbook in nearly all aspects relating to music engineering, and Gibson's *The Art of Mixing* provides a more comprehensive explanation as to how all of the elements of a musical work can be understood from the perspective of an engineer, and how to make the most effective mixing decisions as a result.

The first mixing technique to consider would be what is called the 'soundstage' or 'stereo field'. This is, essentially, where each part of a recording is placed from left to right, and forward to back. The soundstage has three dimensions: panning, distance, and timbre. The first, and most apparent, is panning. A track's stereo placement can affect its perceived importance in a number of different ways. The instruments placed in the very center are usually perceived as most important, and the center area is often times reserved for the lead vocalist, the lead guitar (usually during a solo), and the kick and snare drum, the most fundamental two pieces within the drum kit. Sometimes, important tracks can be brought out by placing them in a space of their own, without any other instruments near it

in the soundstage. The Beatles would often pan important parts to the extreme left or right, but without much else in that stereo location, allowing the track to stand out despite its position in the soundstage.

Distance is the second dimension of the soundstage. The engineer uses reverb, echo, and equalization to place a track either forward or back, essentially, up close, or farther away. Like with panning explained above, the tracks that are intended to have the most prominence are the ones that sound the closest to the listener, and the less important tracks (usually used for filling in the sound) are often placed farther back in the mix.

Timbre is the third dimension of the soundstage. Human hearing is capable of perceiving sound from approximately 20hz to 20,000hz. This equates to approximately 10 octaves, and this ranges from extremely low bass to very high treble. Each instrument occupies a different place (or a few different places) within this range, which largely determines what the timbre of that instrument is. A kick drum and bass guitar usually occupy the lowest bass frequencies, while a voice might occupy low midtones. An acoustic guitar or cymbal might occupy the higher treble frequencies, and so on. Like in panning, having too many tracks trying to occupy the same timbral space can make a mix sound rather undefined. To remedy this, an engineer usually tries to keep each track in its own timbral space, so that it can stand out among the other present tracks. An engineer can also use this to his advantage: if he or she wants a certain track to stand out, certain mixing techniques can be employed to provide more emphasis within this timbral space.

These three dimensions of the soundstage do not necessarily have to stay put. This is where ‘automation’ becomes useful. Automation is, essentially, the change of a mix element over time. This can include an instrument moving from left to right, something

getting louder or softer, something becoming more or less distant, and so on. Volume and stereo placement are most often automated, but nowadays, nearly anything can be with relative ease. This can create a sense of motion or change, and is very effective for capturing the listener's attention. There is no doubt that an engineer would likely use such automation to bring out what he feels is an important element of a mix.

Now that the soundstage has been explained, the smaller details can be briefly discussed: the use of effects and the consideration of text. The effects are essentially the toolbelt of the engineer and producer, able to perform any number of functions in a mix. Although soundstage and instrumental arrangement are perhaps the biggest considerations, there are a few effects that engineers use the most frequently, and are all commonly use tools in bringing out or altering a certain element of a track or overall mix.

The five effects that are most often used, and will likely appear in certain places during the following analyses, are: Equalization, compression, reverb, echo (or delay), and saturation. If an engineer had only these five effects at his disposal (as well as panning and volume control), he or she would be able to mix nearly any recording with entirely professional results, and it could be argued that all other effects, while convenient at times, are not nearly as important as these.

For the readers less familiar with what these effects do, they will be very briefly described. To begin, equalization is essentially a tool used to increase or reduce the volume of a track or recorded sound within a specific range of frequency. A dull sounding guitar, for example, would be equalized with added treble, so that it would sound brighter as a result. A muddy sounding electric guitar might be equalized with a reduction around 500hz, and so on.

One of the reasons equalization is important is because it allows an engineer to bring out specific characteristics of a recorded sound, and hide undesirable ones, allowing only the desirable characteristics to be clearly audible. A dull snare drum, for example, could be equalized specifically to increase the 'crack' sound of the strike, without affecting the fundamental tone of the drum itself. A prominent bass guitar part might be equalized with more midtones to allow it to stand out better in a busy mix. Because equalization is so effective at bringing out specific characteristics of a sound, it is without a doubt a common tool used by the engineer to emphasize what they feel is important, down to the specific details of the timbre.

Compression is the most commonly used tool to automatically control the dynamic character of a recorded sound. Although its use can be complicated in some contexts, a compressor can be very simply explained as follows: it increases the volume of the quieter sounds, and decreases the volume of the louder sounds. This results in a more even volume level along the whole track. This is particularly useful if, for example, a recorded vocal track has alternating loud and quiet sections. The vocals should always be loud enough to stand in front, but when the singer sings louder, they should not overpower the rest of the instruments. Compression is used to keep a recorded sound in the same dynamic location throughout the whole recording, and for instruments that are intended to be heard evenly throughout the entire song, it is a very useful tool.

Reverb is the most commonly used tool in creating a sense of distance. Reverb is, essentially, the sound of the room or acoustic space that the sound was recorded in. This can include the actual location of the recording, or can be digitally simulated. Digital reverb did not become commonly used until around the 80's, so prior to this time (and

not considering tools like spring and plate reverb machines), much of the reverb would have been a result of actual acoustics in the room that the recording was taking place. The intensity of this effect would have been dependent on how far away the microphone was from the soundsource. A clear example of this is in Michael Jackson's vocals. For his lead vocals, he stood right next to the microphone, but for the background vocals, he desired a slightly more distant sound (so that the background vocals would blend better with the lead) and he would then record these tracks standing several feet back.

Digital reverb can be altered in a number of different ways to make a track sound more or less distant, to make the acoustic space seem smaller or larger, and so on. Reverb can also be used for expressive effect, appearing at some times and not at others. A clear example of this would be in Led Zeppelin's "Going to California." The more dramatic middle section is treated with heavy reverb, while the rest of the song is relatively dry and reverb-less. Echo (also called delay) is used in a very similar fashion to reverb. It creates, essentially, an echo effect, of varying magnitude, and this can also create a sense of distance, but with slightly different applicaton compared to reverb.

Finally, there is saturation. Saturation is also known as overdrive or distortion, but it is perhaps more wide-ranging than most people think when they hear the words 'overdrive' and 'distortion'. Saturation is, essentially, a change in the harmonic and timbral character of a sound as a result of the side effects of certain recording equipment, most notably tubes, tape, and FETs. This usually results in increased harmonic content along the entire frequency range, and in extreme cases, saturation is what gives the electric guitar its characteristic distortion.

In more mild applications, saturation can enhance a recorded sound without

actually sounding distorted or like it is crackling. Tube microphones are generally sought after for vocalists because of this subtle enhancement, and saturation is particularly noteworthy in this thesis in that it has the ability to bring a sound up front, and make it sound bigger and closer to the listener. If there's a sound or element of a mix an engineer wants to bring out, saturation is a useful and common tool.

After analyzing the engineer's use of effects, it is also important to consider this: do the effects used coincide with other mixing or production decisions? Does an engineer decide to move the panning around, or brighten up the whole mix, during the sections where there are more instruments? Does the entry of one track coincide with other mixing techniques?

The same, to a lesser extent, can be said about text. Although text-painting is a more common relationship between music and lyrics, it should not be ruled out that it is indeed possible to do so between mixing and lyrics as well. (If the lyrics take a lighthearted turn, perhaps brightening up the sound of the mix would be appropriate!)

Now that all of the important concepts, terms, and techniques have been briefly explained, we should be fairly well-prepared to approach the actual musical analysis.

CHAPTER V

ANALYSIS OF THREE POPULAR-STYLE RECORDINGS

The following analysis is intended to be the foundation of the thesis. They will be analyzed in an attempt to discover any coincidence between the songwriting and composition decisions, the production decisions, and the mixing decisions. Essentially, the question is this: During the most musically significant passages of a recording, are production and engineering techniques being employed to help bring out these significant features? To keep the analysis as focused as possible, the main analytical goal will be finding areas of musical significance- essentially, to search for the parts of the music that especially stand out, and are intended at being particularly expressive.

For the sake of both variety and credibility, three recordings will be chosen from very different technological and historical eras, and will also be chosen for their high acclaim, popularity, and commercial success. These three recordings will hopefully be representative of high-quality writing within their respective styles and eras.

The three recordings chosen are:

1. “Here Comes the Sun” (Written by George Harrison of The Beatles, from the album *Abbey Road*. Produced by George Martin, 1969.)
2. “Thriller” (Written by Michael Jackson, from the album *Thriller*. Produced by Quincy Jones and Michael Jackson, and engineered by Bruce Swedien, 1982.)
3. “Instant Crush” (Written and produced by Daft Punk, from the album *Random Access Memories*. Engineered by Mick Guzauski and mastered by Bob Ludwig, 2013.)

For the sake of clarity and organization, here are the numbered steps that will be applied to each of the three analyses:

1.Preliminary: Briefly reviewing any existing literature written on the specific song

2. Musical Analysis:

- Historical and cultural context of the composers/writers and the song itself
- Observations about the instrumentation
- Analysis of form
- Harmonic analysis (Roman numerals)
- Motivic/contrapuntal analysis, from both the melodic and rhythmic content.
- Schenkerian analysis
- Analysis of text
- Combination analysis- pinpointing the most musically significant passages of a song

3. Analysis of the production and mixing:

- Analysis of the expressive nature of the performance
- Historical context of the recording equipment and techniques available, as well as popular trends in production
- Instrumental/orchestral arrangement analysis
- Analysis of the soundstage
- Analysis of effects and tools used
- Combination analysis- pinpointing the point in the recording where the mixing and production techniques provide the most emphasis on the musical content.
- Combining both the musical and recording analysis: do they coincide at all?

"Here Comes the Sun" (The Beatles)

To begin, we will look at "Here Comes the Sun" by The Beatles. As a first step, the historical and cultural context must be considered. Written by George Harrison, the song was released on the album *Abbey Road* in 1969. Although the album *Let It Be* was technically their last, the tracks were mostly finished before recording for *Abbey Road* began, and that makes the album the last one recorded before the band's dissolution in April of 1970.

The period of time between 1960 and 1970 saw arguably one of the biggest leaps in stylistic evolution for popular music. During the early 60's, there was a folk revival happening as well as a popularization of blues and early rock-n-roll. The beatnik movement also started to gain momentum, and the Vietnam War sparked a great deal of momentum in counterculture, as well as the music that came along with it.

The "riff" became popular during this time as well. It is, essentially, a short and repetitive guitar motive that serves as a sort of centerpiece or framework for the rest of the song, and it had a strong influence on bands like the Rolling Stones, the Beatles, the Yardbirds, and so on. By 1970, the practice of using riffs would become standard in many styles.

The Beatles were considered the most important of the "British Invasion" bands, for a few specific reasons. One reason is that they generally encompassed a wide range of styles. By 1964, their range of material set them apart from other British rock bands, and the orchestral influences of George Martin as well as the wide range of employed instrumentation ensured that they had a fairly rich instrumental palette to work from.

Another reason was the changing relationship between the performer and the songwriter. Before this point, the writer was often separate from the individual performing the music, and the Beatles were one of the earlier, and one of the more successful examples of the same people filling in both roles. After a while, The Beatles vs. The Rolling Stones symbolized the dichotomy of pop vs. rock in British music.

The later works of The Beatles are noted for being more experimental and forward-thinking, especially considering the limitations of the technology available. In contrast to their earlier songs, their later experimental songs were approached as sort of "studio artwork," employing sound effects that could only be created in a studio (and, as a result, were harder to perform live). This was met with somewhat mixed review, as some critics complained about the experimental effects creating an artificial or inauthentic sound. (Stark 2009) Despite this, *Abbey Road* is the best-selling album of The Beatles. It was produced by George Martin, and the focus of the album was intended to be similar to the earlier approach, allowing Martin to have more rigorous control over the production process. It is because of his influence and knowledge of orchestration that Martin is often times called "the fifth Beatle".

The song "Here Comes the Sun" was written almost entirely by George Harrison, while in Eric Clapton's garden. Harrison had taken a break from stressful business-related matters, and worked on writing the song. Despite being written and recorded in a fairly short amount of time, it received much praise, and is considered one of the finest songs written by Harrison.

On an initial listen, "Here Comes the Sun" has a bright and optimistic sound, perhaps reflective of the bright spring day it was written on. The song comes after "I

Want You/She's So Heavy," which is one of the darkest sounding songs on *Abbey Road*. It starts in the same key that the previous song ends on, but is tuned slightly above A=440hz (using a tool called Varispeed), sitting around A=445hz. This does, without a doubt, contribute to the song's bright sound. Harrison had said that the song "was written on a very nice sunny day in Eric Clapton's garden. We'd been through real hell with business, and it was all very heavy. Being in Eric's garden felt like playing hooky from school. I found some sort of release and the song just came. " (Everett, The Beatles as Musicians: Revolver through the Anthology 1999)

Harrison's style differed from the other band members in that it usually featured more rhythmic complexity and syncopation in the vocal parts, as well as occasionally more advanced harmonic relationships. (Another good example of this would be Harrison's song "Something") These features are definitely evident in "Here Comes the Sun," especially in the section marked 'Development'.

One of the first things that is apparent for any recording is the instrumentation. In this song, there is an acoustic guitar (being the first to appear), vocals and harmonies, drums and bass, and a number of instruments used for accent, including an organ, an electric guitar, string, flute, and piccolo parts (done by George Martin), and a handful of synthesizer tones. The instruments do not appear all at once, but instead, appear and disappear in different sections of the song, providing emphasis and continued interest as a section or phrase repeats.

The most notable use of this instrumentation is in the second half of the song, during the middle section (marked 'Development'). The phrase "Sun, sun, sun, here it comes" is repeated, and the tones of the synth and the guitar change as the repeats occur.

The synths become brighter each time they reappear, and the timbre starts out as soft, and ends big and bright, with the last verse featuring a new contrapuntal melody created with this bright synth sound.

Next, we can look at the form of the song. For my thesis, I am using some common terms slightly differently for the sake of clarity. To avoid confusion, I will describe what I intend to mean by these terms:

Verse: The verse is the part of the song that has the most lyrical content, and it could also be called the "A" section. Each time the verse appears, the lyrics are different. In this way, the verse usually serves as a section involving change, whether it is musically or lyrically, and the focus is on the solo melody, supported by backing instrumentation.

Chorus: The chorus is the counterpart to the verse. It is the part that serves as a 'return', and as it repeats, it maintains the same lyrical content. In this way, the chorus can serve as a sort of point of lyrical foundation or theme as the rest of the lyrics in the verses and transitions change. The chorus is often times vocally harmonized (hence the name chorus), and it is often times a point of higher energy or expressiveness compared to the verse, which is usually more reserved. For the purposes of this thesis, paying attention to these points of higher energy (usually the chorus) is important.

Development/Solo/Interlude: Also called a "C" section, this is a break from both the verse and the chorus, in some way. This means it could be thematically different and instrumentally similar, instrumentally different and thematically similar (in the case of a guitar solo), or both thematically and instrumentally different. These sections are important in giving a song variety, and can be found with both higher or lower levels of expressive energy.

Transition/Retransition/Bridge: These sections are often times shorter than a verse or a chorus, and are intended to move from one main section to another. This is where my terminology tends to differ somewhat from some other popular interpretations[3]. For my analysis, a section that moves from the verse to the chorus is called a Transition. A section that moves from the chorus back to the verse is called a Retransition. A section that connects two similar sections together (a bridge and a bridge, or a chorus and a chorus) is called a Bridge, or more specifically, a Verse-Bridge or Chorus-Bridge. It is important to keep in mind that a transition section usually has different melodic (and sometimes harmonic) material as it builds energy or moves into the following section, but it is not necessary that a song contains transitional sections at all. Some songs move right from the verse to the chorus, and back to the verse.

Coda/Ending/Outro: This section functions as the end of a song, either concluding it with a cadence, or fading out as it plays. It usually contains material from the chorus, but there are no hard rules- it can contain material from anywhere.

Below is a chart outlining the form of "Here Comes the Sun," marking the major sections as well as the transitions to and from these sections (Fig.1). A reference at the bottom shows the location of every 16 measures, so that the proportions on the chart are visibly relevant and accurate as well.

[3] In his two-book series "The Beatles as Musicians" (Everett 1999 and Everett 2001), Walter Everett discusses form, and my interpretation generally agrees with his in regards to verse and chorus sections. My definition of 'bridge' differs in that, to me, it is a transitionary section that connects two like-sections, while Everett describes a bridge as I am describing a 'development': an independent section that temporarily departs from verse and chorus material.

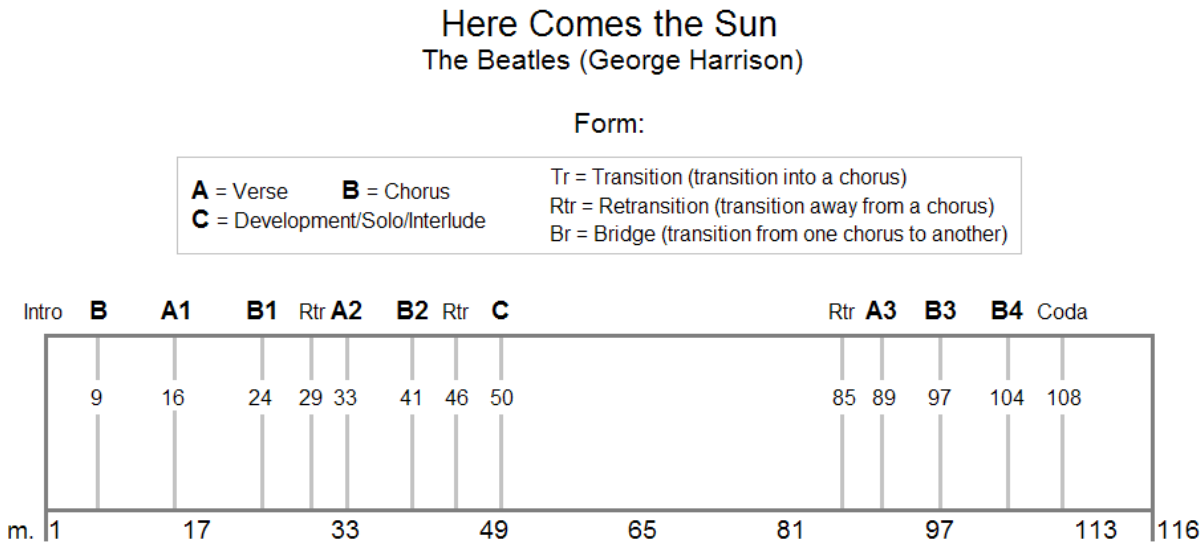


Figure 1. “Here Comes the Sun” Form Chart.

The introduction first begins with verse material in the guitar, while the voice first appears with chorus material (perhaps suggesting its importance), before moving into the first verse section. The chorus begins immediately and seamlessly after the verse, followed by a short retransition section. The retransition is rhythmic and melodically different from both the verse and chorus, which gains more importance later in the song. After the retransition, another verse and chorus appear, this time with different lyrics in the second verse, and slightly different instrumentation. After the second chorus, the transition section leads into a separate section, called the Development, where the material from the previously heard retransition is used and developed into a harmonically and rhythmically complex ‘building’, repeating five times, each with different instrumentation and timbre. This section is the most chromatic, and features the highest register of melodic notes. After this, there is a retransition leading back into a verse. This retransition has an ascending melodic line performed by the instruments, and it is also the

only place where we hear flutes and piccolos. As we enter in the third and last verse, the synthesizer introduces a new melody along with the main vocal melody, registrally slightly higher than the lead vocals. Finally, after the third chorus, the coda of the song ends with chorus and development material, perhaps providing a brief summary of 'what the song was all about' before it ends.

Looking at the entire form, one could potentially draw some loose parallels to sonata-allegro form as well. There are two main thematic sections, separated by a brief transitionary section, which repeat once, before moving into a more chromatic and complex middle section. The middle section, called 'development' (for its resemblance to sonata-allegro form) features material found earlier, but repeated and used differently. After the development, the harmony holds on the dominant and builds up before finally resolving back to the A section (the primary theme), and after running through the A and B section, it ends using B and development material. It is not exactly like sonata-allegro form, of course. The A and B theme are in the same key (rather than in contrasting keys), and the development section only takes material from the retransition found earlier in the song. However, there are enough large-scale similarities to conclude that it may have been at least partially intentional by George Harrison. The Beatles, as well as a number of other British musicians during the time, would have likely had some exposure to Classical and Baroque-era music, and even if they never studied sonata form, they would have likely had some intuitive grasp of it due to exposure[4].

[4] In *The Guardian's* 2007 article by Bob Stanley, titled *Baroque and a soft place*, it is explained that The Beatles would have been influenced by exposure to the British "music hall" which could, on occasion, feature classical music. They also experimented with using harpsichords and string quartets, most notably in their album *Sgt. Pepper's Lonely Hearts Club Band.*

This form highlights a certain area that we could consider to be the most musically significant section. The development serves as a fairly chromatic and rhythmically complex departure compared to the simplicity of the verse and chorus sections, so upon the return to the final verse, the listener will experience perhaps a sense of relief or familiarity. Additionally, the dominant is heavily emphasized in the retransition before the last verse, meaning the arrival is all the more significant when it does occur.

In his book *The Beatles as Musicians: Revolver through the Anthology* (Everett 2001), Walter Everett has a small two-page section written on this song. Although he does not go into great detail discussing form or Schenkerian analysis, he does discuss the song's background as well as some features of the instrumentation and the more complex middle section (which I am calling the development section). He says, "The middle section, featuring the repeated text "Sun, sun, sun, here it comes" over lightly varied instrumentation, takes on the quality of a meditator's mantra. The voice leading here consists of a tri-plagal progression, C-G-D-A, quoting the dreamy retransition from "A Day in the Life," with a structural gentleness that enhances the suggestion of a meditative state. Harrison's meditation becomes truly transcendental when the V7 of the fifth ending (2:04-2:11) reveals that the A chord of A+28, heard six times as a point of tonal arrival, truly functions as an upper neighbor to the structural dominant. The composer's enlightenment is seemingly celebrated in this fifth ending by the retransition's radiant unfolding of V7, reminiscent of such retransitions in "Twist and Shout," "This Boy," "Day Tripper," and other early numbers, culminating on the exuberant seventh, the piccolos' d3 (2:09-2:10)." (Everett 2001, 257)

Although this analysis does approach the analysis in a more detailed manner compared to Everett's, he nonetheless makes important points regarding the middle development section and the final retransition. This is good indication that, according to Everett, this area in the song is considered musically significant, which also agrees with my own conclusions drawn from the formal analysis.

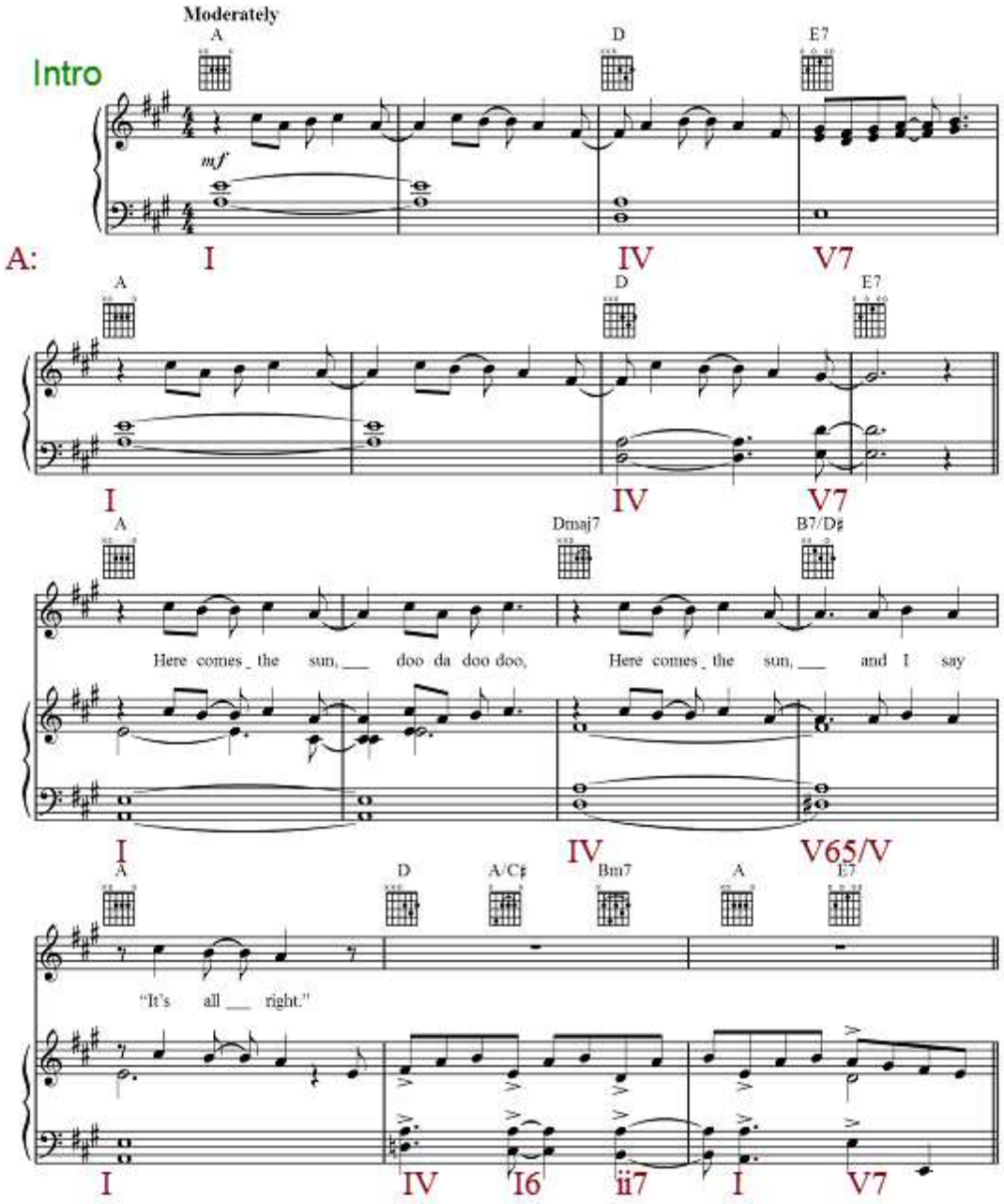
Next, we will see if the other analyzed musical elements also suggest this area of the song as significant. Harmonic and rhythmic content can help pinpoint the musically significant passages. As well as varying melodic and lyrical content, harmonic content usually varies from section to section in popular songs. Understanding the harmonic structure of a song, one can better understand what the songwriters intended, and what parts of a song are intentionally emphasized by those harmonies. On the next page is the piano reduction, analyzed with Roman numeral analysis, and marked with the sections of the form (Fig.2).

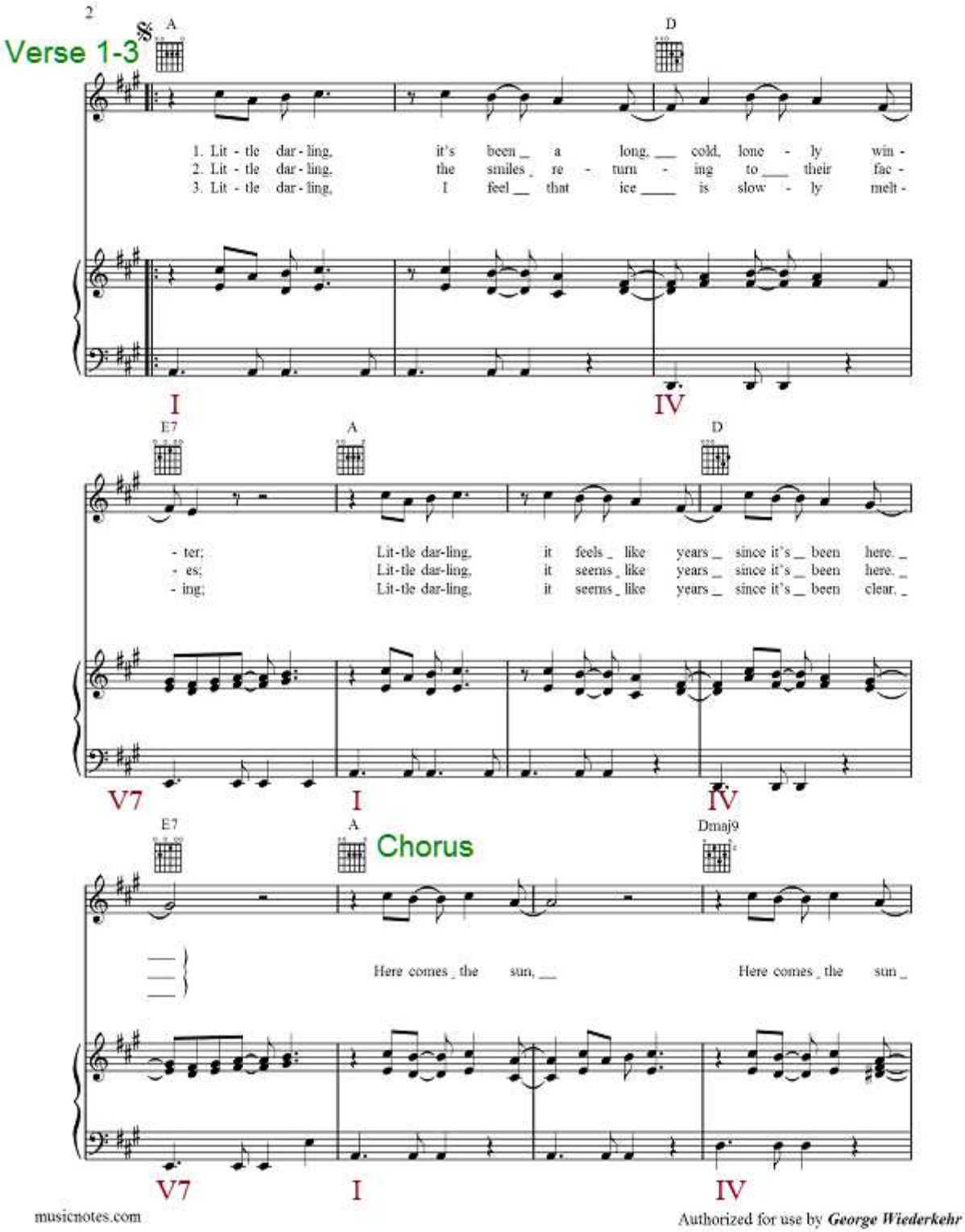
The chord progression, for the verse and chorus, is fairly conventional and straightforward, as one would expect from 1960s popular-style music. The verse and the chorus follow a standard I, IV, V pattern throughout, with a bit of variance happening at the end of the chorus. The end of the chorus features a secondary dominant (a V of V) which deceptively resolves back to I, and then goes through a number of quick harmonic changes (IV, I6, ii7, I, V7, I, V7), ultimately landing on V7 at the end of the retransition, leading back into the I for the beginning of the next verse.

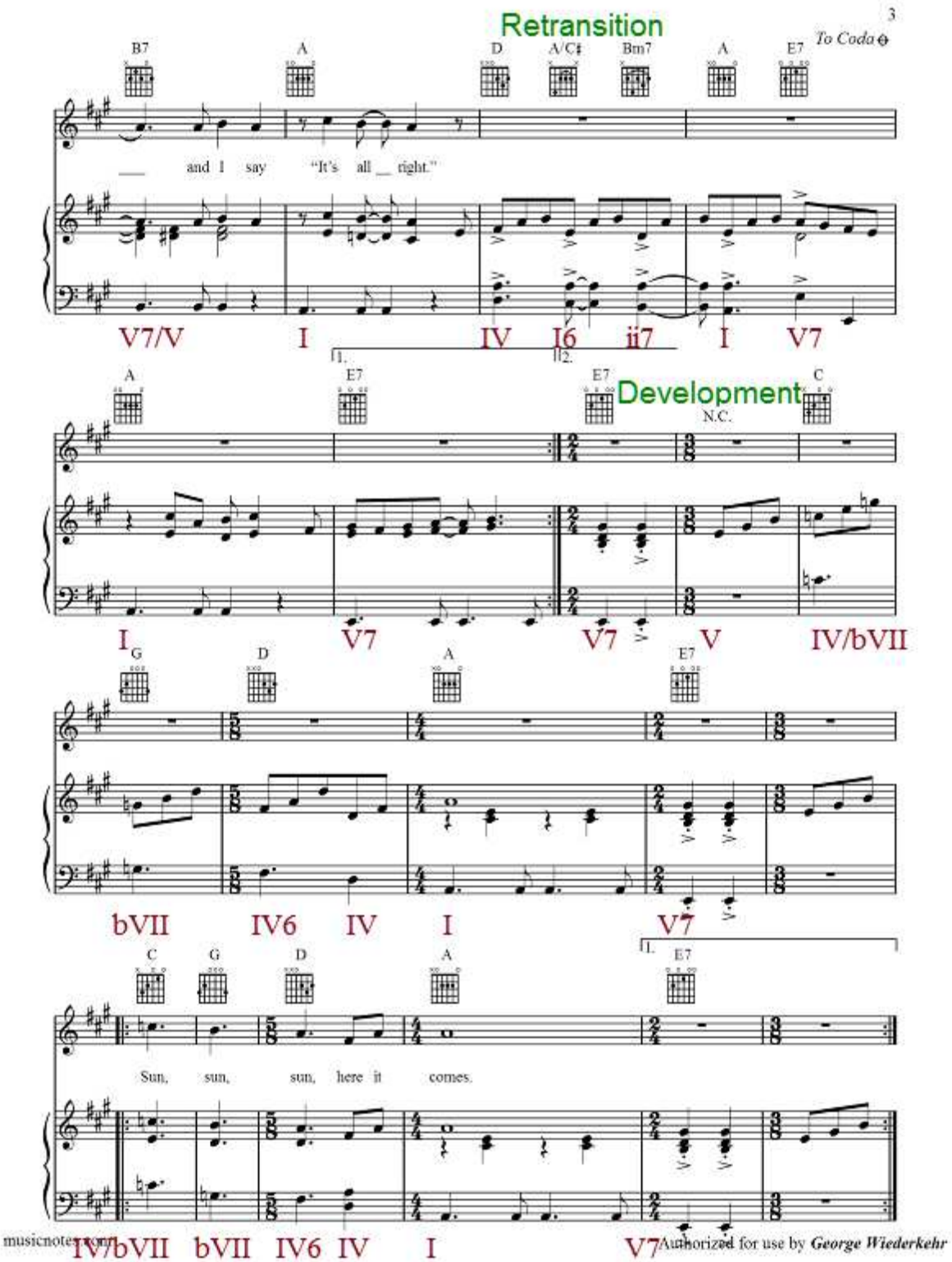
Figure 2 (next pages). "Here Comes the Sun" Analyzed Score.

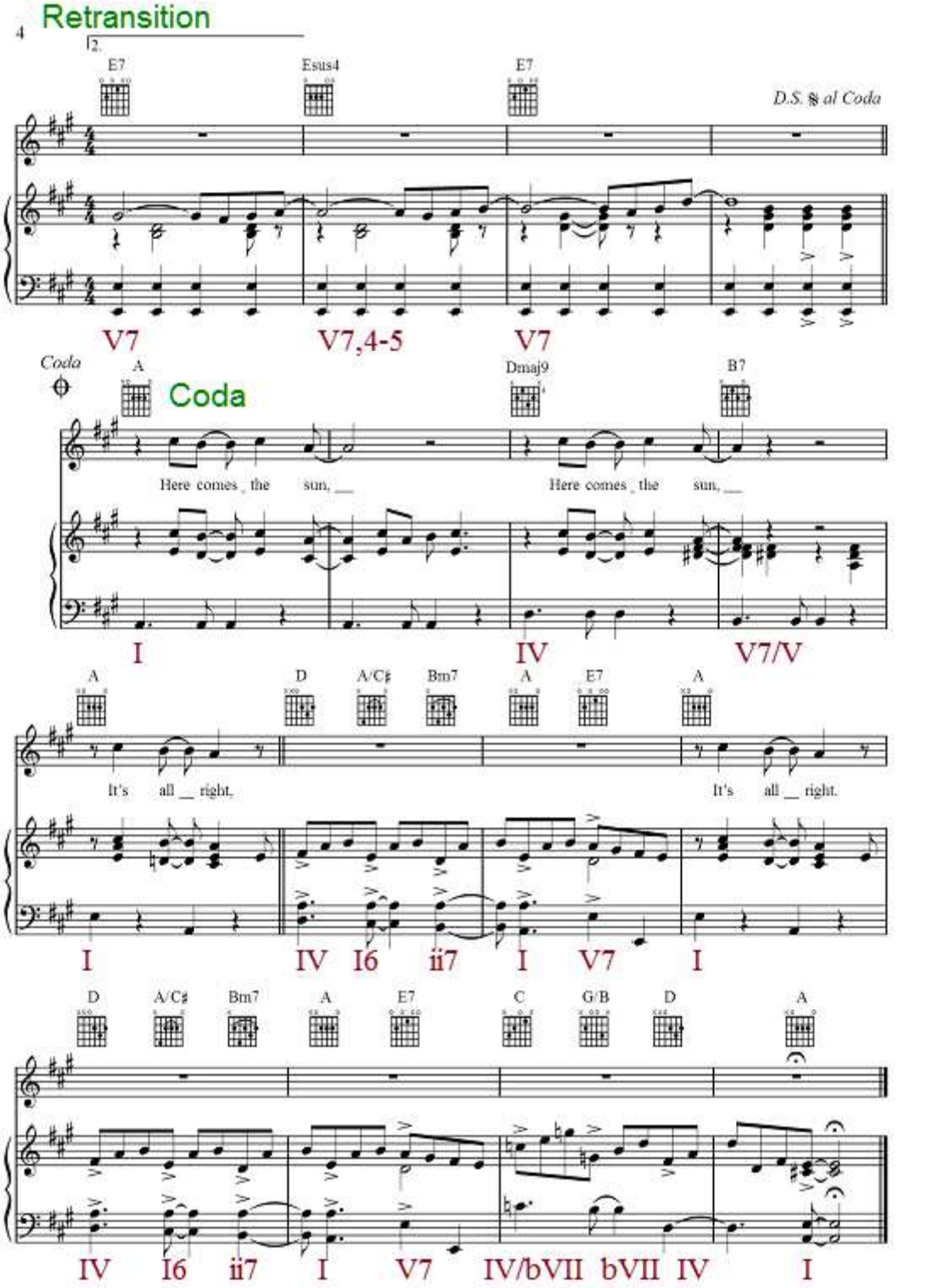
Here Comes The Sun

Words & Music by George Harrison









The rhythm is a bit more varied than what is usual in popular music. In measures 14 and 15 in the intro, we are introduced to the very important syncopated guitar riff that will serve as the foundation of the development section later on. The guitar implies a 3+3+3+3+4 rhythm, which is apparently quite similar to the rhythm in some traditional Indian music, which the Beatles (and Harrison) had a noteworthy exposure to, considering their collaboration with famous sitar player Ravi Shankar.

The development section is where both the harmony and rhythm become the most varied and interesting. The rhythm of the development section is derived from the retransition section found earlier, but this time, with even more rhythmic variation. The vocal line "Sun, sun, sun, here it comes" follows this pattern: Two measures of 3/8, one measure of 5/8, one measure of 4/4 to briefly resolve the phrase, and then another measure of 2/8 and 3/8 to restart it again. The rhythm is in a constant state of change, and the key centers reflect this complexity and energy. Unlike the transition section found earlier (from which this rhythm was derived), the harmony is even more chromatic, this time navigating to a distant key and then back again.

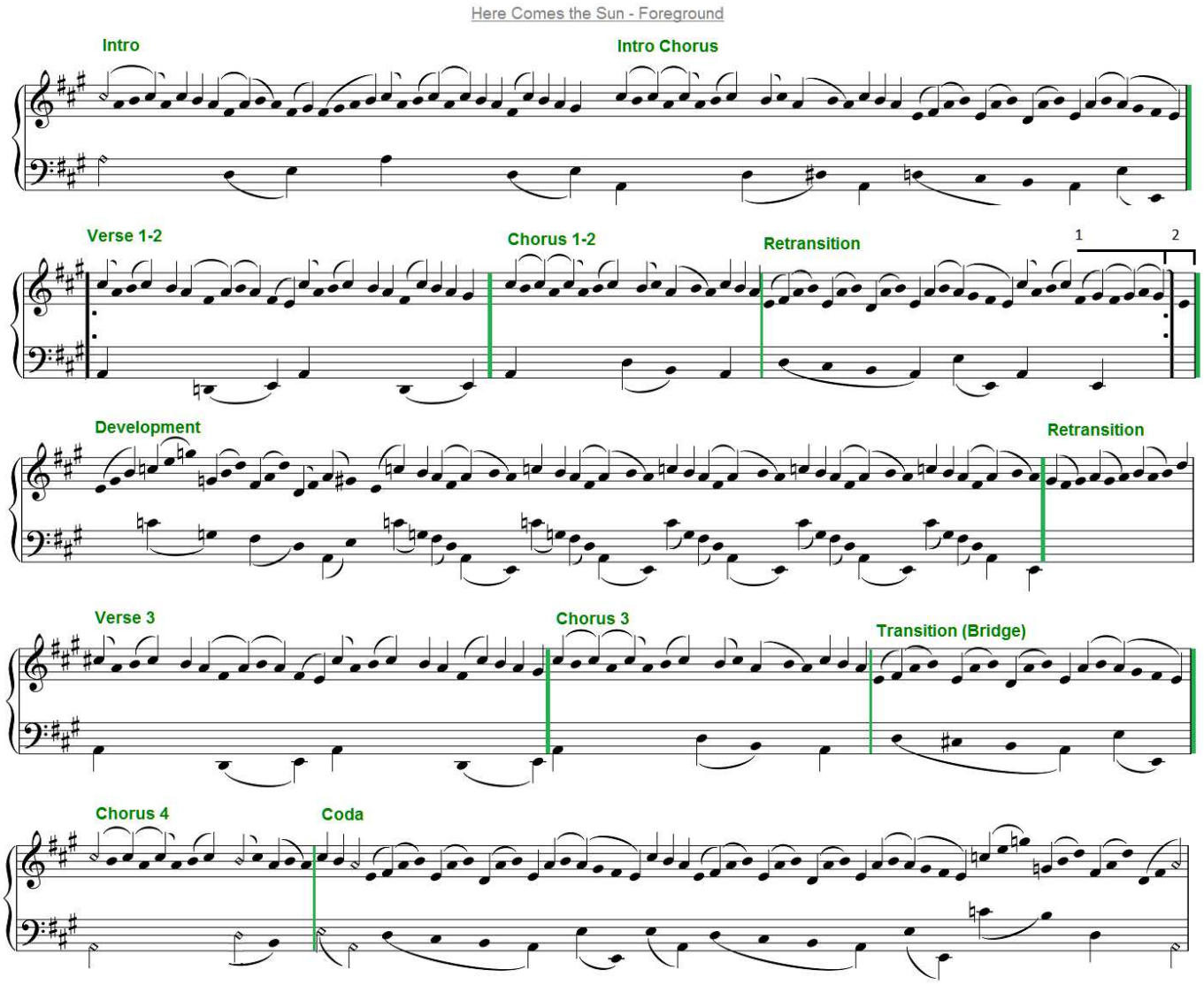
The harmonic center moves between the flat VII (From A major to G major) and the major I, using C major (IV of bVII) to move to the flat VII and D major (V of bVII and IV of I) as a pivot chord to move back to the home key in the same fashion that it departed, by using a subdominant of the new key. The chord progression is simultaneously sensible and chromatic, arriving at a fairly distant key center without losing sight of the original key of A major.

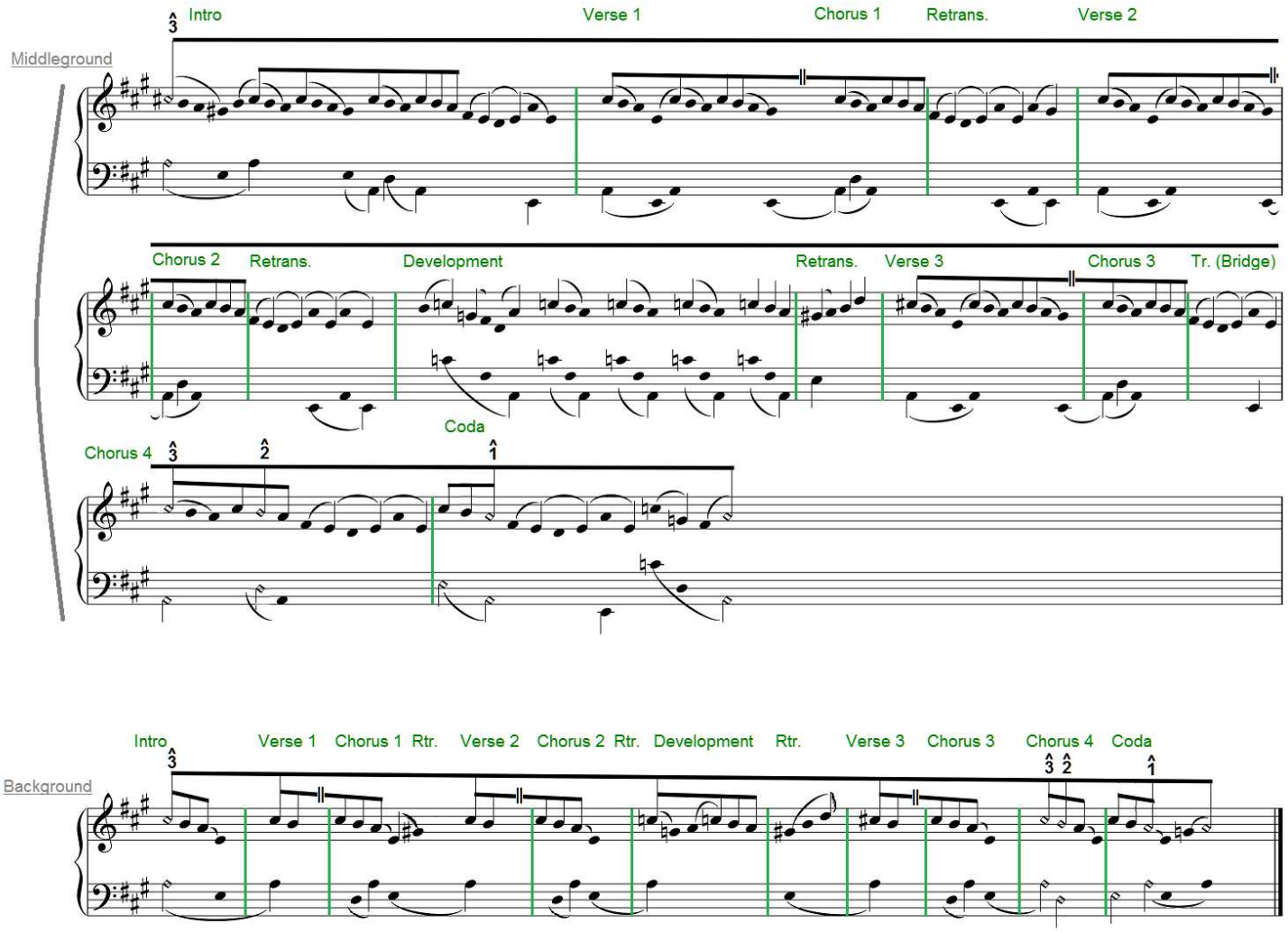
Finally, after the melodic phrase within the development section has repeated five times, it builds up on a dominant chord before resolving (in what could be considered the

most important dominant-tonic resolution in the song) to the last verse in the home key of A major, completing the song's last verse-chorus repetition before ending on the coda. The last few measures of the coda end with the familiar development riff, again, venturing to the flat VII before ending on a I, like in the development section. Perhaps this is to remind the listener of the important dichotomy between the verse-chorus material and the development material.

The development section, especially as it builds, as well as the very last retransition and arrival on the final verse can be considered perhaps the most important part of the song according to what we can learn from the harmonic and rhythmic analysis. This also coincides with the conclusions drawn in the analysis of the form. To further investigate, we can now look at the Schenkerian analysis (Fig.3), and finally, the text analysis. To better fit on the page, the Schenkerian sketch is turned sideways to landscape orientation. The foreground is first shown, with all notes except repeats written in. Although more relevant analytical information will be found in the middleground and background, the foreground is included so that the reader can understand how I arrived at the reductions that I have, and it occasionally contains some interesting patterns in itself.

Figure 3 (next pages). "Here Comes the Sun" Schenkerian Reduction.


Here Comes the Sun - Foreground
Intro
Intro Chorus
Verse 1-2
Chorus 1-2
Retransition
1
2
Development
Retransition
Verse 3
Chorus 3
Transition (Bridge)
Chorus 4
Coda


Middleground
Intro
Verse 1
Chorus 1
Retrans.
Verse 2
Chorus 2
Retrans.
Development
Retrans.
Verse 3
Chorus 3
Tr. (Bridge)
Coda
Chorus 4
Background
Intro
Verse 1
Chorus 1
Rtr.
Verse 2
Chorus 2
Rtr.
Development
Rtr.
Verse 3
Chorus 3
Chorus 4
Coda

On the purely foreground level, we can see some details of the counterpoint that could give clues to the deeper structure. The 1-2-3 and 3-2-1 scale-degree shape is common on the foreground level. Right from the beginning, the intro is: 3 123, 321 6, etc. The contour itself is easily visible on this level as well, and we can see where there are areas of greater registral activity. The verse generally stays around the same register in both the bass and the vocal part, although when we get to the retransition, we can see a descent in the bass line as well as a repeated arpeggiation figure in the guitar. This perhaps foreshadows the much more active registral changes in the development section, with the bass cycling through large descending figures as the section plays through. The last note of the final retransition lands on a D and stays there before the beginning of the verse, which is the highest structural note in the entire song. This further indicates the musical importance of this section of the song.

Moving to the middleground and background, the importance of the 3-2-1 motive becomes even clearer. At this level, the *Urlinie* is marked, and the piece follows a fairly sensible 3-line descending *Urlinie*. This is apparent in the middleground as well as the background. What also becomes more apparent at the middleground and background level is the structure of the verse and chorus together. The verse ends on a 7^{th} scale degree (serving as an extension of the 2^{nd} scale degree, essentially), and does not resolve with finality on the 1 until the end of the chorus, when the lyrics "It's all right" are sung. (Perhaps this is text painting- the steady resolution the listener has been waiting for finally arrives when the words "It's all right" appear)

This, conveniently, means that every appearance of the verse-chorus pair can be seen as a self-contained interrupted 3-line descent. The development section also shows a

fairly clear three-line descent, even with the flatted 3rd scale degree. The importance of that structural D in the retransition also becomes apparent, and is flagged as a structural neighbor tone. The final descent appears in the fourth verse and the Coda, and this is marked as such because, after this point, the song does not ascend again, and essentially stays on the 1st scale degree as it ends. The 3-2-1 descent of the *Urlinie* mirrors not only the descent at the end of each chorus, but the prevalent 1-2-3 and 3-2-1 motive that exists throughout the melody.

The final descent is usually considered an important element in any given song or musical work. It can represent the final and conclusive resolution, where the tension has resolved (in most cases). In this case, that would be right around the location of the final chorus and coda. Interestingly, the actual 3-2-1 descent, occurring on the words "It's all right" repeat twice at the end of the chorus, instead of just once, and this is the only time this happens in the song. Perhaps this descent was intended to stand out, or carry more weight because it is the final one.

It is also important to consider the flagged D at the end of the retransition (into Verse 3). Although this is not part of the *Urlinie*, it has significance. Agawu's approach to Schenkerian analysis helps in this situation (Agawu 1984). Schenkerian analysis puts emphasis on foundational contrapuntal structures, although it can sometimes put less importance on particularly expressive or important notes, or structural highpoints, as Agawu calls them. A structural highpoint can be represented in a few ways. It can be a simple melodic peak, a point of textural culmination, or the point of greatest harmonic tension. This D note serves all three functions. It is the highest structural melodic note, it is approached by a clear ascent, it stays on the dominant key and puts a great deal of

emphasis on it, and it is the only part of the song featuring flutes and piccolos, both fairly bright and 'sunny' sounding timbres.

The Schenkerian analysis points to two points in the song that can be considered the most musically or structurally significant. This is the high D right before the last verse, and the final "It's all right" in the coda. Both the harmonic analysis and the formal analysis tend to agree with this conclusion.

Finally, one must consider the text. Does the text suggest or relate to some of these musical features we have discovered? Let's have a quick look at the three verses in comparison, the chorus, and the development.

-Intro: "Here comes the sun, here comes the sun, and I say, it's all right."

-Verse 1: "Little darling, it's been a long cold lonely winter; Little darling, it feels like years since it's been here."

-Chorus: "Here comes the sun, here comes the sun, and I say, it's all right."

-Verse 2: "Little darling, the smiles returning to their faces; Little darling, it seems like years since it's been here."

-Chorus: "Here comes the sun, here comes the sun, and I say, it's all right."

-Development: "Sun, sun, sun, here it comes." (repeats)

-Verse 3: "Little darling, I feel that ice is slowly melting; Little darling, it seems like years since it's been clear."

-Chorus: "Here comes the sun, here comes the sun, and I say, it's all right. Here comes the sun, here comes the sun, and I say,"

-Coda: "It's all right. It's all right."

There is an important pattern to point out here. Every time the chorus appears, it triggers a change in the lyrics. The first verse responds to the first chorus saying that it has been cold, and it feels like it's been years since the sun came around. The chorus explains that a change is occurring, and that the sun is coming back. The second verse describes people beginning to smile once again.

The development repeats the phrase "Sun, sun, sun, here it comes", and finally, after a handful of repetitions, the final verse appears, saying "I feel that ice is slowly melting", contrasting from the first verses in that by this time, the sun has already arrived, perhaps brought in by the text in the development. Finally, we have "It's all right" twice in a row for the first time, at the very end of the song.

Right before this final verse where the lyrics are the 'warmest', so to speak, we have an important structural highpoint leading into the last verse, a strong emphasis on the dominant, reinforced by new instruments. The listener has just gotten through a chromatic and rhythmically complex section, and is perhaps relieved to hear the return of the verse.

Looking purely at the musical and text analysis, it becomes easy to pinpoint the most musically significant passages. The development is the point of greatest tension-building, and perhaps greatest energy. It carries the most chromaticism and most rhythmic energy. Like the development in a sonata form, this is where tension is built. A resolution is then set up in the final retransition, moving up towards the structural D, which also happens to be the highest structural note in the song. This resolution finally returns to the familiar verse and chorus, but with text indicating that the sun has finally arrived, and things are beginning to warm up. The repeat of the phrase "It's all right" and

the repeat of the 3-2-1 descent (as well as the final descent in the *Urlinie*) indicate that the Coda intends to resolve the song in a satisfying way.

It is this arc, the building of the development, the peak of energy near the final retransition, and the relief provided by returning to the verse, that can be considered the most structurally important arc, specifically orienting itself around the retransition and resolution at the end of the development. This is, coincidentally, also often an important structural part of many works written in sonata-allegro form.

Now that we have pinpointed the most musically significant areas of this song from the music analysis alone, we can look at the analysis of the recording itself, considering the production and mixing, to see where the production and mixing decisions provide the greatest reinforcement and emphasis.

The first thing about the recording to consider is the actual nature of the performance itself. The lead vocals, guitar, and the synth parts are done by George Harrison, and it is the expression of the lead parts (whether they be a vocalist or a soloist) that are most worth consideration while analyzing a recorded performance. It is not that the other instruments are not capable of expression, but rather, it is the lead instruments that are often presented with the most expressive nuance.

As is the case with much of the vocals of Beatles songs, the singing is done in what could be considered a 'conversational' style. Rather than being melismatic, ornamental, or virtuosic, the vocals are sung with a rhythm and simplicity that is reminiscent of spoken dialogue. This gives a sense of casualness and lightheartedness which works well with the intended aesthetic of the song. The backing vocals were done by both George Harrison and Paul McCartney, and they work to expand the range and

provide a higher energy sound to the vocal performance. The backing vocals in three-part harmony are found in both the chorus and the development section, so their higher energy style fits in well where they are placed in the song. There is also a subtle difference between how Harrison sings the first verse and the last verse. The last verse is sung in a slightly more confident and open manner, which further supports the overall arc of the song.

The recording is, unmistakably, a product of 1960's recording technology. The gear used during this time was rather primitive compared to what we use today, and a mix engineer might have anywhere between 4 and 8 tracks available to him at maximum, having to mix down instruments into smaller groups, or track instruments using fewer microphones. For this album, two Studer J37 tape machines were used, in synchronization. The J37 was tube-powered, and the combination of tube gear and recording onto tape means that the music has a distinct warmth and vintage sound to it. Although today's recording equipment is far more accurate and realistic, the sonic imperfections in older recording technology have given it an often-times pleasing character that, in many cases, can work to the song's advantage. This added sense of warmth is likely more of an advantage than a disadvantage in this case, considering the aesthetic goals of the song.

Stereophonic recording would have been a relatively recent standard during this time as well. During the 60's, engineers and producers sought to experiment with this new technology. This resulted in a trend fairly unique to the late 60's and early 70's in recording. Many recordings, especially ones that were more experimental, would employ dramatic panning and stereo imaging, sometimes having instruments on one extreme end

or the other, and occasionally causing tracks to "fly across the stereo field" as a special effect. Nowadays, most engineers are a little bit more conservative with their use of stereo effects.

While considering the instrumentation used in a recording, it is not only important to consider what instruments are being used, but where they are being used, and what their function is. This is not often considered in purely musical analysis, but layering instruments and tracks during certain parts of a recording is one of the most commonly used techniques of the producer in providing emphasis. Instrumentation and orchestration has a great deal of impact on the overall timbre of a song or musical work in most genres, and considering timbre and instrumentation more carefully can potentially benefit not only the analysis of the recording, but the musical analysis as well, and it is a fairly new and unexplored aspect of musical analysis. Hopefully, in the analyses of this thesis, the benefits of timbral consideration can be demonstrated.

The instrumentation used in a recording can serve one or more of four basic functions. These are:

Rhythmic: A drum set, tambourine, strummed acoustic guitar, hand claps, sometimes pianos, and so on, can all provide rhythmic support. They keep the rhythm steady and provide a rhythmic framework for the other instruments to either follow or syncopate from.

Harmonic: An instrument like a guitar, piano, polysynth, strings, organ, or any other capable of producing harmony could be used for the role of harmonic support, and this serves to fill in the space between rhythm, bass, and lead.

Melodic: The melodic space in a recording is oftentimes filled by the lead vocalist, but it

can also be filled by a lead guitar, a synth, or any other instrument capable of producing melodic lines. More often than not, only one lead instrument is present at a time, but it is possible to write relatively functional songs with two simultaneous melodic instruments.

Bass: The bass is, of course, the foundation of the harmonic space, and usually plays a rhythmic role as well. This gives the listener a sense of what the underlying key might be, and is usually a low-pitched instrument like an electric or standup bass, cello, mono synth, or even a piano.

It is possible for instruments to move from one layer to another, filling in different roles during different parts of the song. This is especially notable in guitar playing, where only one guitarist is available and must split jobs between harmonic/rhythmic support and melodic support (soloing or filler melodies).

To better show what exactly is going on in "Here Comes the Sun", I created a graph that shows the name of each instrument, its location in the stereo field, the exact entry and exit point of each instrument, and approximately where in the form they occur (Fig.4). In this song, the acoustic guitar is the main accompanying instrument, and it is one of only two tracks that provides constant harmonic support. This is understandable, considering that George Harrison is a guitar player. The lead vocals are frequently doubled by harmonies, and in the verse, this occurs only on accented words, while in the chorus and development, it occurs consistently. The electric guitar and synthesizer play the role of melodic support and harmonic filler, mostly doubling either the acoustic guitar or the vocal line. These, plus the organ, are important for providing varying timbres and levels of fullness in more important parts of the song, especially the development and third verse/chorus.

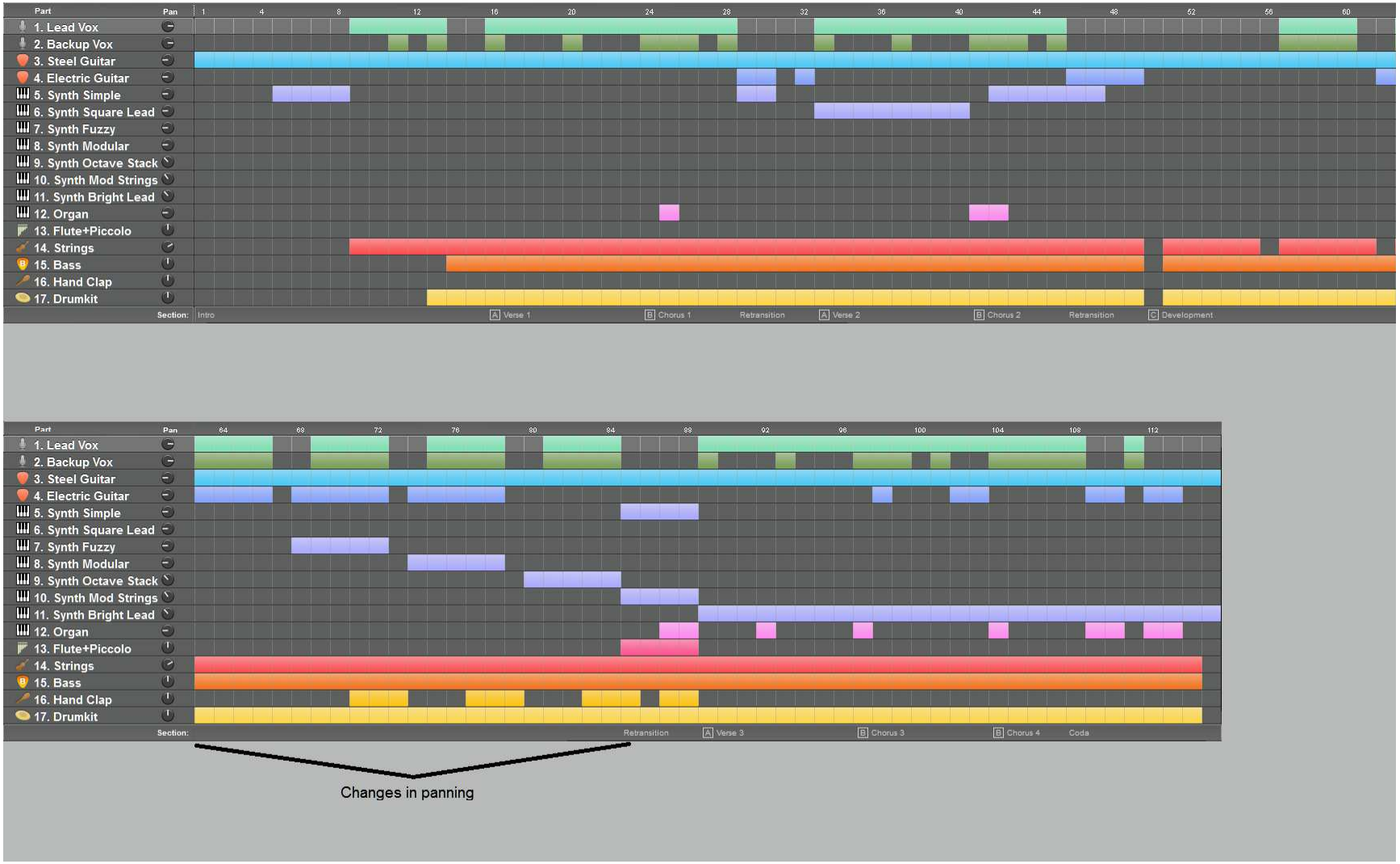


Figure 4. “Here Comes the Sun” Instrumental Layout Chart.

The drum set provides constant rhythmic support, and hand claps come in during the development, further emphasizing the rhythm of the song. Finally, it is important to consider the string and wind tracks as well. George Martin's orchestration provides consistent harmonic support, and is scored for cellos, violas, and basses (no violins), perhaps to emphasize a warmer and fuller timbre. The piccolos and flutes only appear during the final retransition, followed by a bright lead synth part, which introduces a new melody in counterpoint with the vocal line.

Looking at the included chart above, it becomes very clear where the emphasis was intended. The retransitions and choruses in the beginning of the song have brief doublings from the organ and electric guitar, while the second verse introduces a subtle synth part. They foreshadow the instrumentation that comes later. During the development, the electric guitar is introduced again, this time with heavy fuzz, and each time the "Sun, sun, sun, here it comes" line repeats, the synth introduces a new tone. This is where the hand claps come in as well. The development is, importantly, a sort of building of layers and textures, which finally reach their peak of density in the final retransition with the introduction of the wind instruments, before resolving to the last verse and chorus. The last verse and chorus feature the most harmonic fill from the organ, and also are the first time we hear this new melody, presented by the synthesizer.

It is quite clear here that, from a pure production standpoint, the development serves to build up to this 'textural resolution' that happens after the final retransition occurs with the introduction of the last verse. The timbral evolution of the song is perhaps one of the most interesting features, as well. As the song progresses, we are presented with brighter and brighter instruments. The first synth, appearing in Verse 2, gives us a

bit of extra openness and brightness, but it is not until the synth ‘evolves’ with each repetition that we can hear its tone open up and become much bigger. Finally, the brightest three instruments, the flutes, piccolos, and lead synth part in the last verse, all happen near the end of the development. The recording becomes brighter as it progresses, which is a brilliant production decision. The text at this point in the song, as discussed earlier, also gives imagery of brightness and warmth, and the timbre reflects this.

In *The Beatles as Musicians* (Everett 2001), Everett also does make a clear note of the timbral characteristics in the development and retransition sections, further suggesting their importance. He says, ” Dominated at first by layers of acoustic guitar and low strings, "Here Comes the Sun" represents the brightening sun in the bridge by the Moog motive that rises in register and culminates in a V7-prolonging retransition highlighted by brilliant frequencies in piccolos and well-placed cymbal crashes. The middle section features a patch probably based on a sawtooth wave, realized as the motive sounds in four different registers. With each higher octave, the edge of the sawtooth seems dulled a bit, approaching the purity of a sine wave but not so much that its last appearance, which concludes on a2 in the opening of the fifth ending, doesn't lead perfectly to the bright attack of the piccolos on g|2 one bar later. A second patch, seemingly based on a triangle wave and featuring a light ribbon portamento, was used in two other passages that exemplify on a larger scale the rising octaves of the bridge: in the second verse (0:59-1:13) the Moog doubles the solo guitar line at the unison, and in the third verse (2:11 through the coda; these two verses straddle the "enlightening" middle section and retransition) the Moog adds an obbligato line an octave above. The high-register triangle wave (which heavily emphasizes the fundamental) joins the family of

flutes and piccolos. The Moog performances completed the work on "Here Comes the Sun," following even the normally final orchestral overdubs. Martin's touch with the woodwinds was complemented perfectly by Harrison's final superimpositions, all working together to reflect the sun's increasing brilliance." (Everett 2001, 258)

Although Everett does not go into as specific detail as the chart shown above, he draws some noteworthy conclusions about the importance of instrumentation and timbre as it relates to the aesthetic goals of this song. Both this analysis and Everett's analysis suggest that timbrally, the development and retransition demonstrate an important buildup to the last retransition, implying the importance of these sections.

Next, we must consider the soundstage. As explained earlier, this is the position that each track is placed at, from left to right, and from front to back. An engineer usually places the important tracks in the center of the mix, and the supporting tracks to the sides, where they will not crowd the other tracks. It is common to hear the lead vocalist, bass, kick, and snare all in the center, while harmonic filler, rhythmic accents, and melodic doublings will occur near the sides.

That being said, *Here Comes the Sun* is a fairly unusual example of stereo placement. The guitar is in the very left, and the vocals are in the very right of the stereo field. Although not a strict example, it is what is called LCR mixing, where the instruments are either placed in the very left, the center, or very right. The guitar and most filler instruments are in the left speaker, while the lead vocal and backing vocals are in the right speaker. The drums and bass are found in the center, and the strings are closer to the middle, slightly to the right. The synth parts vary in placement, but are mostly in the left.

Why these mixing decisions were chosen is not entirely clear to me; perhaps it is to create the sense that, through the listener's speakers, the musicians sound as if they're standing in different locations of the stage, perhaps to imitate their positions during live performance. However, it was indeed a trend in production and engineering to do unusual and extreme pannings during this time. Similar mixing tricks can also be heard in much of Eddie Kramer's music, especially while working with Jimi Hendrix. One thing that it does achieve functionally is a good separation between the different parts- the guitar and voice, being so far apart in the stereo field, will generally not step on each others' toes, and the only other instruments that they are located near in the stereo field are ones that double them or have very similar material to them.

Finally, we can consider the use of tools and special effects. Although use of special effects might have been somewhat uncommon during much of the 60's, near the late 60's, engineers and producers first started to experiment with 'psychedelic' sounds and effects, which was a common musical aesthetic in pop and rock music in this time period. *Abbey Road* was simultaneously praised and criticized for its use of electronic effects and processing, and there are a few noteworthy examples of such effects in this song.[5]

The first that is most noteworthy is the change in stereo panning that happens in the development. As the melodic phrase is repeated in the development section, the panning of the acoustic guitar flies from the left, to the center, then to the right, and finally back to the left. This serves two purposes: first, it provides a fairly interesting

[5] In Steven D. Stark's 2009 book *Meet the Beatles*, he notes that William Mann, critic of the London Times, said that the album would "be called gimmicky by people who want a record to sound exactly like a live performance", however a number of reviews, namely those from *Melody Maker, The Sunday Times,* and *The New York Times* were generally positive.

sound, with the location of the instrument changing as the section builds. Second, it provides room for some of the other instruments that come in. This suggests an emphasis on the building of energy here in the development section. The panning suggests that the engineer really wanted the listener to be paying attention here.

The use of fuzz is another noteworthy example. Fuzz is a type of distortion often reserved for heavier styles, and was a favorite of Jimi Hendrix and Led Zeppelin. The electric guitar and synth both appear with a fuzzy distorted effect during the development, perhaps filling the same role as the panning changes- to create interest for the listener during this section.

Finally, the synth part in the development employs different special effects as it repeats and changes. On each repeat, the synth becomes brighter (likely by means of adjusting the 'filter' on the synth), and finally, during the last repeat of the melodic phrase in the development, the synth appears in the entire stereo field, and has a widened effect. This is likely by employing what was called the Haas effect (a trick used to make a track sound much wider), and again, this puts focus on the development section.

Looking at all of these aspects of the mixing and production, we can see that the engineers and producer intended to emphasize certain parts of the song by means of doubling, special effects, timbral changes, and so on. The development section features the most 'psychedelic' sound effects, while the last retransition and return to the last verse is a sort of timbral and instrumental culmination. This analysis points to both the development and the retransition/resolution to the last verse as the most emphasized part of the song.

Now that both the musical analysis and recorded analysis have been considered,

we can ask ourselves: do they coincide? The answer is, yes, absolutely. Although the *Urlinie* puts the main descent a bit farther along, the harmonic analysis, formal analysis, some of the Schenkerian analysis, and the analysis of the text both point to the journey between the development and the last verse as being the most significant. The producers and musicians involved in this song's creation had a sense for what parts of the song were significant, and did what they could to emphasize these. The details of this correlation will be discussed later on. For now, we will look at a very different song, from a different era.

"Thriller" (Michael Jackson)

Released in 1982, *Thriller* was the sixth studio album released by Michael Jackson. In just over a year, it became the best selling album of all time, and still holds that title, as well as having won eight Grammy awards in 1984. It featured collaboration from other notable individuals, including Paul McCartney, Eddie Van Halen, Steve Lukather, and Vincent Price. The album's success makes it a good candidate for the kinds of analysis I do here.

Like Jackson's earlier album *Off the Wall*, *Thriller* combines pop, R&B, rock, and disco styles. It was co-produced by Quincy Jones, and engineered by Bruce Swedien, and was generally well-received in all regards. In the decade of the 80's, the music industry (as well as many other technological fields) saw some of its biggest technological advancements, as the world was then in the infancy of computer technology. Although digital recording technology did not become prominent until the early to mid 90's, the use of synthesizers, digital effects, MIDI instruments, and electronic drum machines

became much more affordable and prominent.

Like in the late 60's and 70's, this decade saw a stylistic divide between pop and rock that, as the decade progressed, widened further as pop became more produced and mainstream, and as rock and metal became heavier and more specific in their fanbases. Pop during this time had strong roots in disco, and 80's rock and metal was directly descended from 70's hard rock, which originated in blues rock. During the disco era and with the music that stemmed from it, we begin to see the popularization of the idea that music could be written primarily for dance. Michael Jackson's careful choreography suggested his music's close ties to dance, and it was roughly during this time that music began to be written for two different purposes: active and passive listening[6].

Music intended for active listening was written to provide a sort of musical experience in itself, something where the listener would be actively paying attention to what was going on in the recording. Passive music would have been intended for dancing or background at clubs or parties, and generally, disco is one of the first and most notable examples of music intended for this purpose. The two differ stylistically in that passive-listening music would have a more steady and predictable rhythm (and occasionally, bass line as well).

Disco provided one of the biggest foundations for 80's pop and passive-listening music, and the use of the synthesizer is one of the biggest new developments in this style. Tangerine Dream and Kraftwerk were perhaps some of the first bands to use the synth, and it was around this time that it became a staple. The invention of the sampler also played an important role in the music produced during this era.

[6] In Allan F. Moore's book *Song Means*, in the chapter titled "Style", he discusses stylistic roots of different popular genres, as well as the difference between music intended for active listening and passive listening.

Michael Jackson, having a near-lifetime of musical exposure and rigorous practice, was considered the most prominent pop musician of his time,. "Thriller" was the seventh and final song on his studio album of the same name, and it was composed by Rod Temperton. It is considered a mix of pop, disco, and funk, and it is in the key of C# dorian, occasionally moving to C# minor. Both the song and the later music video have a horror-inspired theme, and employed sound effects like footsteps, creaking doors, thunder, and so on. The song also included a narration at the end by Vincent Price, perhaps the best known voice-over actor in the horror genre.

There are a number of literary sources that discuss Michael Jackson's life, the historical background of the *Thriller* album, and the music videos associated with it, although very few literary sources seem to delve into a detailed musical analysis of *Thriller*.[7] (This may be partially due to the fact that *Thriller* has not been released for as long as *Abbey Road* has.)

In regards to instrumentation, the first thing one notices in the intro, besides the use of sound effects, is the prominent use of the synthesizer, which was a staple of pop during this era. There is a lead vocal part, backing vocals, and a steady drum and bass part which plays through almost without variation (which is reminiscent of Michael Jackson's disco roots). Horns provide melodic filler and harmonic support, while the synth pads, muted electric guitar, and synth lead provide doublings and harmonic reinforcement. Compared to the Beatles song, which also featured synthesizer, the Michael Jackson example relies more heavily on the synthesizer, and has a more

[7] *The Album: A Guide to Pop Music's Most Provocative, Influential, and Important Creations* (Perone 2012) is a collection of articles that discuss various popular songs. *Thriller* is briefly mentioned a few times in this book, although not in a great deal of analytical detail. *Man in the Music: The Creative Life and Work of Michael Jackson* (Vogel 2011) is a well-received biography of Michael Jackson's life and career, although it does not feature detailed music analysis of his songs.

produced and electronic sound, which has been characteristic of pop music for decades. There is also use of a theremin later in the song, which points at Thriller's horror influence, as the theremin was commonly used in older sci-fi and horror soundtracks. There is some subtle change in the instrumentation as the song progresses, although that is covered in more detail later on in this analysis.

The form of the song is fairly straightforward, with the verse and chorus repeating three times, plus an extra chorus at the end. For the sake of this analysis, I will not be considering the music during or after the spoken dialogue near the end, as this section is more separated from the rest of the musical content of the song, and could be considered a sort of "long Coda" which extends the tonic key until the end of the recording. The graphed form is shown below (Fig.5):

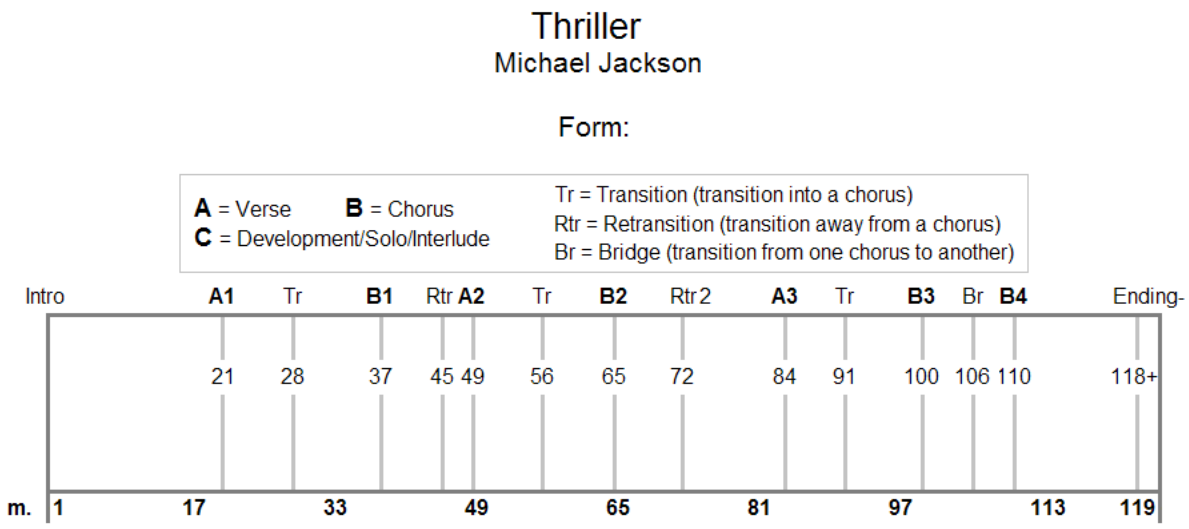


Figure 5. "Thriller" Form Chart.

Again, like in *Here Comes the Sun*, the introduction here begins with material from the chorus section, perhaps suggesting its importance or priority. Between each

verse and chorus is a transition or retransition section, and it is in these retransitions (and the bridge) that the most variety is found in the song. In the retransitions and the short bridge, the music features the most chromaticism, as well as the most syncopation and rhythmic intricacy. In a way, these retransitions could almost be considered musically varied additions to the end of the chorus, with just as much purpose in providing interest and variety as they do in retransitioning to the verse. As these sections repeat, the retransitions become more chromatic as well.

The chorus generally contains higher melodic material, and the verses sit about an octave below the chorus. The verse hangs around middle C#, and the transition to the chorus moves up to a G#, a 5^{th} above the root, and finally, in the chorus, the melody moves up to the upper octave of the C#. The transitions are registrally interesting as well, although this will be easier to discuss after showing the Schenkerian reduction later in the analysis.

The form seems to indicate that the main four note ascent in the chorus (and also the intro), as well as the transitionary sections, are the most musically important. This is also evident in how famous the four introductory chords actually are. The four descending chords in the intro and chorus are perhaps the most iconic feature of the song.

The harmonic and rhythmic analysis can now be considered as well. Since this song has strong roots in the disco tradition, the harmonies cannot be so easily discerned from the bass line. The bass line, rather uniquely, stays essentially the same for the entire song. The verse, transitions, and chorus all have the exact same bass line, and it does not modulate from the home key, either. The same can be said about most of the rhythm section. These two instruments only break their pattern during some of the retransitions,

which point even more strongly towards them as being important

Before going into more detail, here is the analyzed piano reduction, starting on the next page (Fig.6):

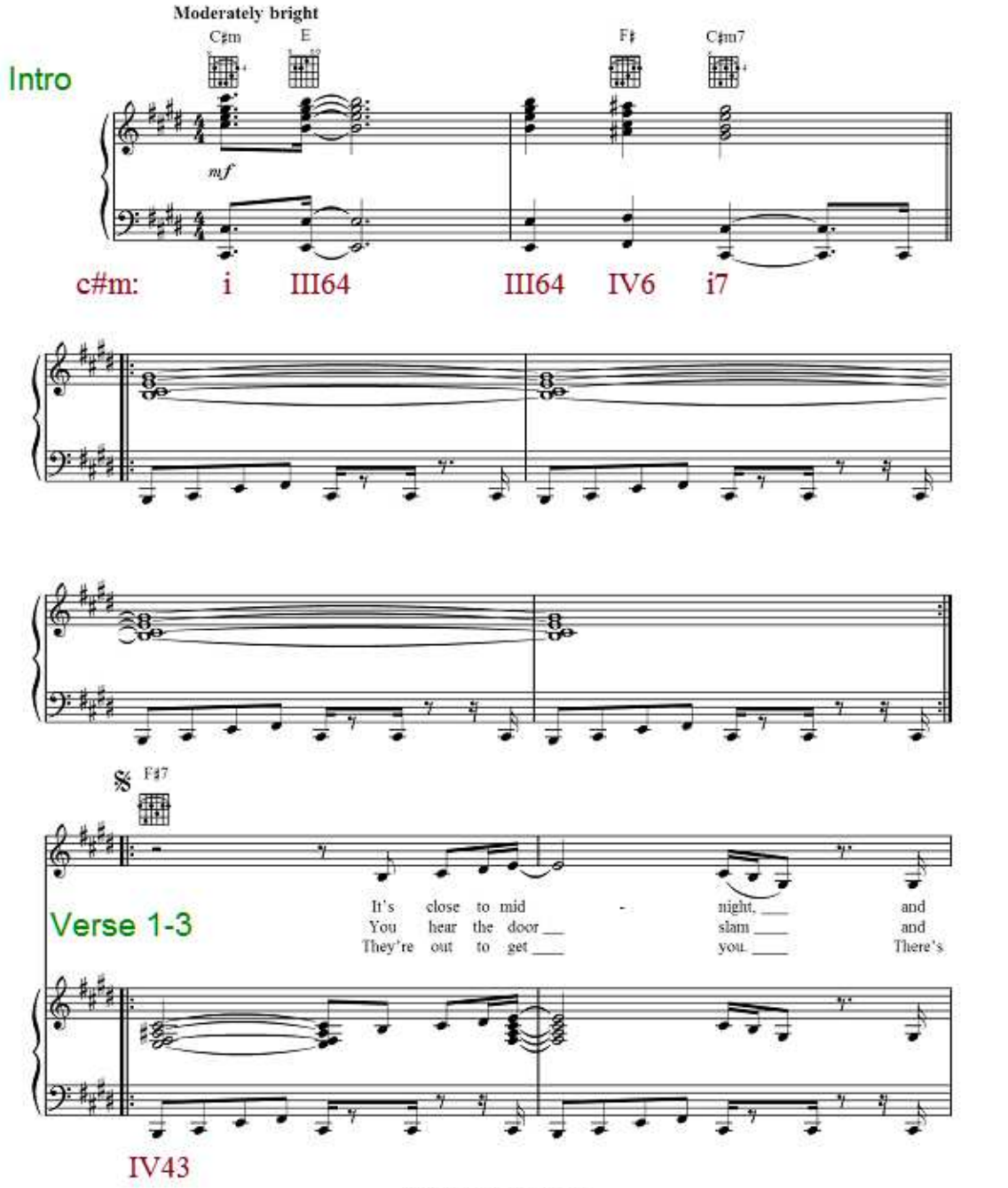
Except for in a few of the retransition sections, the bass line provides a sort of 'passacaglia' (to put it in art-music terms) over which the other harmonic filler instruments can play different harmonies. The harmonies that seem to appear the most often are c# minor seven (i7) and F sharp major 7 (IV7), in various inversions. This puts most of the song in Dorian mode, and these two alternate back and forth over the bass line until the chorus. This works fairly well considering the nature of the bassline. The bass ascends from scale degree 1, up to 4, and back to 1 again, providing support for both chords, and making this fairly static bass line somewhat 'modular', able to be used in a few different harmonic contexts. The steadiness of the bass and rhythm section is, almost certainly, a product of the song's disco and dance music roots, and it also might serve to provide a sense of unresolved tension or suspense, which ties in well with the intended horror-influenced aesthetic of the whole song.

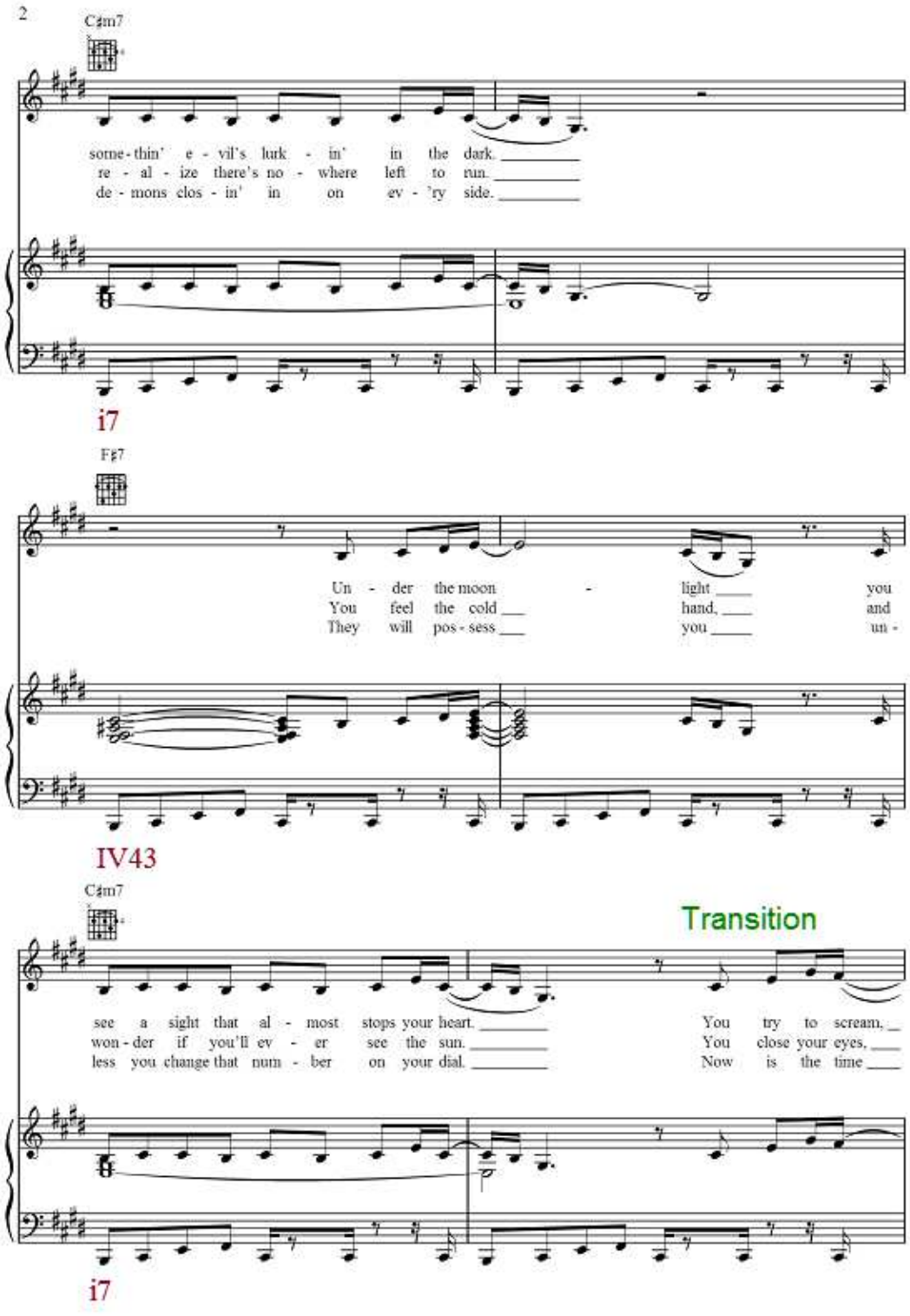
This rhythm and bass line stay constant until the retransition, where the harmony becomes more chromatic as well. The constant rhythm suspends briefly, and the bass line breaks pattern to play a low A, and then B, and in some cases, up to emphasize an F#. This puts the bass above and below the range of its normal 'riff', and in the end of the second retransition, it sits squarely on the 5th scale degree, emphasizing the dominant chord for the first time in the entire song.

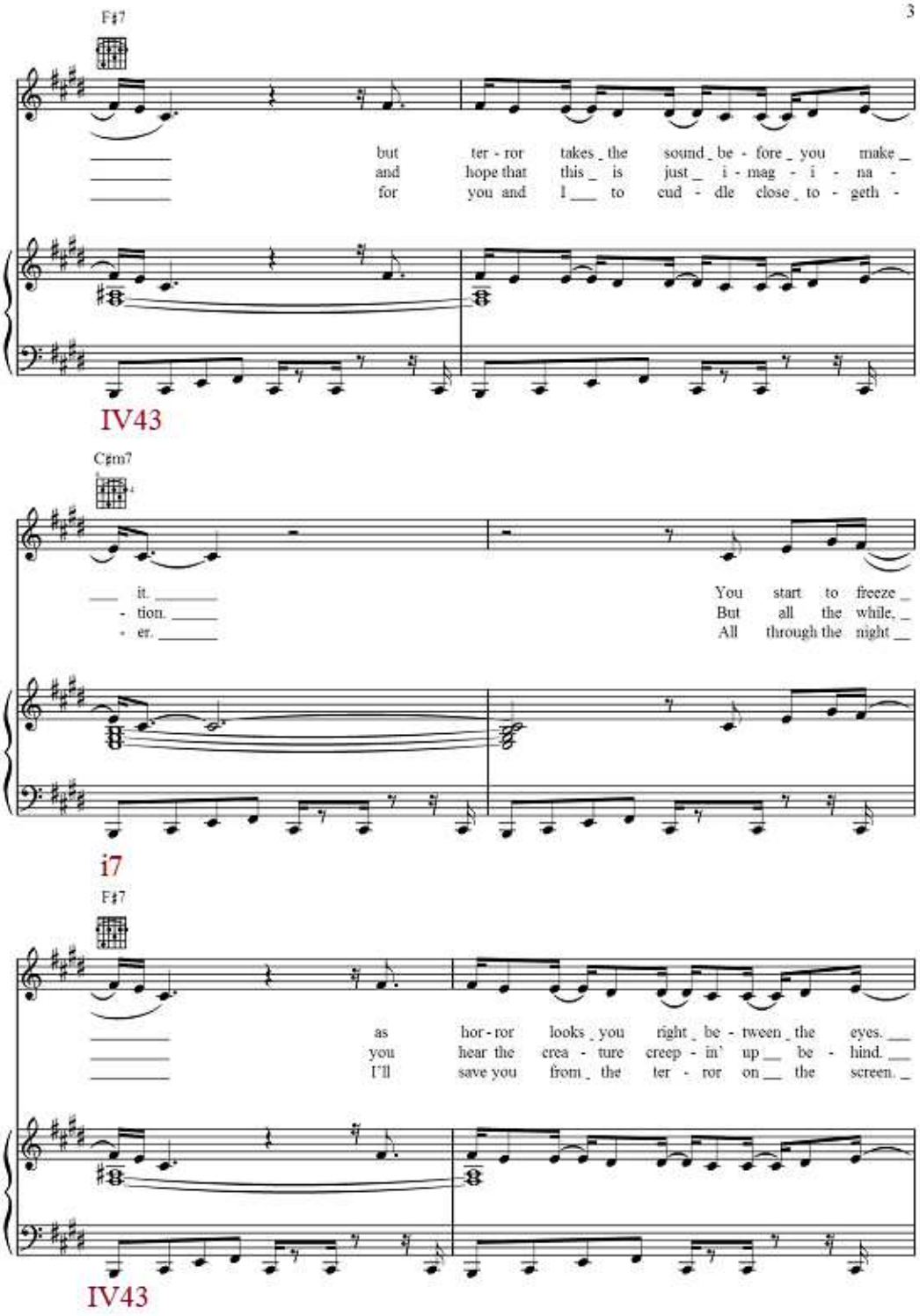
Figure 6 (next pages). "Thriller" Analyzed Score.

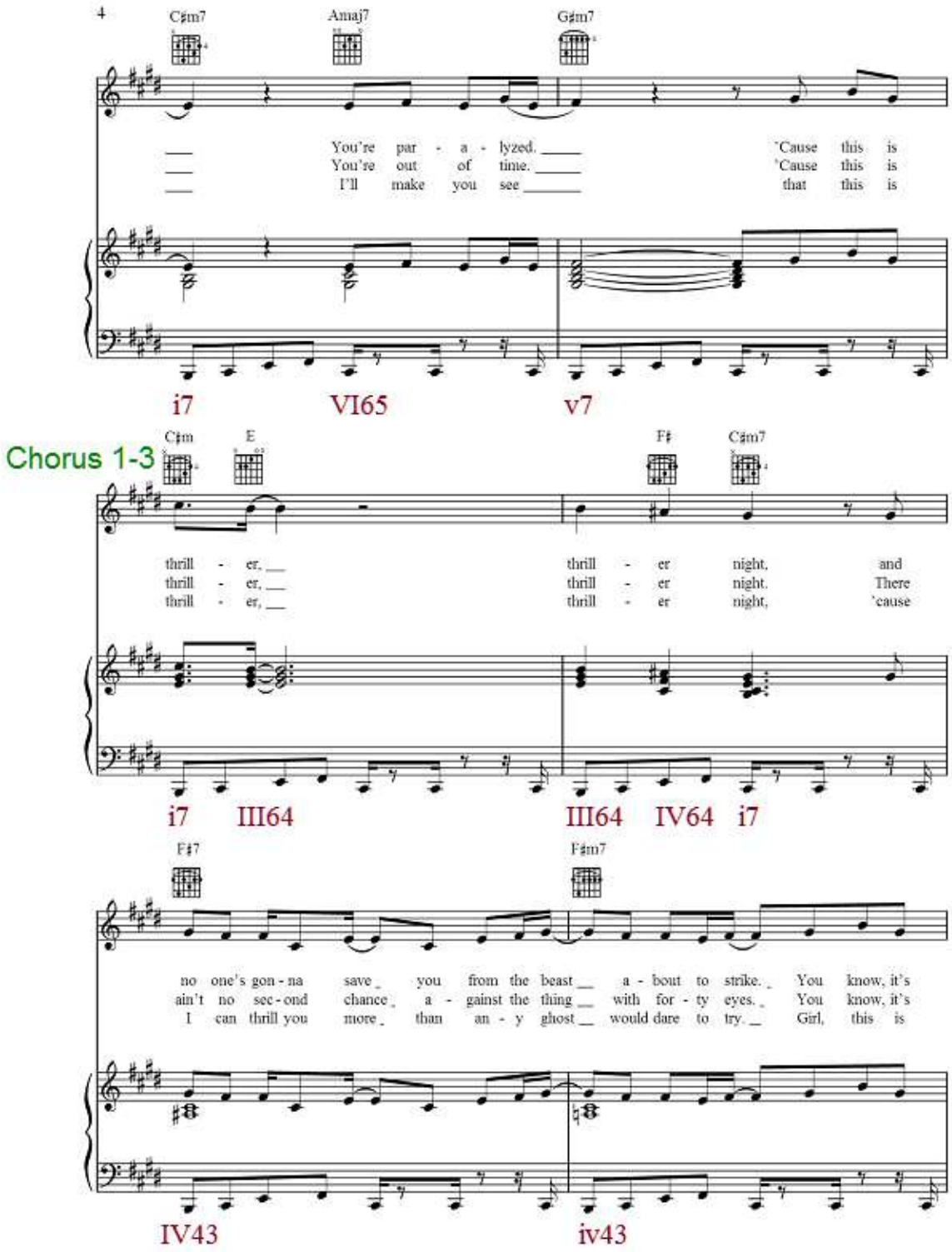
THRILLER

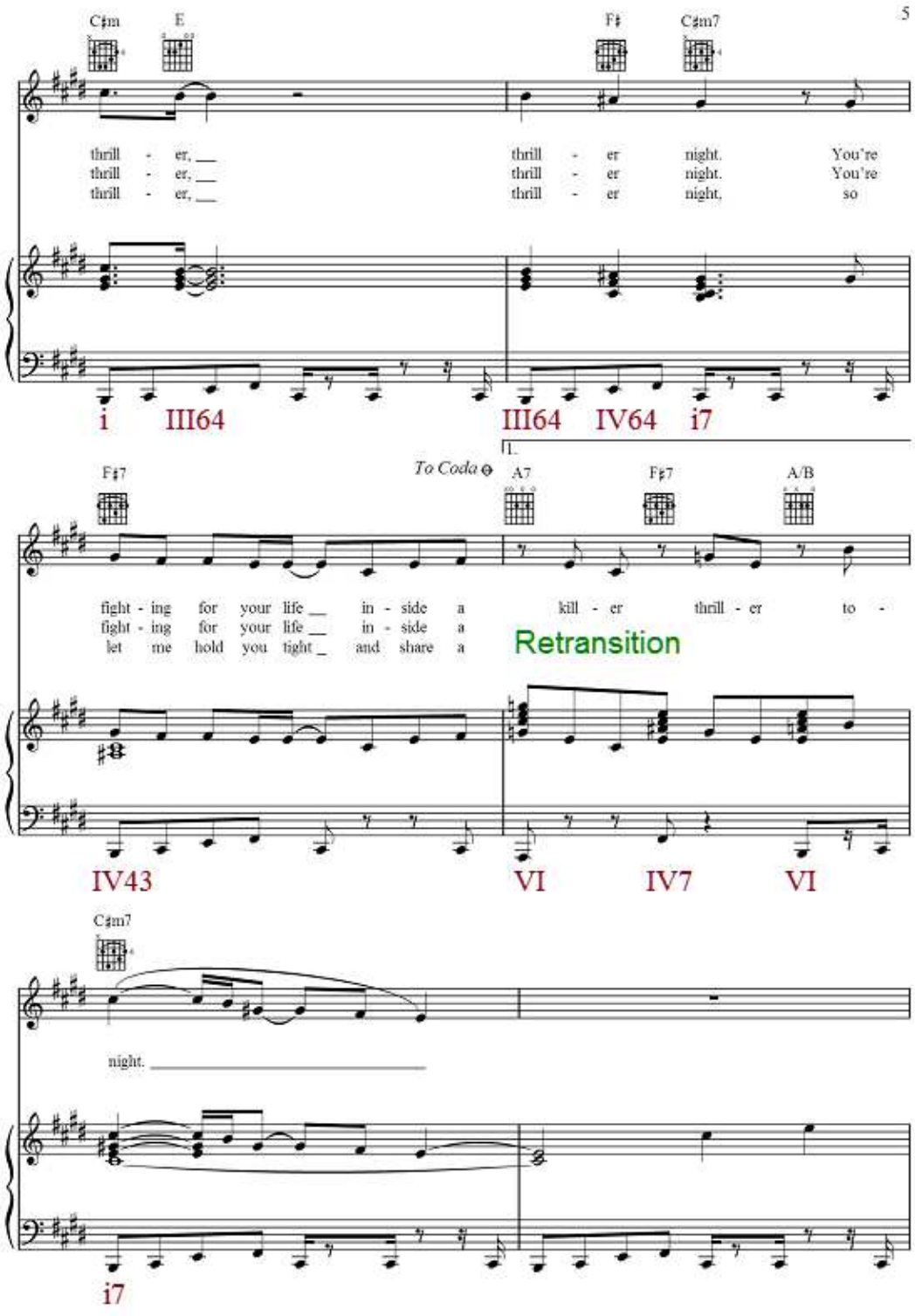
Words and Music by
ROD TEMPERTON

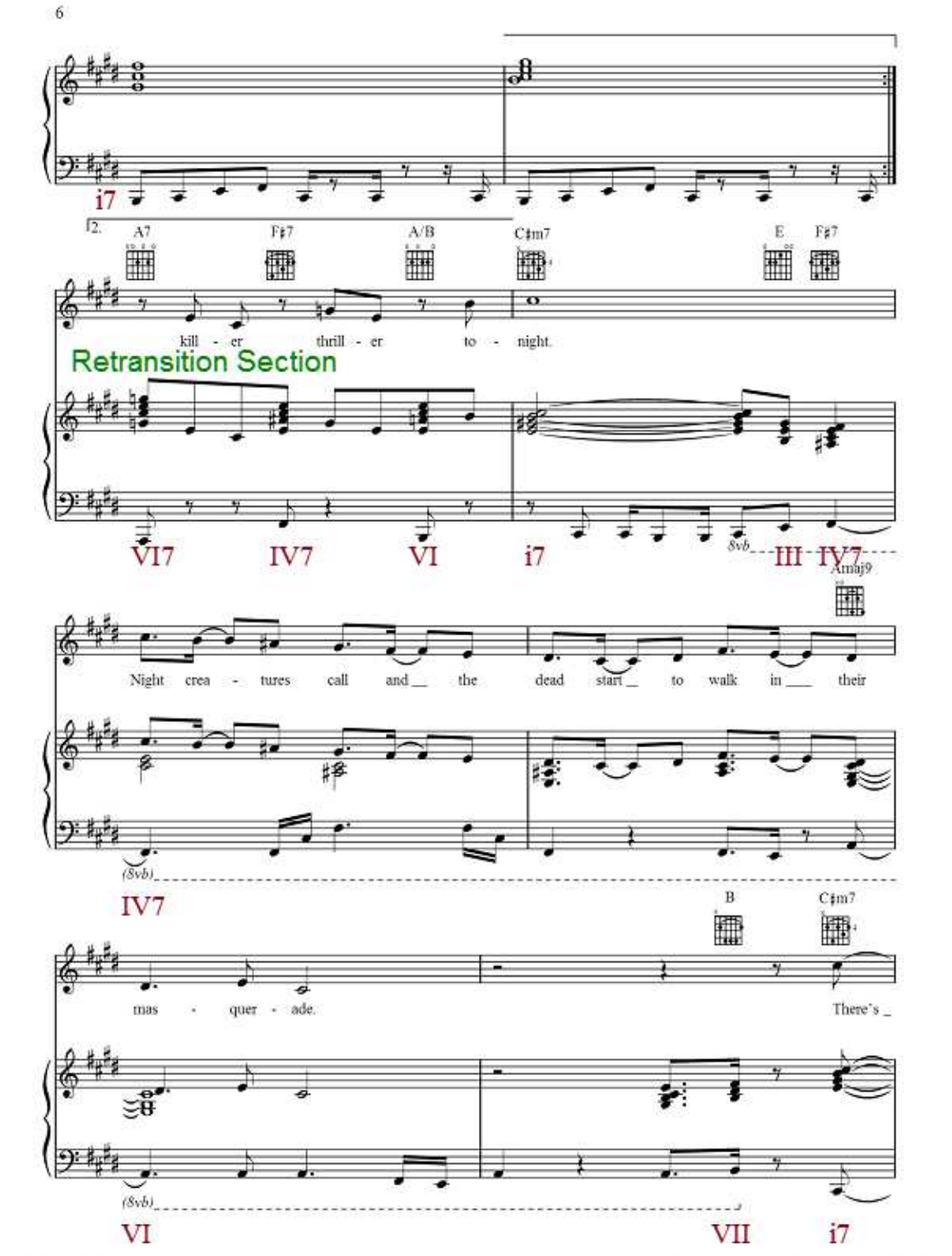











6
i7
2.
A7
F♯7
A/B
C♯m7
E
F♯7
kill - er thrill - er to - night.
Retransition Section
VI7
IV7
VI
i7
8vb
III
IV7
Amaj9
Night crea - tures call and the dead start to walk in their
(8vb)
IV7
B
C♯m7
mas - quer - ade.
There's
(8vb)
VI
VII
i7
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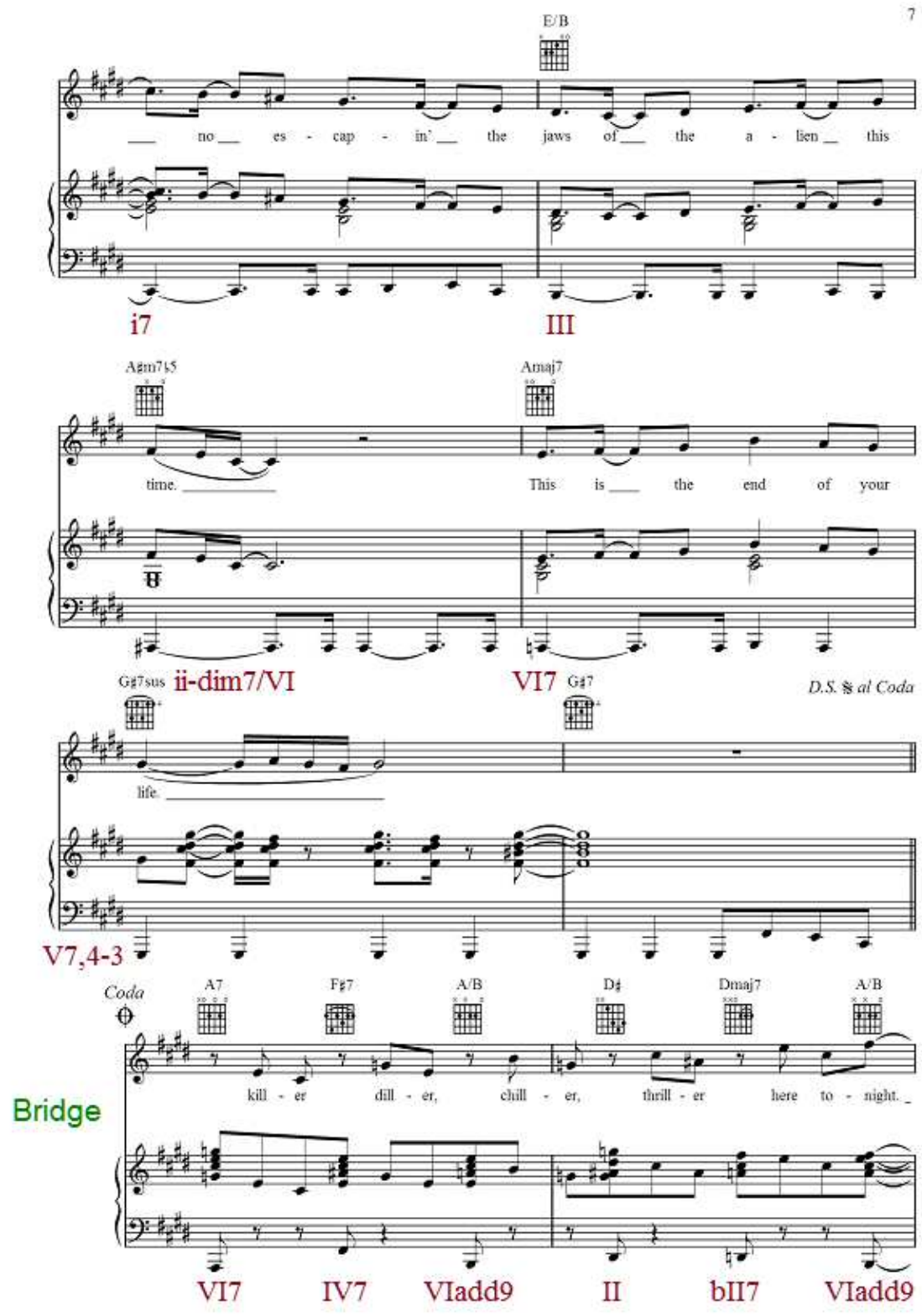
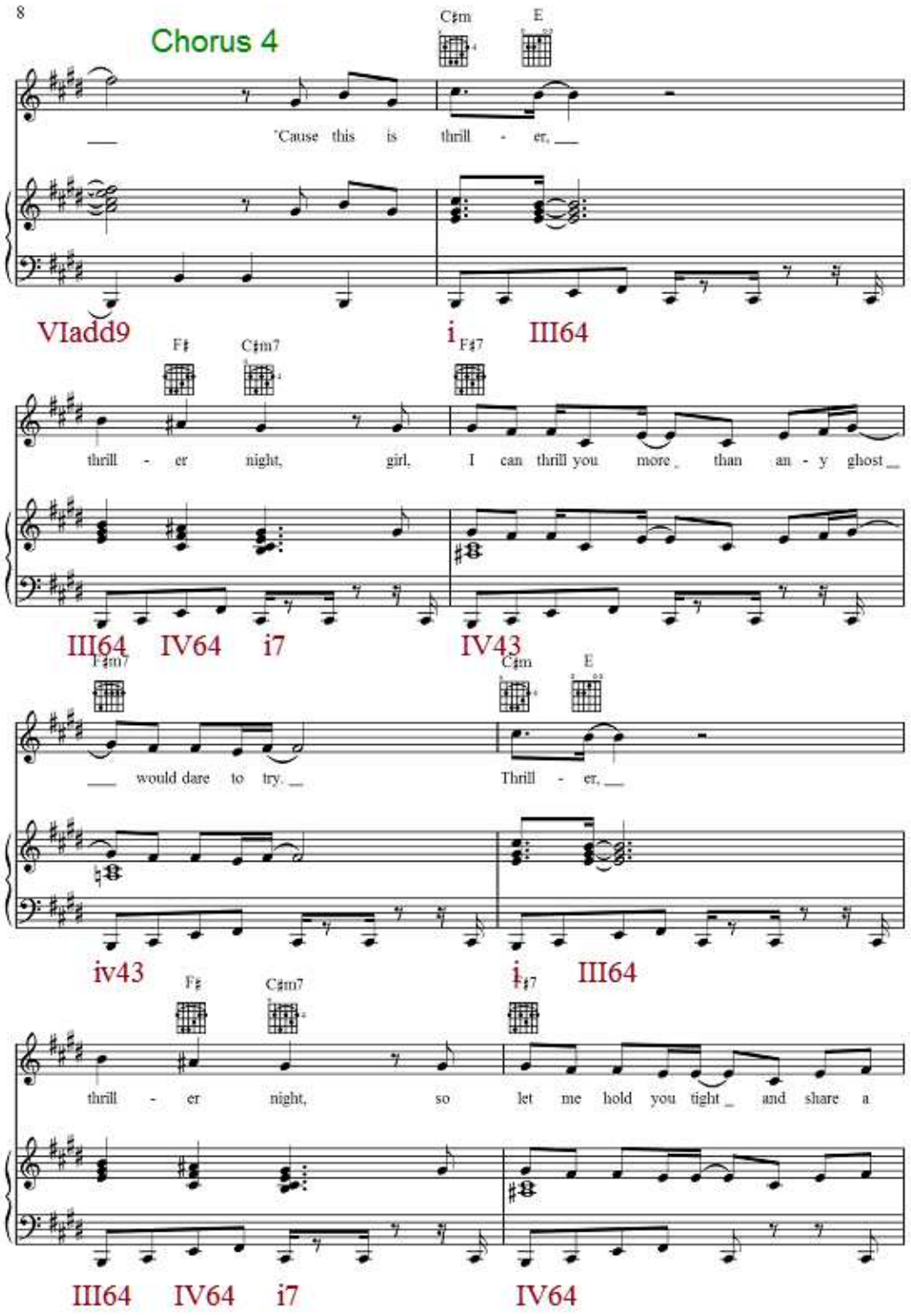
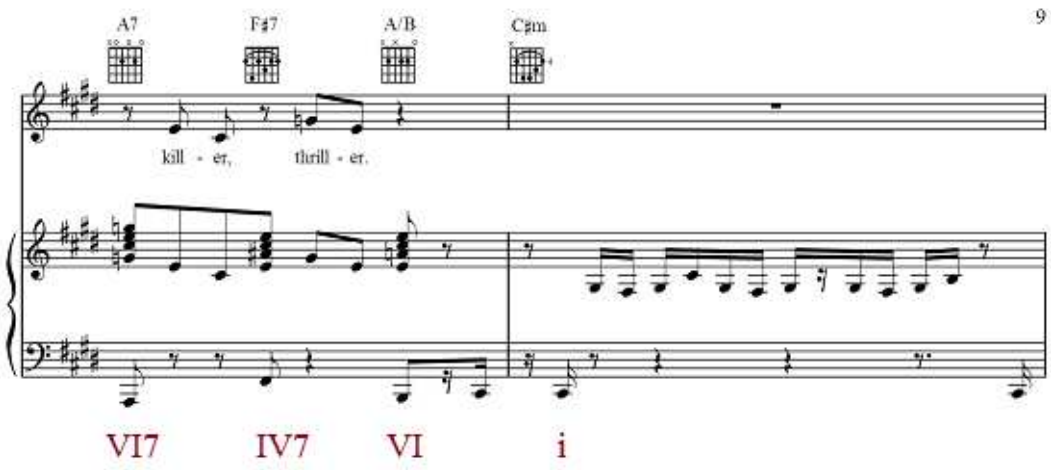






Rhythmically, it is largely the same story. The bass and rhythm sections generally follow each other in where they stay constant, and where they change. The avoidance of the dominant chord (in favor of the major IV) is an interesting choice, and the 6th scale degree is usually sharped. In the second retransition, as mentioned previously, the dominant appears for the first time and holds until the return of the third verse. The minor v appears at the end of each transition to the chorus as well, breaking the pattern from the constant alternation between i7 and IV7.

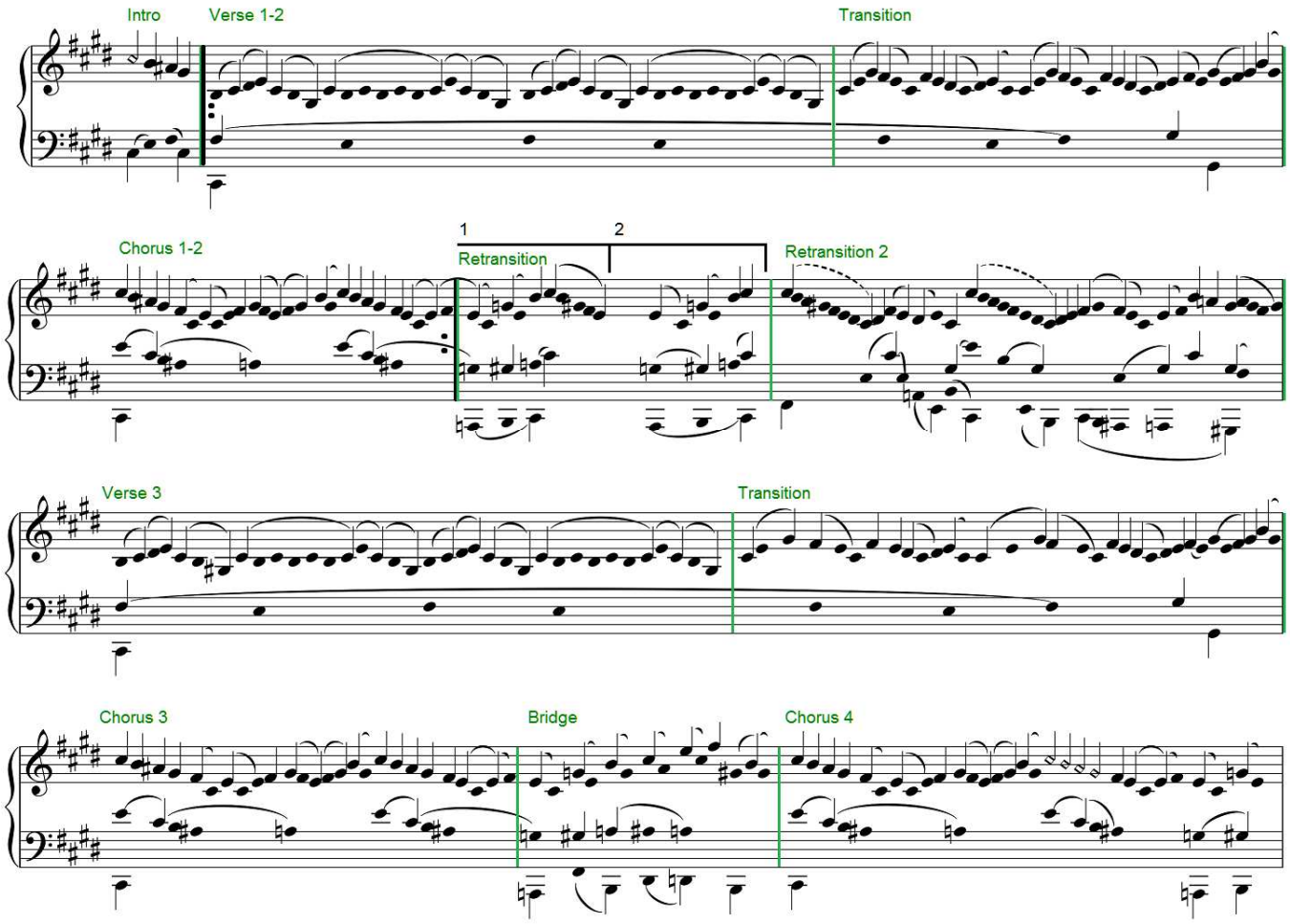
The bridge between chorus 3 and chorus 4 is definitely the most harmonically adventurous section of the song. The harmonies quickly go from VI7, to IV7, to VI add9, to II, to bII7, and back to VI add9 before going back to the chorus. This would be considered fairly chromatic by the standards of nearly any popular style of music, and this also coincides with a change in the rhythm and bass line, as well as the highest melodic note of the song, a high F natural (in stark contrast to all of the F#'s seen earlier in the song).

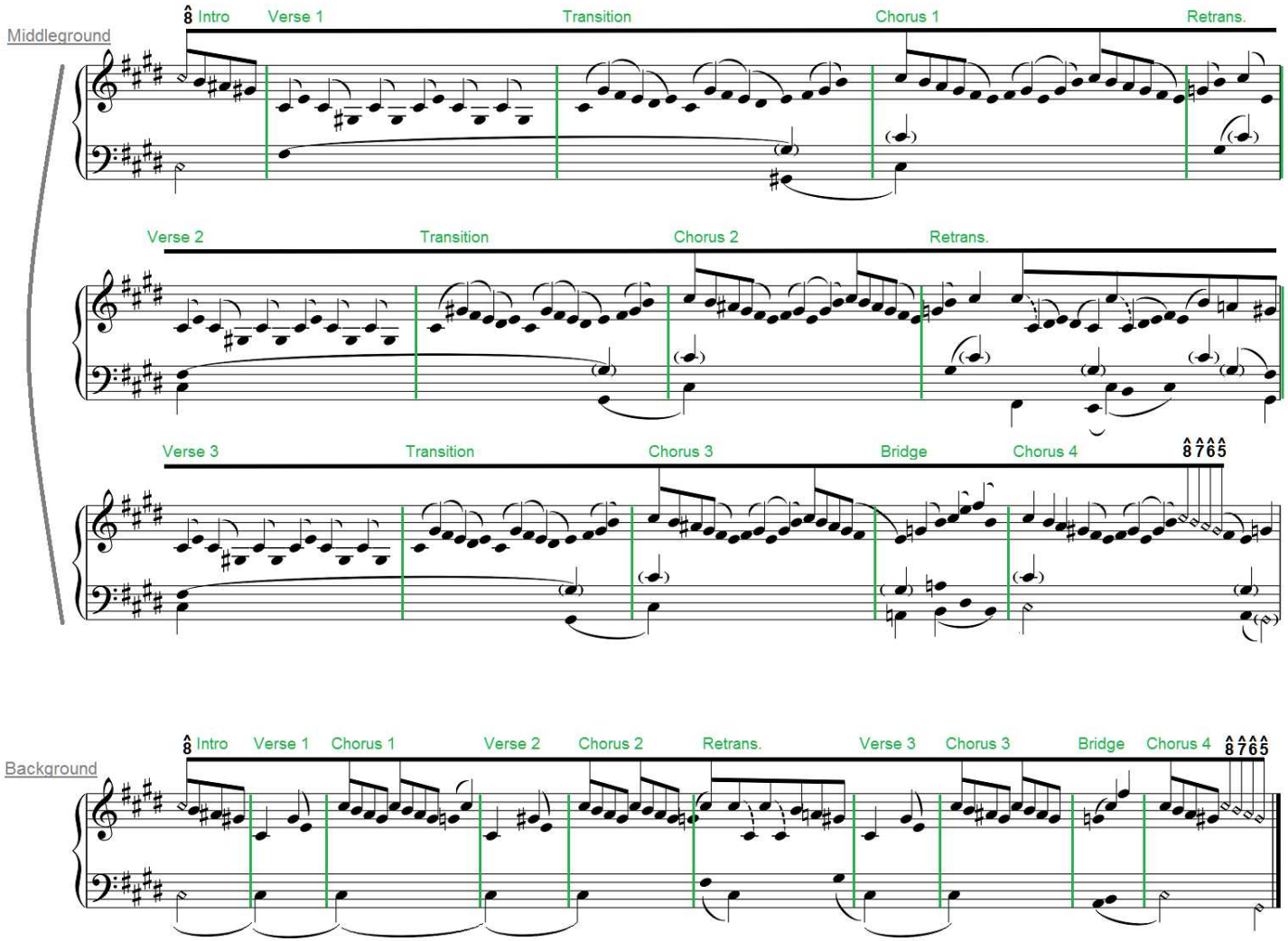
The chorus, despite not being as varied as the retransitions are, does feature a faster harmonic rhythm than the verses and transitions before it, and the 8-7-6-5 descent serves as the most recognizable melody. It is also one of the few places that the song breaks away from Dorian and briefly steps into natural minor. After the first two measures of the chorus (when he sings, 'No one's gonna save you from the beast about to strike' and so on), the harmony changes from IV43 to iv43, allowing that sharped 6 to fall into natural minor, just briefly, before continuing on to the rest of the chorus section.

According to the harmonic and rhythmic analysis, we can assume that the more musically varied or significant sections are the ones that feature a quicker harmonic rhythm, more chromaticism, and a break from the constant and steady bass line and rhythm part. The retransitions seem to be the most noteworthy parts so far, and the chorus (especially the beginning) can be considered musically important as well, as it deviates from the steady harmonic rhythm and alternation between i and IV that happens in the verse and transition before it.

Now, we can look at the Schenkerian analysis, beginning on the next page with the foreground, followed by the middleground and background on the page after it (Fig.7). During the reduction, it was evident that the *Urlinie* would be fairly unorthodox, but after some consideration, it seemed fitting for this song.

Figure 7 (next pages). "Thriller" Schenkerian Reduction.


Intro
Verse 1-2
Transition
Chorus 1-2
1
2
Retransition
Retransition 2
Verse 3
Transition
Chorus 3
Bridge
Chorus 4


Middleground
Intro
Verse 1
Transition
Chorus 1
Retrans.
Verse 2
Transition
Chorus 2
Retrans.
Verse 3
Transition
Chorus 3
Bridge
Chorus 4
Background
Intro
Verse 1
Chorus 1
Verse 2
Chorus 2
Retrans.
Verse 3
Chorus 3
Bridge
Chorus 4

The foreground reveals a few interesting features regarding the lead melody. The first, and most iconic, melody is, of course, the descending fourth (from ^8 to ^5) that appears in the intro and the chorus. This descending fourth figure is also prevalent in the verse (where it descends from the ^8 to the ^5 as well), as well as the transition (where it descends from the ^4 to the ^1), and in the chorus and second retransition, we see descending octaves as well. In many of these cases, we see that the descent occurs *from* the root, instead of descending *to* the root.

The changes in range are evident here as well. The verse does not ascend beyond the 3rd scale degree, while the transition ascends to the 7th scale degree. The chorus ascends to the octave, and the retransition ascends to this octave as well. The retransitions have a sort of 'evolving contour'- every time a retransition appears (including the bridge between chorus 3 and 4), the contour increases in energy, so to speak. The first retransition ascends to the higher octave, and immediately descends after that. The second retransition hangs onto the higher octave and moves into a longer extended section, scaling down the octave and back up again, before hanging on the 5th scale degree (being supported by the only dominant chord in the song) before moving into the third verse. The bridge that comes after the third chorus has the most extreme contour of all of the sections. It follows the same ascending arpeggiation pattern as the first and second retransitions, although continues the pattern to a high F, serving as the highest melodic point of the song.

Moving to the middleground and background, we can see the *Urlinie*. It is a descending 8-7-6-5 line, which is uncommon in art music[8], but in this song, it makes

[8] In Neumeyer and Littlefield's article *Rewriting Schenker: Narrative-History-Ideology* (Neumeyer and Littlefield 1992, p.62), they show that an 8-7-6-5 *Urlinie* can also infrequently appear in art music.

much more sense. The 8-7-6-5 descent is the clearest descent in the song, and the fact that the descent rests on a 5th scale degree (instead of descending down to the lower octave) maintains a feeling of suspension and tension, which fits in well with the intended horror-influenced aesthetic of the song. The descent of the fourth is also found often in the foreground melody, and is arguably the most iconic motive to be found in the song. The descent is not harmonically supported here, although, considering the very static nature of the bassline in this song (and that, unlike many songs, the chorus shares the same bassline as the verse), the descent in the melody occurs while the lower line stays on the ^1.

Like in "Here Comes the Sun", a descent is found consistently in the chorus, and it also provides a framework for the melodic content found in the foreground. As in the Beatles song analyzed earlier, the chorus (and thus, the descent) is found twice at the end, further suggesting its emphasis. In this way, the 8-7-6-5 *Urlinie* is the most logical candidate. "Thriller" is a song closely tied to the aesthetic of horror films, so the descent from 8 (the stable root) to the 5 (the energized and tense dominant) makes sense- it keeps the listener feeling somewhat unresolved.

In the background, we can see the most reduced interpretation of each section. The verse, unsurprisingly, reduces out to mostly 1, 3, and 5. The chorus reduces out to two statements of an 8-7-6-5 descent. The second retransition and bridge between chorus 3 and 4 are the most unique sections. The second retransition has two embedded octave descents, and also serves as an 8-7-6-5 descent in itself (as can be seen on the sketch), but instead, descending to the natural 6th scale degree rather than the raised one, breaking away from Dorian into minor briefly. The bridge jumps up an augmented 4th and then up another fourth, which, visibly, has a unique contour compared to the rest of the song as

well.

The Schenkerian analysis points to certain locations as being the most significant: the ending 8-7-6-5 descent (as well as the descents that also happen before it), and the retransitions. Before concluding the musical analysis, it is important to consider text as well. There is indeed a pattern that the text follows, and it is the same for each repetition of the verse and chorus. As an example, let us look at the first verse, transition, and chorus.

> **Verse 1:** It's close to midnight, and something evil's lurking in the dark. Under the moonlight, you see a sight that almost stops your heart.
>
> **Transition 1:** You try to scream, but terror takes the sound before you make it. You start to freeze, as horror looks you right between the eyes, you're paralyzed.
>
> **Chorus 1:** Cause this is thriller, thriller night, and no one's gonna save you from the beast about to strike. You know it's thriller, thriller night. You're fighting for your life inside a
>
> **Retransition:** Killer thriller tonight.

The pattern in the text follows roughly what is happening in the music. The verse is suspenseful, but lower in tension. The text in every verse anticipates something: "It's close to midnight, something evil's lurking in the dark", or, "You hear the door slam", or, "They're out to get you", and so on. The transition, where it builds tension, talks about interaction with this anticipated 'bad thing' that was described in the verse, and right before the chorus, the lyrics describe an encounter with this 'bad thing'. We have, for example, "As horror looks you right between the eyes, you're paralyzed", "You hear the creature creepin' up behind, you're out of time", and so on. The chorus, following the

same pattern, describes a greater sense of danger and tension, where, by this point, the protagonist has fully encountered this monster or bad thing anticipated in the verse and transition, with lyrics like “No one’s gonna save you from the beast about to strike”, and etc. The lyrics follow the contour of heightened energy and tension, and the greatest points of drama painted in the text are, sensibly, in the chorus.

Looking at all of the musical analysis, it becomes clear that there are two things that stand out in terms of musical significance: the descent in the chorus, and the retransition sections. We will keep this in mind as we look at the analysis of the mixing and production of the recording itself.

Before looking at the technology and effects used, the first step is looking at the expressive nature of the performance. Michael Jackson had a very high-energy and precise style of singing, and this gave him a high level of control in the recording process. Part of this high-energy sound is his use of percussive sound effects and noises, as well as a tight precision, and a quick attack of the notes. This precise, energetic, and rhythmic style of singing fits very well for pop music, and is perhaps Michael Jackson’s most impressive musical signature. The verses and choruses also have a contrasting vocal tone. The verse is slightly more reserved and held back, while the chorus is more open and projected, to reflect the higher energy of this section. The singing shows more of an emphasis on the higher pitched areas, notably, the chorus and the retransitions.

The use of early synthesizers and electronic percussion gives the song an unmistakable 80’s sound. The 80’s represents a sort of merging between established analog technology and new electronic technology. Engineers were still recording onto tape, but things like synthesizers, digital reverbs, drum machines, and samplers became

much more common. Like in the 60's with stereophonic recording, these newly found technologies were taken advantage of and experimented with by the producers and engineers in a way that might not be as common nowadays. Electronic drums were found more often in the 80's than they are now (with the exception of a few genres, like Electronic Dance Music), and the synthesizers were generally less versatile and more basic compared to what they are capable of now, giving them a recognizable 'synthy' sound.

By the 1980's, 24 tracks (and even more, in some cases) had become standard, and this allowed more advanced stereo micing techniques, greater amounts of layering, and more precise placement of sources in the stereo field (since they could be recorded separately, due to higher track counts). Although more precise and detailed in its capture of sound compared to the technology of the 1960's, 1980s sound still did have a certain warmth to it, since use of tube, FET, and tape equipment was still considered standard. For higher energy music, tape does have the ability to contribute in a beneficial way by means of saturation. Saturation is, essentially, distortion that occurs due to unique imperfections in the way sound is captured, and in the case of tape, it is generally thought of as positive, in smaller doses. Saturation can bring out a sound, making it sound more up front, and more impactful. For popular music, this has its benefits, especially where the rhythm section is an important part of the overall 'feel' of the recording.

The control over the stereo field is far more refined in this example compared to the Beatles song (which will be discussed in more detail later). There are not as many dramatic panning effects, but the stereo field does change in that certain instruments located in certain areas will come in and out depending on the section.

In pop music, layering and sampling is standard practice. This means a fairly large, and fully 'orchestrated' recording is what is to be expected, although these expectations are changing with some more minimal textures in today's pop music. To get a better idea of what the instruments are doing, a chart has again been provided, showing the stereo location of the instruments, as well as their entry and exit. The chart is shown on the following page (Fig.8).

The sounding of the drums and bass part are consistent throughout the whole song (as they would normally be for dance music), and the synth pad provides the primary means of harmonic filler, since it is audible for nearly the entire song. The other instruments, most notably the brass section and the muted electric guitar, also provide harmonic and melodic support, as well as syncopation to the steady rhythm below them. At first, they do not appear much except for in the chorus, but later on, they become more and more frequent. Other instruments also appear more frequently in the later choruses as well, including a synth lead part, and a theremin. As is visibly apparent on the chart, the most instrumentally dense spots of the song are the transition to chorus 3, and the third and fourth choruses. The appearances of the horn section (marked in purple on the analysis) are the most telling. At first, they only appear at the intro and the end of the first chorus, but become more and more common until during the second retransition and the last two choruses, where the horn section is heard much more consistently. This is worth taking note of, since the horn section is the brightest, most strident, and perhaps most high-energy track in the recording. If an engineer or producer were trying to create a sense of increased energy, using a horn section would do the job well.

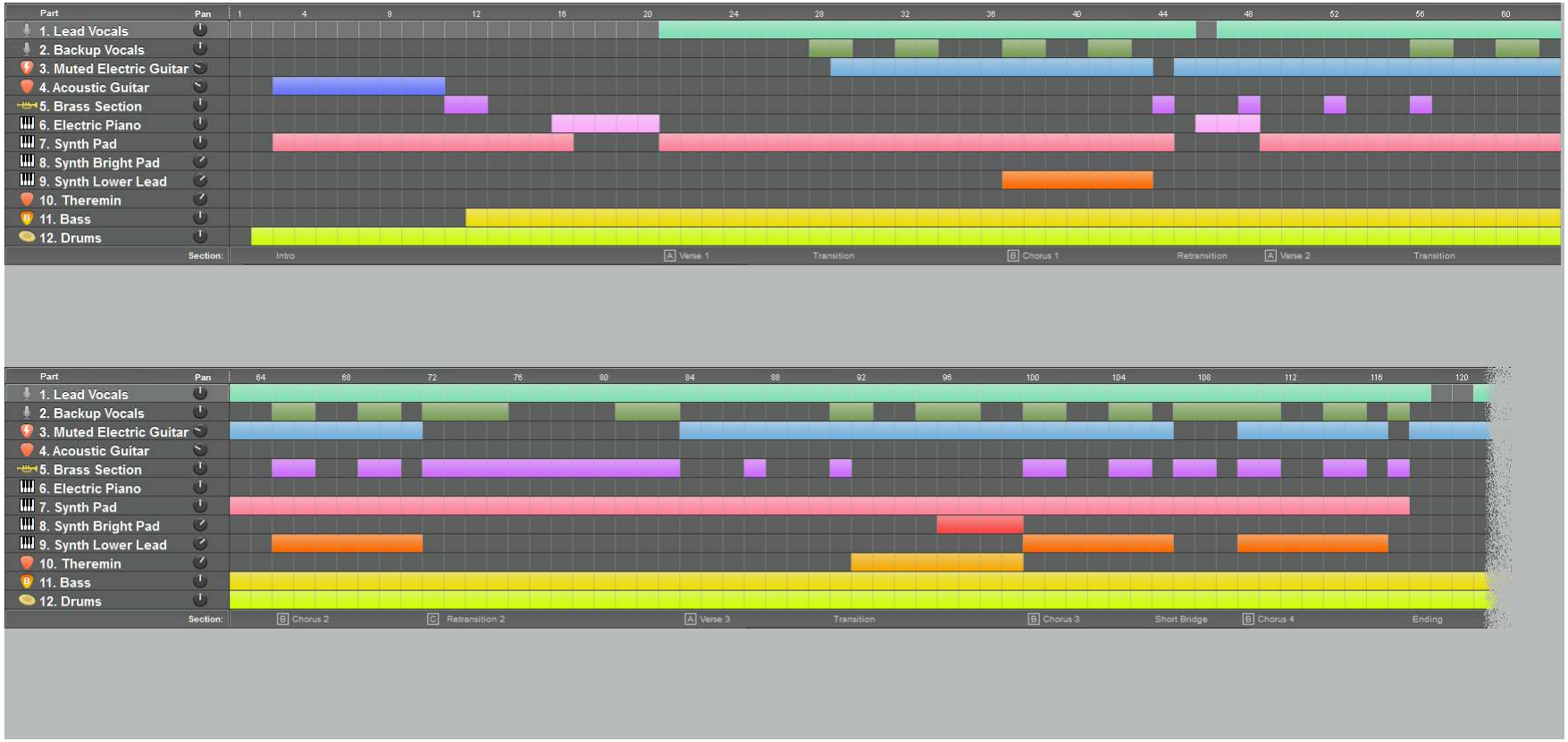


Figure 8. “Thriller” Instrumental Layout Chart.

According to the analysis of the arrangement here, the choruses (especially the last two) and the last retransition and transition sections are the most dense and fully layered. Because it is such a common technique to use during production, it can be easier to understand the intentions of the producer by looking at where he places instrumental fills and layering. It seems to suggest here that the last two choruses, as well as the transition before them and the bridge in between them, are of importance.

The soundstage in this recording is much more similar to what one might hear in a modern recording, compared to the soundstage in Here Comes the Sun. The most prevalent tracks are all located right in the center, as is common practice. This includes the lead vocals, the kick and snare, the bass, and the polysynth which is providing the main harmonic support. What makes the soundstage unique is the stereo placement of the filler instruments, the vocal harmonies, and the sound effects. Every one of these instruments is placed somewhere off center, so as the density of the instrumentation builds, the stereo image becomes wider as well, and the recording goes from sounding fairly narrow (in the verses, mostly) to wider and larger, especially in the later sections. Part of this was achieved by varying distances in microphone placement as well. Bruce Swedien, the engineer for Thriller, would place Michael Jackson at varyingly increased distances from the microphone while recording the harmonies, so that the harmonies would not crowd the lead vocal track by sounding as up-front as they do.

The most notable use of effects and tools here is the addition of various sound effects like door slams, howls, creaks, footsteps, and so on. This really ties in the intended connection with horror films. They are sometimes presented as rhythmic ideas as well, especially in the second verse after the words “You hear the door slam”,

followed by an on-tempo door slam sound effect. The theremin could be considered somewhere between a melodic addition and a sound effect. It has a connotation quite strongly tied to older sci-fi and horror films, so its use in this context would be well-understood by most listeners. Like in the music analysis, the text having a more active and higher energy subject matter during the choruses is further reinforced by the placement of the instruments (and, as a result, the width of the stereo field).

Looking at all of the aspects of the mixing and production, we can see that the engineer and producer intended to emphasize certain parts of the song by means of providing multiple layers of instruments placed more widely in the stereo field, as well as use of sound effects and increased density of instrumentation as the song goes on. The last transition moving into choruses 3 and 4 seems to be the most instrumentally dense part of the recording, and this analysis seems to indicate that these are intended to be emphasized by these production and mixing decisions.

Now that both the musical analysis and recording analysis have been discussed, we can ask, do they coincide? The answer is, yes, they do. The most musically chromatic sections, as well as the occurrence of that very important 8-7-6-5 descent in the chorus, is almost always accompanied by a more dense and full instrumentation, as well as a wider stereo field. The location of the song where the most 8-7-6-5 descents are happening, and also where the most dense layering is (the third and fourth chorus), is also the location where the *Urlinie* descends from 8 to 5. There is no doubt that the production, mixing, and songwriting were closely involved with each other during the song's creation process. What these correlations mean will be discussed in greater detail in the section following all of the analysis.

"Instant Crush" (Daft Punk)

Finally, we will be looking at a song written and recorded very recently, to represent what is considered to be high-quality songwriting, engineering, and production in the present day. "Instant Crush" is a song on the album *Random Access Memories*, released by Daft Punk in 2013. Although somewhat less well-known compared to *Thriller* and *Abbey Road*, *Random Access Memories* was well-received after its release, and was awarded three Grammy awards in 2014, for Album of the Year, Best Dance/Electronic Album, and Best Engineered Album (Non-Classical). Daft Punk is considered one of the most important pioneering groups in electronic music, and they have been active since 1993, making them a great candidate for the third chosen piece for analysis, since they cover both the 90's and 2000's.

Unfortunately, no apparent analytical literature exists discussing this song or album, although this may be largely due to its relative newness. Some literature does exist discussing Daft Punk's background and their influence on electronic music, although none seems to consider their music from an analytical perspective.[9] Hopefully this thesis will be the first of more analyses discussing Daft Punk's music.

In the present day, the creation of music is almost always inseparable from the use of computers and other digital technology. The digitalization of effects processors, the unlimited capability of digital multitracking, and the power and ease of digital splicing and arranging has allowed for recorded creations that lie way beyond the capability of previous technologies. In many cases, a recording is created as a process of layering,

[9] The book *Daft Punk: A Trip Inside the Pyramid* (Santorelli 2014) and the article "Robopop: Part Man, Part Machine, All Daft Punk" (Gill 2001) from the book *Keyboard Presents the Evolution of Electronic Dance Music* (Kirn 2011) provide some basic background information on Daft Punk, although neither feature any musical analysis.

often times adding each track separately and independently, and the role of the producer, songwriter, and engineer has become more homogenous, compared to the more separate roles they used to have in previous decades.

With the advent of sampling technology and the prominence of electronic genres (including hip hop), synthesizers and digital instruments are not only a basic staple of a modern recording, but are nearly limitless in their sonic possibilities. Genres like pop, rock, metal, and some independent styles, are all beginning to integrate more digital and synthesized instruments, and this makes a song in the electronic genre an accurate representation of what modern recording is.

Like in the past, there still does exist a divide between active and passive listening music, although because there is such a huge variety of genres and styles available, many modern musicians blur the lines between musical roles (active vs. passive), style, nationality, and so on. Daft Punk, due to their influence from earlier electronic, funk, and dance music, blurs the line between old and new: their aesthetic is what I would call 'retro-futurism.'[10] They use a number of electronic instruments, vocoders, and electronic percussion, but all with a 'vintage' flavor to them, allowing for a fairly unique sonic dichotomy. Despite the limitless capabilities of electronic instruments nowadays, Daft Punk still leans towards the use of analog synthesizers and vocoders, as well as more traditional mixing and production methods. This gives their newest album an effective combination of vintage warmth, but with the pristineness of modern day digital recording. At the same time, they also recorded their album simultaneously using analog methods, for a vinyl release with the CD release. Their ties to vintage recording

[10] In *The Guardian's* November 2010 article "Daft Punk recruited 90-piece orchestra for Tron: Legacy soundtrack," it is mentioned that Thomas Bangalter, one of the two members of Daft Punk, referred to his music as "retro-futurism."

techniques are unmistakable, and it is part of the reason why many (including myself) consider it perhaps the best-engineered album of the decade thus far.

Unlike much of the electronic dance music out there, Daft Punk's music is not as highly energized and simple- it rides the line between active and passive listening, with both a consistent, danceable rhythm but also enough musical content and variety to allow for an interesting active listening experience. That being said, the previous two songs analyzed, Daft Punk's music will hold much more similarity to "Thriller" than it will to "Here Comes the Sun." This is largely due to the fact that both Michael Jackson and Daft Punk have similar roots of influence: early dance music, funk, and disco.

"Instant Crush" is perhaps one of the more introspective tracks on the album, with a more melodic and songlike quality, compared to the almost trance-like repetition of "Motherboard" and "Giorgio by Moroder," or the higher energy dancing songs like "Get Lucky." Because of its focus on melodic content and narrative, "Instant Crush" makes a good candidate for musical analysis, while still being representative of the electronic genre.

The first thing to make note of is the instrumentation. The song has a fairly traditional layout of instruments, with a rhythmic synth and muted electric guitar providing most of the harmonic support. The lead vocals are presented by what sounds like a blend of recorded voice and vocoder processing, and after the first verse and chorus, the voice is harmonized until the end of the song, rather than just in certain locations (like "Thriller," for example). The synthesizer is perhaps the most prominent instrument used to support the song, although its tone is one that has a distinctly vintage feel to it- it would not be unusual at all to hear these sort of synth tones in the 80's.

The drums and bass also provide a certain consistency. They are not as static as found in "Thriller," but have an unchanging steadiness for the verses, transitions, and guitar solo, only changing for the chorus section. This rhythmic steadiness in the percussion and bass is reminiscent of the dance music roots of Daft Punk. The drums are fairly acoustic in their sound, but have a tightness that almost makes them sound somewhat electronic, further supporting the sort of aesthetic combination of 'old and new' together.

The bass, drums, and voice give us some hints for where emphasis is intended. The bass is more mobile and energetic during the chorus, and the rhythm also goes from predominantly 8^{th} notes to 16^{th} notes (with the tambourine) in the chorus sections. Because these two instruments are intended to provide a steady foundation, their deviation from that foundation is worth considering. The vocals, rather than being harmonized in only specific locations, become harmonized in the first chorus and remain so, through the following verse and chorus sections, until the end of the song. In a way, this means the developmental arc of the voice parts is longer, rather than moving in and out of harmonies depending on the section. This is a fairly unique approach to harmonization, and gives the song momentum across its repetitions. The instrumental layout will be considered in more detail further in the analysis.

Next, we can look at the form of the song. The chart is shown below (Fig.9).

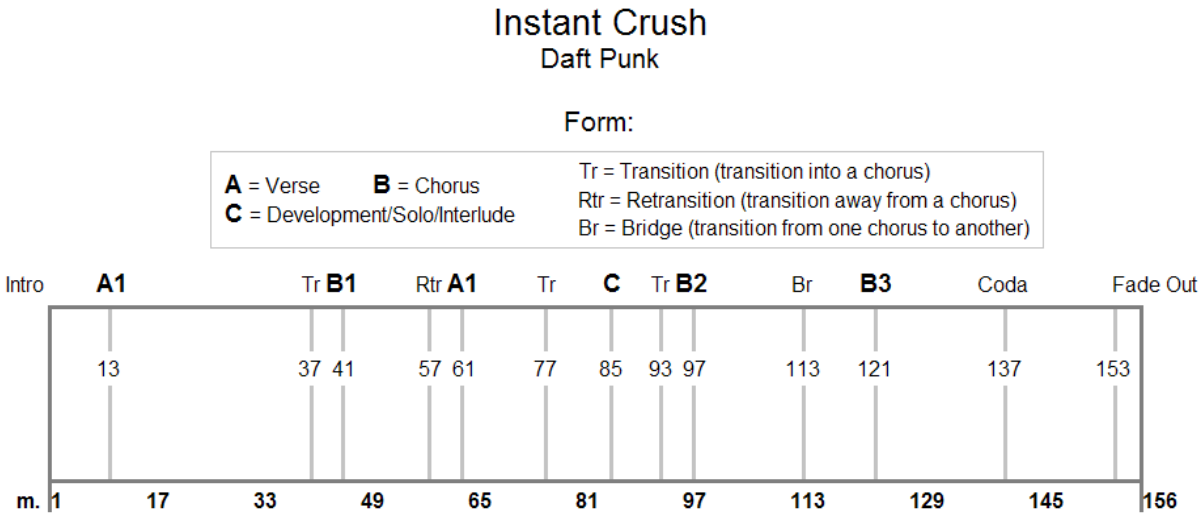


Figure 9. “Instant Crush” Form Chart.

Although the form does not resemble a form derived from art music traditions like sonata-allegro, there is a sensible organization to it nonetheless. There are a number of formal similarities and nuances to “Thriller,” in that the verse and chorus are fairly consistent and unchanged as they repeat, and the transitionary sections are what contain the most diverse and melodically energetic music. The transitions and retransitions (and the solo, marked C, which essentially serves to extend the transition into its own section) are located between every verse and chorus, and like both the Beatles and Michael Jackson examples, the chorus is repeated twice at the end before going into a coda and ending the song.

The shortened second verse also begins more immediately, and is audibly different from the first verse (especially considering the inclusion of new vocal harmonies). This decision may have been for the sake of maintaining a sense of energy or tension before the more conclusive chorus section, and by featuring a more brief second

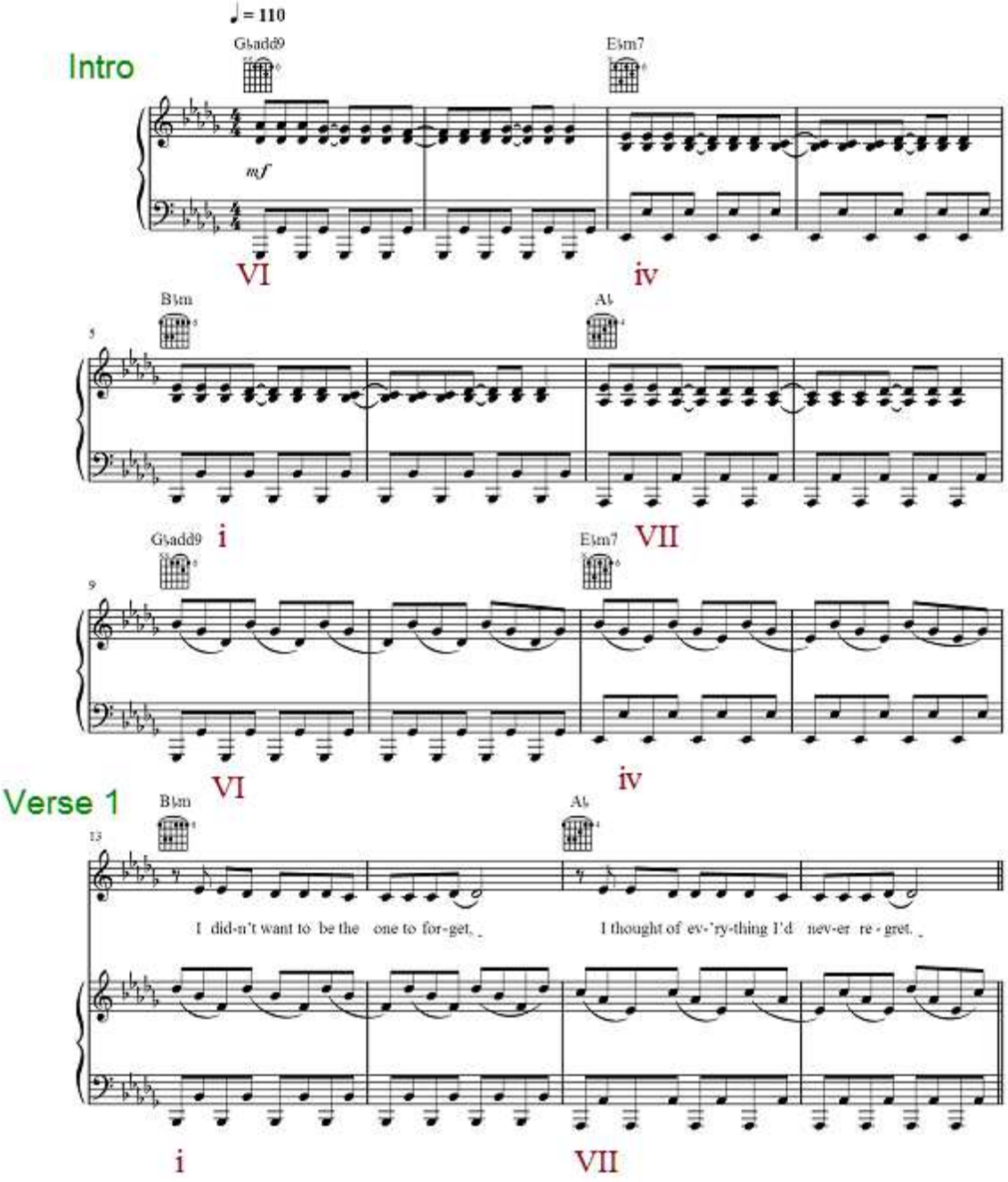
verse, the momentum between higher energy choruses and transitions is likely maintained better. The first verse, in contrast, had an instrumental introduction as well as being longer. This serves well in the beginning, since it creates a sense of slowly building momentum, although an exact repetition of the first verse would serve less well, compared to the more concise second verse.

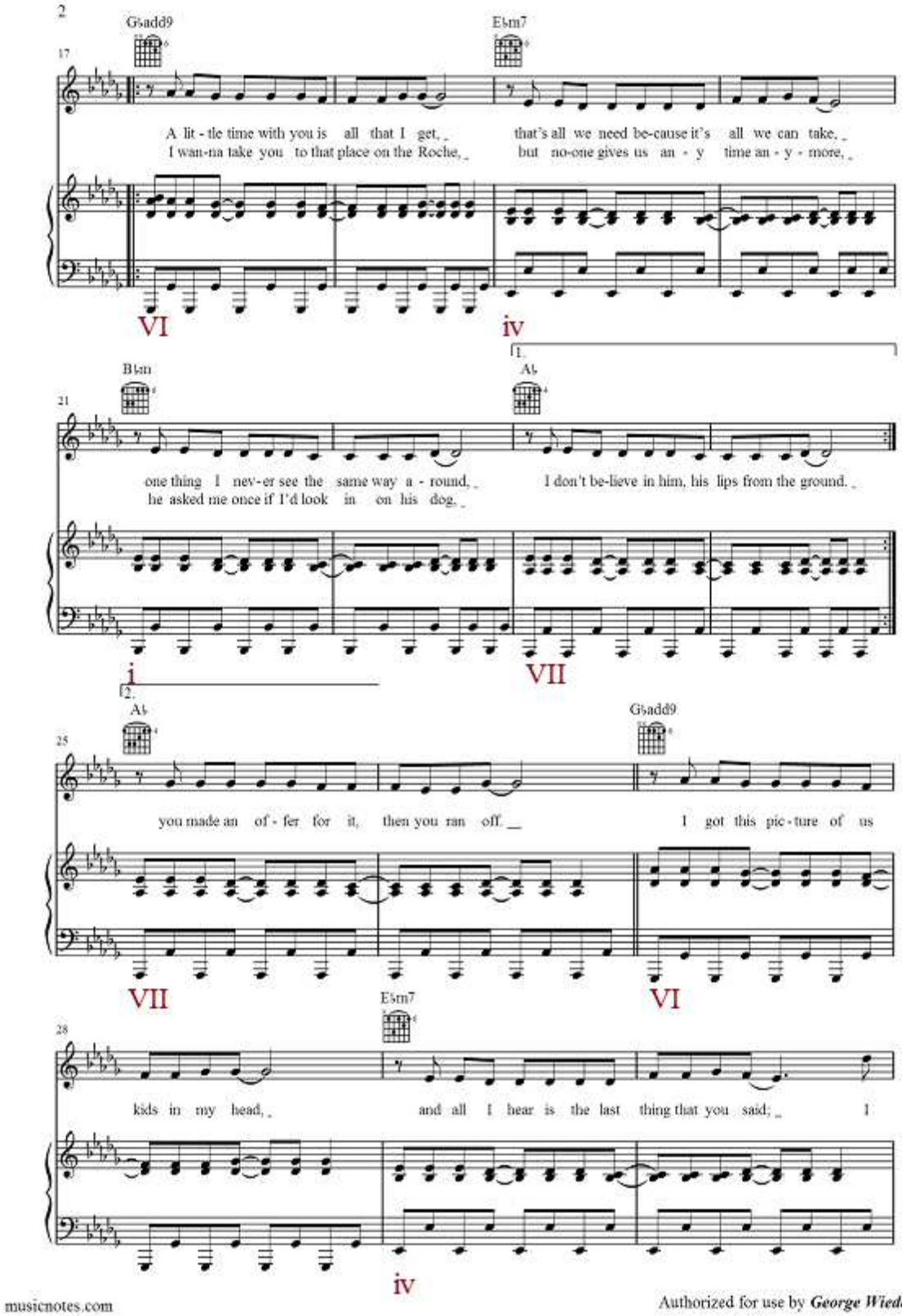
This decision to shorten the second verse and spend more time in more diverse transitionary material or higher energy chorus material may be a reflection of modern sentiment in general. With the huge amount of information being rapidly presented to us, the modern day attention span is going to be different than it was during the 80's or earlier. Commercials and videos are cut and organized with rapid cuts to minimize downtime, and wireless technology allows the individual to fill in any gaps in activity at their leisure. The modern day 'get-to-the-point' kind of attitude undoubtedly affects how musicians organize their music, perhaps causing them to focus more on the higher energy sections (like the chorus). This could be why the repeat of the verse features a shortened version, and why the repeat of the chorus features a lengthened version(essentially two choruses back to back) - the proportions between A and B shift as the song goes on, perhaps to better keep the attention of the modern listener. This creates an interesting symmetry to the song. From the sort of patterns we have seen in the previous two analyses, we can expect that the last chorus area (and the transitions in between the sections) will be the most musically significant. To further investigate, we can look at the rhythmic and the harmonic nature of the song with an analyzed piano reduction (Fig.10).

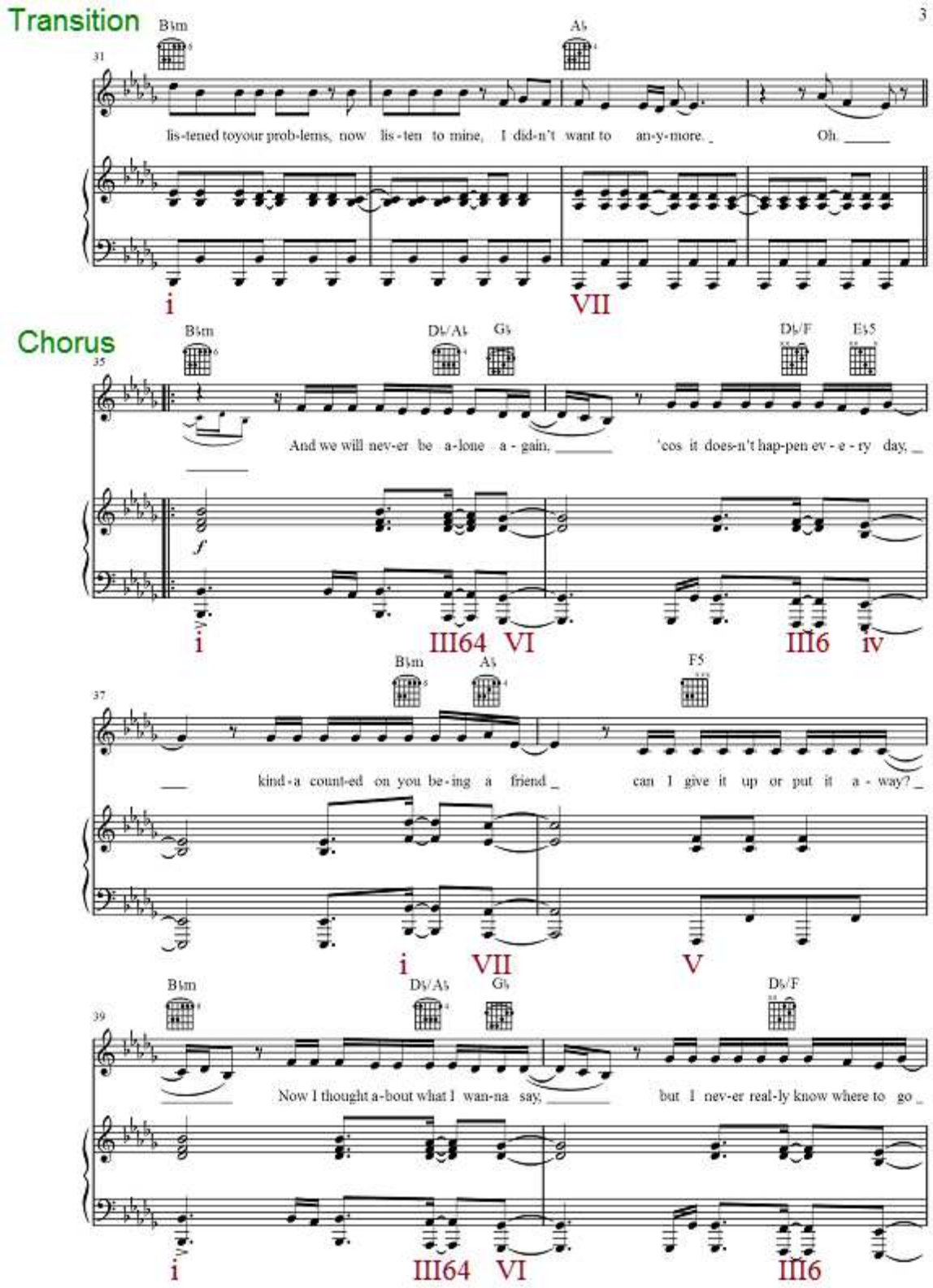
Figure 10 (next pages). "Instant Crush" Analyzed Score.

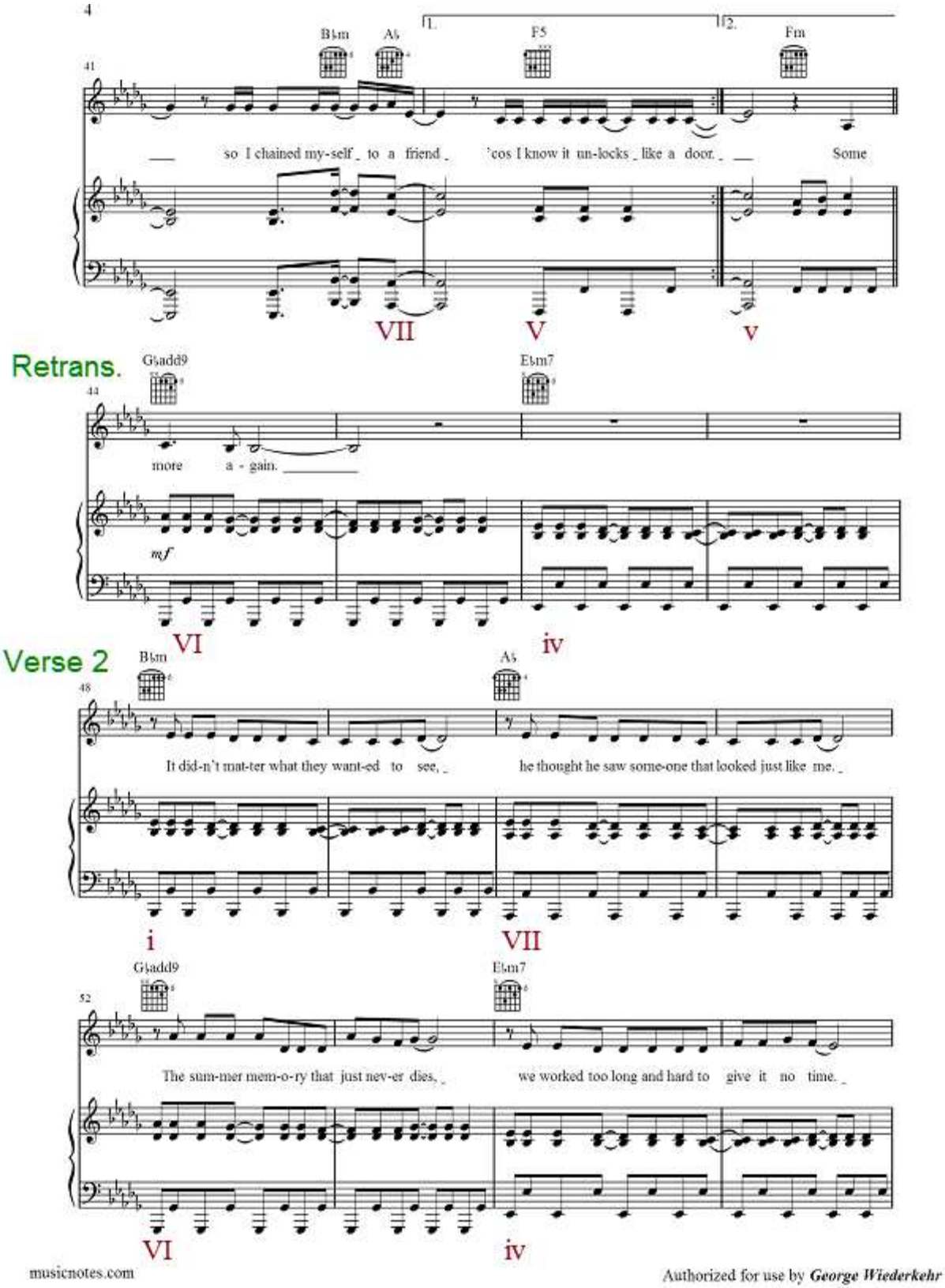
Instant Crush

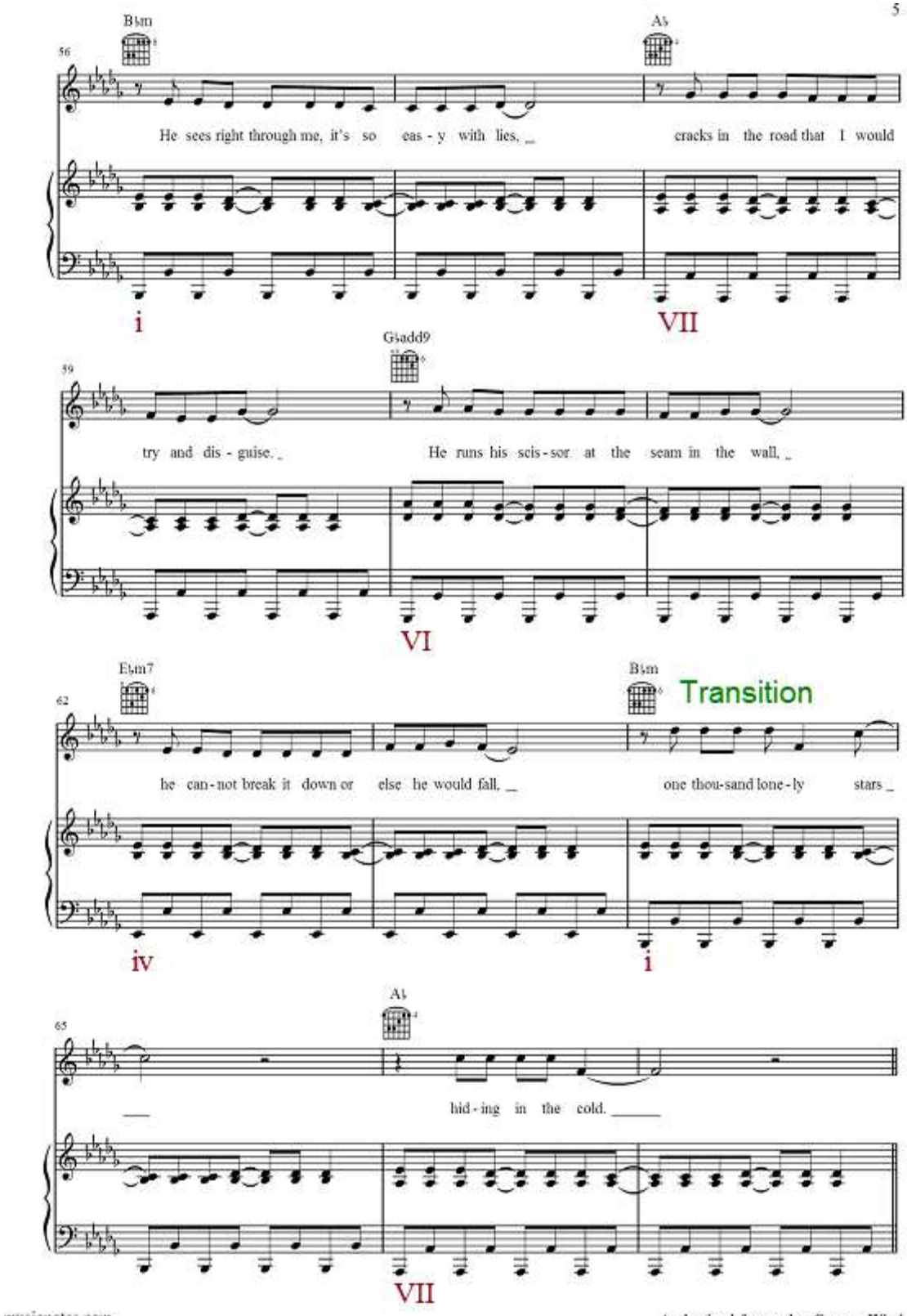
Words and Music by Thomas Bangalter, Guy-Manuel de Homem-Christo,
Paul Williams and Julian Casablancas



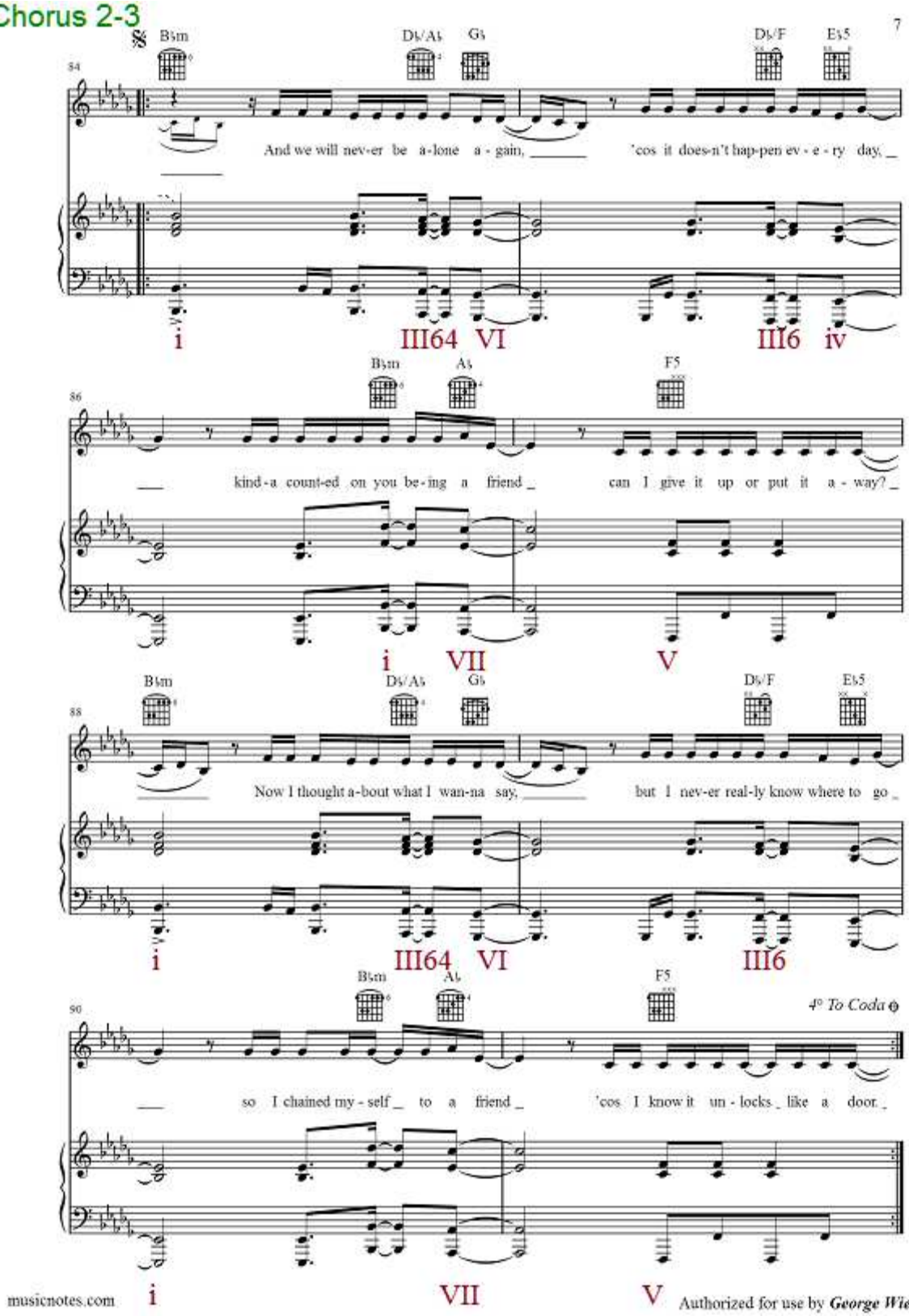


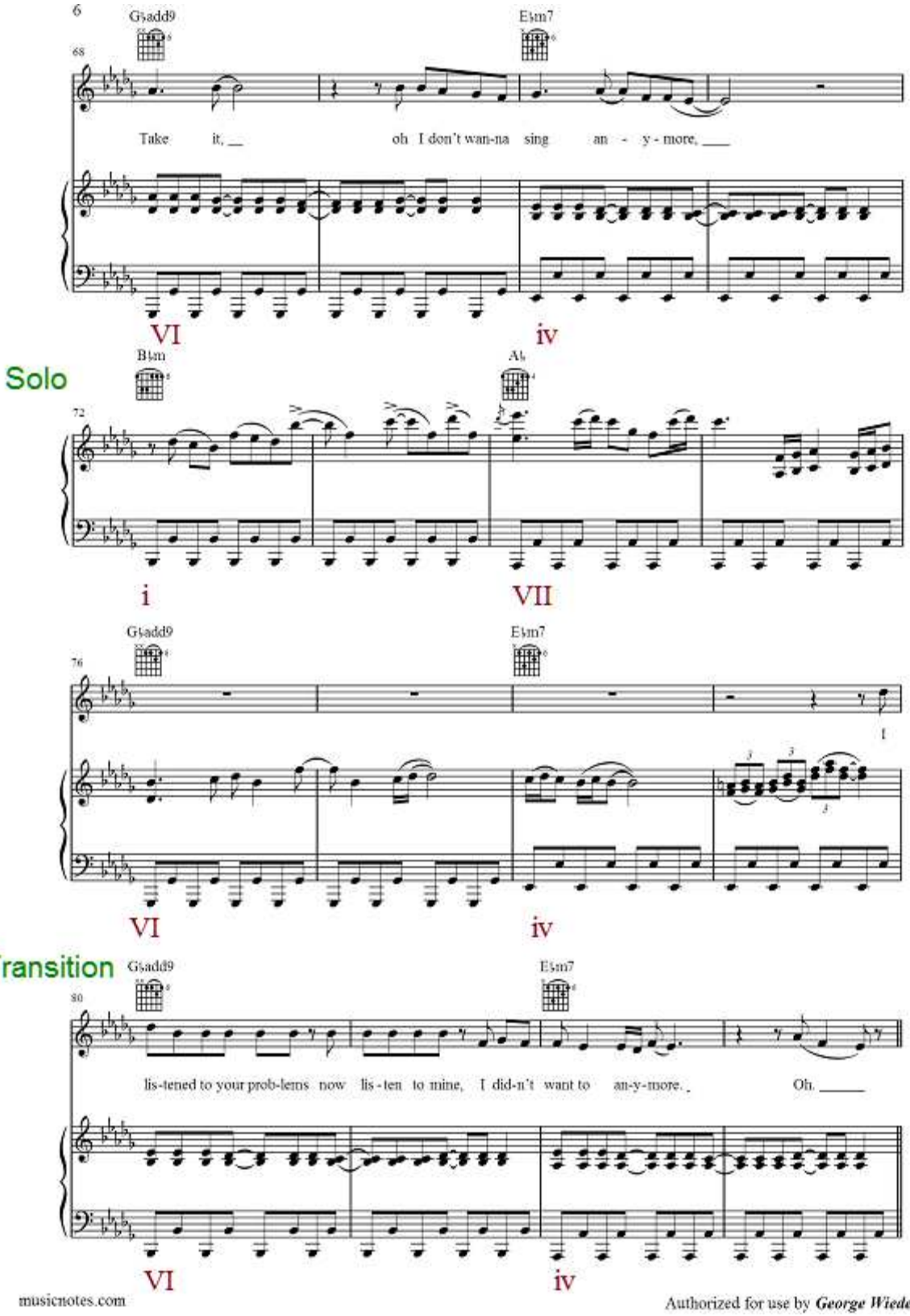


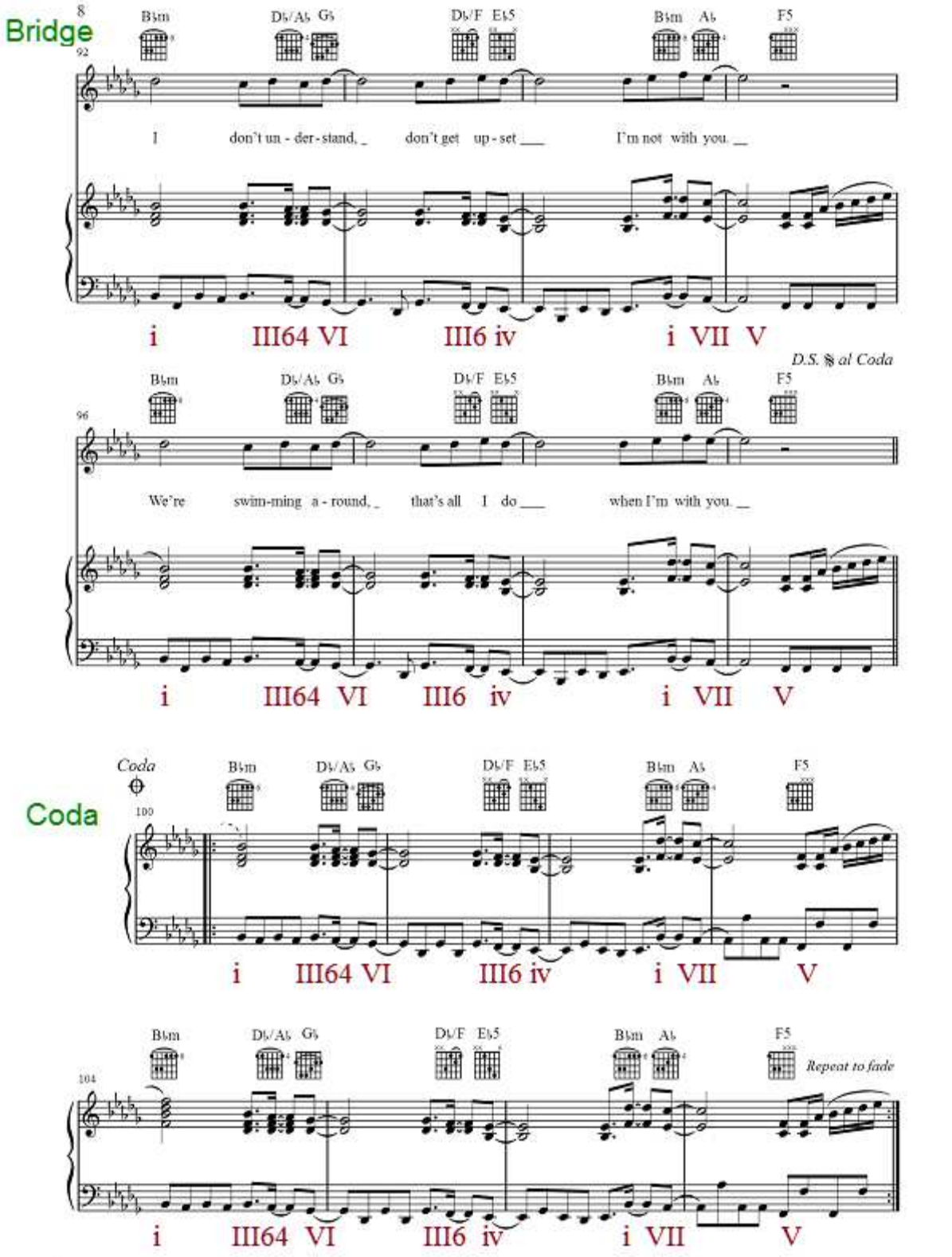




Chorus 2-3







In the verse, the song does not seem to strongly settle in one key. It moves back and forth between Gb major and Bb minor, and does not create a strong sense of arrival in either one. This gives the verse sections both a sense of harmonic and expressive ambiguity, creating a sound that could be described as somewhere between contentedness and seriousness. The song begins in Gb major, but the verses and choruses begin in Bb minor. In a way, the alternation between these two key centers is reminiscent of what we have seen in "Thriller." In "Thriller," there is an alternation between i7 and IV7, without any steady resolution in one of those key centers until the chorus.

Similarly, once we get to the chorus, we hear a more convincing placement in Bb minor, making that the proposed home key of the song. Like in Michael Jackson's song, we see the III64 used as a passing chord, and the dominant only appearing rarely. At the end of the repeating phrase in the chorus, the dominant appears, although, while retransitioning into the verse again, it is replaced with the minor v instead. Perhaps this is to lower the energy level and settle into the verse again.

The two main chord progressions to be found are the verse progression and the chorus progression. The verse progression is i, VII, VI, iv, and it occurs during the solo, while the chorus progression is i, III64, VI, III6, iv, i, VII, V, and it occurs during the bridge and the coda. This does suggest that the chorus is more active, since more harmonic changes occur in a shorter amount of time. Considering the rhythmic content of the song is perhaps even more revealing.

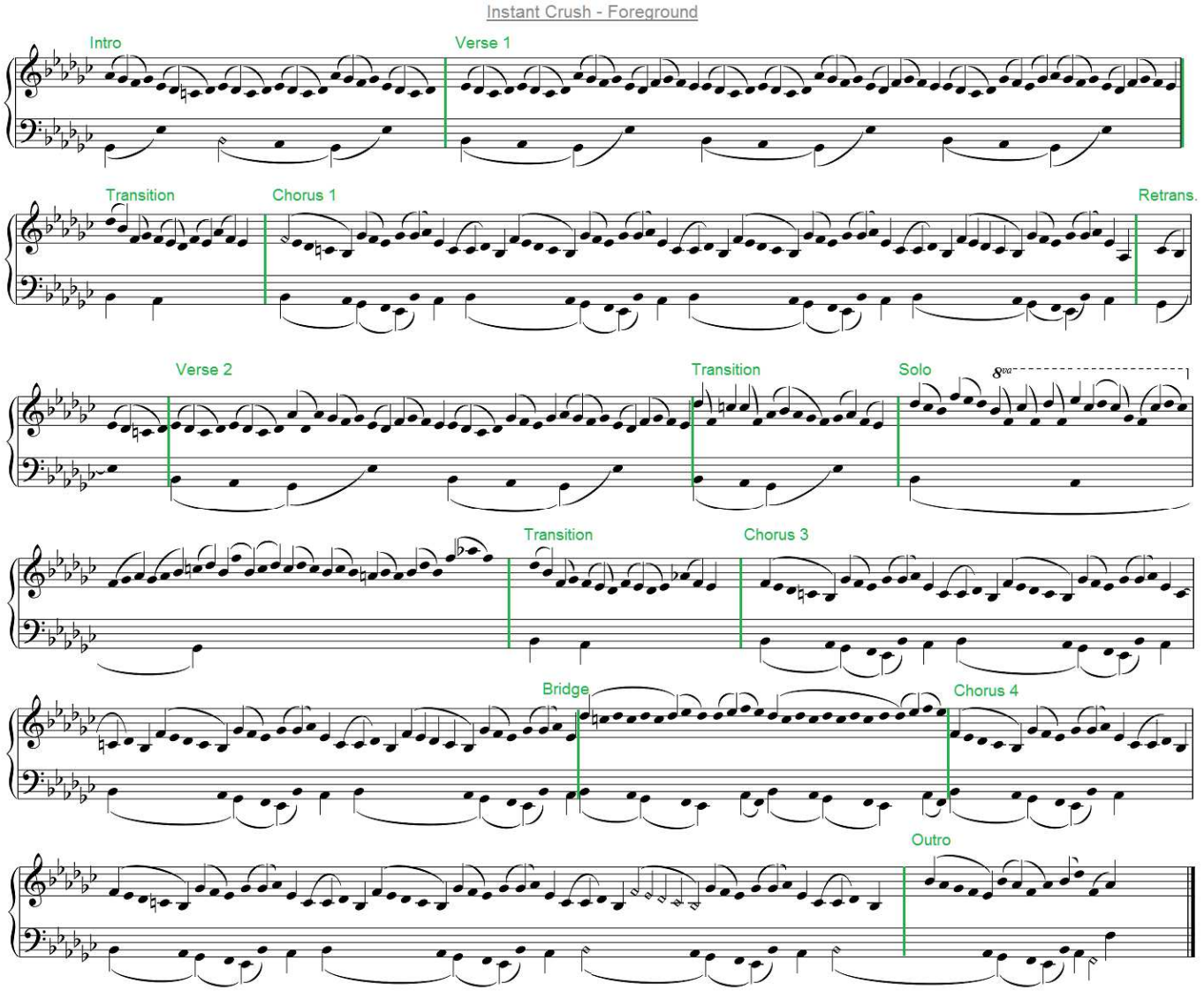
The verse sections hold a steady 8^{th}-note pace, with many repeated notes in the lead voice part and a fairly steady 8^{th}-note-based drum part. In the chorus, both the voice and the percussion move instead to a 16^{th}-note pace, and the bass becomes more active,

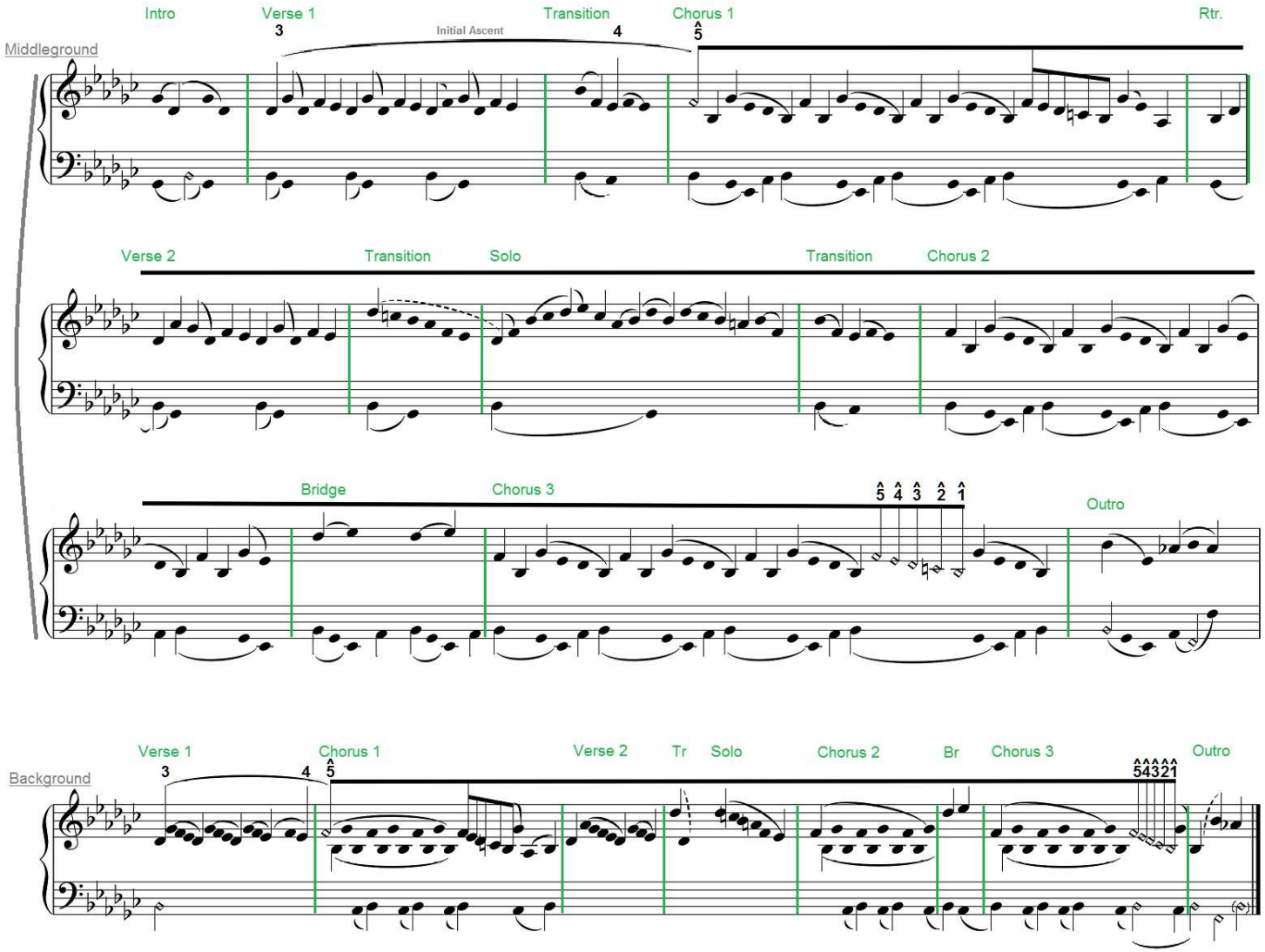
giving the sense that the rhythmic energy has essentially doubled. The inclusion of the tambourine reinforces this sense of increased pace as well.

According to the harmonic and rhythmic features of the song, it appears that the chorus, the bridge, and the coda (which are built on chorus material) are the musical highpoints. This generally agrees with what the formal analysis has suggested, and is similar to the conclusions drawn for the previous two songs. To look further into it, we can view the Schenkerian analysis (Fig.11). This is shown beginning on the next page.

Looking at the foreground, we can begin to see some patterns right away. The ^2-^1-^7-^1 melodic shape is very prevalent in the verse areas, and essentially repeats throughout. The chorus section features the most clear descent, from ^5 to ^1, and after that, shows the melodic fragment ^6-^5-^4-^6, which is vaguely reminiscent of the motive found in the verse. Like in "Thriller," the verse has a more steady contour overall, without too many strong ascents or descents, although in the transition, we can see the melody leap up to a high Db, which is higher than most other melodic notes. The chorus shows a constant descent and leap back up, which suggests that the *Urlinie*, like in both "Here Comes the Sun" and "Thriller," would be derived from chorus material, rather than verse material.

Figure 11 (next pages). "Instant Crush" Schenkerian Reduction.


Instant Crush - Foreground
Intro
Verse 1
Transition
Chorus 1
Retrans.
Verse 2
Transition
Solo
8va
Transition
Chorus 3
Bridge
Chorus 4
Outro


Intro
Verse 1
Initial Ascent
Transition
Chorus 1
Rtr.
Middleground
Verse 2
Transition
Solo
Transition
Chorus 2
Bridge
Chorus 3
Outro
Verse 1
Chorus 1
Verse 2
Tr
Solo
Chorus 2
Br
Chorus 3
Outro
Background

The transitions, solo, and bridge have the most unique melodic contour overall, similar to what was found in "Thriller." The first transition has a brief Db, before dropping back to Bb below it. The second transition before the solo holds on Db for longer, but stays on the C natural, a suspended 2nd scale degree, making this transition more melodically varied and of higher energy than the first. The bridge between the two choruses is the melodic highpoint of the song, featuring an ascent up to F. The bridge between the last two choruses was also the highest melodic part of Thriller as well, and it seems that, in terms of contour, we can see some very similar things here.

Looking at the middleground and background, a few more interesting details become more easily visible. The verse never does descend below Db, meaning that it never finds a solid resolution on the root of Bb. This means that the verse could be seen as an extension of the 3rd scale degree. The transition, following the verse, seems to more clearly emphasize the fourth scale degree. Finally, when reaching the chorus, we have a strong emphasis on the 5th scale degree, descending to the root for the first time, providing resolution to the slow initial ascent that occurred in the first verse and transition. The last 5-1 descent of the chorus, instead of leaping back up, holds on the root in the retransition, so the last descent can be seen as a 5-1, while the previous descents can be seen as less resolute. The retransition features the lowest melodic note in the song, an Ab below the root Bb.

The transition into the solo features an interesting melodic contour. Reduced once, we see that (adjusting for octave differences), the transition shows a near-complete octave descent from Db that leads into the first note of the solo. The guitar has been adjusted for octave changes, but also features a fairly varied contour as well, spanning a

large melodic range. (It is normal to see large spans of range and octave ascents and descents in guitar parts- it is more natural and idiomatic to play larger intervals on the guitar than it is smaller ones, which could explain this).

The bridge between the last two choruses features the most consistently high pitch center, and from the standpoint of melodic contour, this is the point in the song with the highest energy. We saw something very similar in the bridge in "Thriller," and here, again, it serves to hold the energy level up higher as the chorus repeats. Because the most prominent descending feature in this song is the ^5-^1, this has been chosen as the *Urlinie*, and shows the final descent at the end of the last chorus, before the outro or coda section. The ending section, repeating as it fades off, is built on chorus material, and essentially serves to hold out the root of Bb. The ^1 extends through the actual descent, and after the descent has finished and settles on the root note, the repeated ending, as it fades out, goes between a structural V and I in the bass. Looking at the background, one can see the *Urlinie* is slightly offset from the final resolution of the bass, found in the coda. It is not as common to see this kind of feature in art music, although the lower voice is slightly more conventional than in Thriller.

The overall structure is, interestingly, quite similar to what we find in "Thriller," and the Schenkerian reduction here suggests that the transitions and the final chorus are the most expressive and musically important parts of the song. Before concluding the musical analysis, we can look at the text to see if it coincides at all with what is happening in the music.

There does seem to be a pattern of 'set-up' and 'resolution' in the verse and the chorus. The verse discusses the difficulties of the song's subject or protagonist, and sets

up where the discontentment or tension is. Verse 1, for example, reads:

*"*I didn't want to be the one to forget, I thought of everything I'd never regret
A little time with you is all that I get, That's all we need because it's all we can take One thing I never see the same when your 'round, I don't believe in him—his lips on the ground I wanna take you to that place in the "Roche", But no one gives us any time anymore He asked me once if I'd look in on his dog, You made an offer for it, then you ran off I got this picture of us kids in my head, And all I hear is the last thing that you said" (etc.)

This seems to be describing a point of difficulty or discontentment with another individual. In the chorus, we see a sort of 'proposed resolution' to the problems explained in the verse:

"And we will never be alone again, 'Cause it doesn't happen every day
Kinda counted on you being a friend, Can I give it up or give it away
Now I thought about what I wanna say, But I never really know where to go
So I chained myself to a friend, 'Cause I know it unlocks like a door" (etc)

This gives the verse more of a sense of uncertainty, while the chorus has a more certain and determined tone. This is a similar sort of pattern to what we see in both "Here Comes the Sun" and "Thriller." In "Here Comes the Sun," the lyrics explain that it has been a long time since the sun was around, and things are finally beginning to improve, while the chorus and development more directly proclaim that the sun is coming back. In "Thriller," the verse sets up tension with lyrics like "something evil is lurking in the dark" and so on, with the chorus describing an actual encounter with the monster explained in the verse. Here, the verse explains "here is where the trouble is" and the

chorus explains “Here is what I had done to resolve it”. Looking at the background Schenkerian sketch, this lines up quite well, because the verse never does resolve below the 3rd scale degree, while the chorus, more determined in its lyrical content, resolves frequently from the 5 to the 1.

Looking at the entire musical analysis, we can draw similar conclusions to what we had drawn with “Thriller.” The transitions, solo, and bridge are the most varied in contour, and the chorus provides clear resolutions, while increasing the harmonic energy and rate of harmonic change. There are two choruses at the end, emphasizing its finality and importance, and the *Urlinie* reflects that. The transitional parts in between the verses and choruses, as well as the last chorus, can be considered to be the most musically significant, according to the musical analysis.

Now that the most musically significant areas have been pinpointed, we can look at the analysis of the recording, considering the production and mixing, to see where they provide the greatest reinforcement and emphasis for the music. The first thing to consider, of course, is the actual nature of the performance. The vocal parts are perhaps the most unique aspect of the performance, and this is largely due to the use of the vocoder. The vocals were done by Julian Casablancas, the lead vocalist for the band The Strokes. For those unfamiliar, a vocoder is a synthesizer that analyzes speech input, and produces a synthesized sound intended to replicate the speech input that it was given. It gives a recognizable ‘robot voice’ sort of sound, and is commonly used in Daft Punk’s music as well as electronic music in general. The vocoder here does not sound like it is being used on its own- the vocoder tones and the original vocal lines seem to be blended together to give a sort of semi-organic sound, which, it could be said, matches the

dichotomy of Daft Punk's 'retro-futurist' aesthetic- a combination of organic, vintage warmth and modern, electronic sound. The vocoder also provides fairly full sounding harmonizations later on in the song. The style of the melodic line is both fairly lyrical and conversational at the same time. The rhythms are not as close to speech as the vocal lines in The Beatles' writing, but more lyrical than the percussive and energetic style of Michael Jackson.

The other instruments recorded have a very tight, but clearly real sound to them. There are a number of electronically created tones on this album, but many of the instruments were recorded using actual acoustic instruments and live performances, rather than being programmed. The tightness of the recording, especially in the drums, is both reminiscent of older 70's recordings as well as having a sort of cleanliness and tightness that one usually hears in the percussion sections of electronic music.

The recording strikes an effective balance between sounding warm and organic, while having the precision of modern digital recordings. This was the intended result, and further contributes to this sort of retro-futurist feel that Daft Punk could be associated with. The album *Random Access Memories* was created with an intense attention to detail, and had an unusually large budget to meet its goals. Keeping in mind the benefits of analog recording technology, the album was simultaneously tracked into a computer and onto tape while recording, giving the musicians and engineers access to both during mixing. For effects, they preferred the use of outboard analog gear rather than digital plugins, and overall, the album was recorded with a number of classic methods that are not as common nowadays, with the actual mixdown and editing occurring on the computer. A combination of the finest analog and digital gear was used, and this gave

Daft Punk and their engineers the ‘best of both worlds’ during the creation of the album. The instrumental arrangement is the next thing to consider, and that is shown on the next page (Fig.12).

The chart above shows that the use of instruments is fairly static, with some appearing from time to time in different areas, although not as varied as in “Here Comes the Sun.” The bass and percussion parts are present throughout (except for a brief break in the second chorus), and this is understandable considering Daft Punk’s roots in dance music. Different synthesizer tones appear during specific parts, especially the chorus (with a bright pad appearing, providing harmonic support) and in the transitions and solo as well. The most notable decisions in the instrumental arrangement are the inclusion of the tambourine during the chorus, the addition of different instruments during the transitions, and the use of vocal harmonies.

Instead of providing harmonic support only in the chorus, the vocal harmonies, once introduced, stay with the lead vocalist until the end of the song. This gives the vocal line a more long-term sense of development, rather than rising and falling with the verses and choruses. Considering the instrumental arrangement, the places where new layers are introduced, most notably, the transitionary sections and the choruses, are of the most importance. This is, essentially, the same conclusion as we had found in “Thriller” as well, which is also closely tied to the influence of dance music.

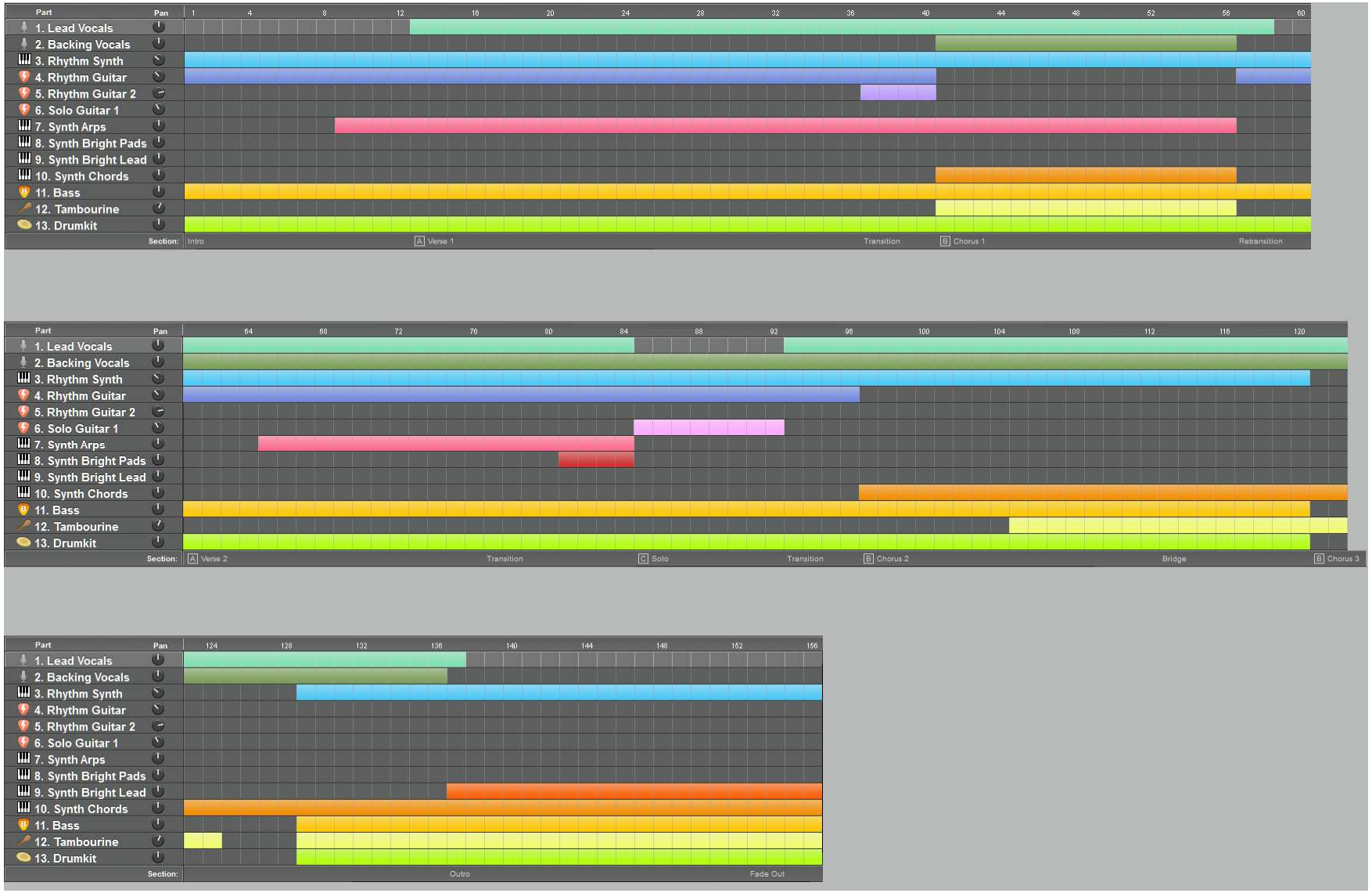


Figure 12. “Instant Crush” Instrumental Layout Chart.

The next aspect to consider is the soundstage. Like "Thriller," this recording is sonically organized in a more traditional way, without the unique and unusual panning found in "Here Comes the Sun." Like in "Thriller," the filler and accompaniment instruments that appear during the chorus and transitions are located wider or farther out in the stereo field. The vocal harmonies are this way as well. The solo voice, kick, snare, and bass are all located in the center, but all others occupy a non-center location. Because the chorus features the introduction of these other layers, the chorus has a much wider sound, introduced with a distorted muted guitar in the rightmost speaker mirroring the cleaner electric heard in the left speaker, followed by synth parts in the right and left, with vocal harmonies occupying a wide range of stereo locations. Like in "Thriller," the chorus here has a bigger, wider stereo picture, which then recedes during the verse, narrowing in and coming back to the center. Although this is similar to what we saw in the Michael Jackson recording, it is more pronounced, and more carefully done, in this example. There are not any noticeable panning effects employed (something flying across the stereo field), although the consideration of stereo width is very important here for the rise and fall of the energy.

The use of tools and effects is worth noting too. The incredible attention to detail in this album meant that the engineers and musicians were able to shape the sounds in exactly the way they had intended. The drums, especially, show a careful attention to detail, with clean precision and careful selection of compressors and microphones. The use of the vocoder is a fairly iconic feature in the music of Daft Punk, and this is the most obvious, and perhaps one of the most recognizable effects in this recording. Its blending with natural voice is very interesting in that it provides a semi-organic sort of feel, which

is not always the case with vocoder use.

The use of distortion is also employed for emphasis in specific locations. The solo guitar, of course, has a distorted tone. For much of the song, a muted electric guitar provides harmonic and rhythmic support (out in the left part of the stereo image), and it is clean for much of the time. In the transition to the chorus, a muted electric guitar appears in the right part of the stereo image, filling the same role, but this time, with distortion added, to increase the sense of movement and build energy while leading into the chorus. This is a fairly tactful decision- most of the time, a guitar is either clean, or it is not. Having it move back and forth between the two allows for more musical control.

Now that both the musical analysis and the recorded analysis have been considered, we can ask once again: do the two coincide? Perhaps unsurprisingly by this point, they do indeed. The production and engineering decisions here are considerate of the arc of musical energy, and during the higher energy sections like the chorus and the transitions, changes in the instrumental arrangement, their timbres, and the stereo width are used to bring out and emphasize the musical significance that is naturally located in the fundamental musical idea.

Now that all three songs have been analyzed, we can summarize our findings.

CHAPTER VI

BRIEF SUMMARY AND THE PROPOSAL OF MIXING AND PRODUCTION GUIDELINES

All three songs chosen for analysis in this thesis show a close relationship between engineering, production, and songwriting decisions. There is, without a doubt, a visible relationship between the ways the two are considered, and now that all three songs have been analyzed in detail, conclusions can be drawn, and we can look at what analysis can teach us.

During the songwriting process, the original songwriter or composer almost always has a certain arc of emotional energy in mind. Part of what makes music special is its temporal nature: it changes over time, and more closely resembles human experience as a result of that. Part of this is what sort of story or aesthetic the composer or songwriter intends to convey. What is the story arc? How is this arc represented? How can the composer or songwriter best get what is in his head onto paper, and then, into the form of musical sound?

Composers use a number of different tools for portraying musical significance, as we have seen in the above analyses. These techniques are:

-Formal considerations; in other words, creating a sort of 'story arc' with the form

-Use of chromaticism and rhythmic variety

-Use of higher or lower rhythmic values (from 8^{th} to 16^{th} notes, for example) and use of more or less frequent harmonic changes

-Departure from key centers

-Change in musical texture

-Use of melodic descents and strong harmonic or melodic resolutions

-Use of contour, allowing the melody to rise up on more expressive sections, and descend on more resolute sections

-Use of repetition, repeating certain sections more than once for emphasis

-Use of text alongside music to more effectively convey the aesthetic intentions

There are, of course, more techniques a songwriter could use to provide emphasis to certain musical sections, although in terms of the music as it exists in concept, these are the ones we have seen the most prevalently in the above analyses. As a producer or engineer, being able to pinpoint where those things occur allows one to understand what parts of the music are significant, and what can be considered structural highpoints. We have also seen the techniques more commonly used by engineers and producers to emphasize certain musical sections. These are as follows:

-Expressive vocal performance to best highlight the emotional context of the song

-Use of certain kinds of gear or recording equipment or techniques to capture the sound of specific styles or eras in popular music history

-Use of varying instrumentation, with unique timbres and colors, to emphasize, double, or support the harmonic, melodic, or rhythmic content of a song

-Specific entry and exit of different tracks and instruments, used to provide different levels of instrumental fullness in certain sections

-Use and manipulation of the soundstage, placing certain instruments in either the center, off to one of the sides, or in the distance, to vary the level of attention the listener might give to it.

-Change in stereo width, increasing the size of the stereo image (usually by means of

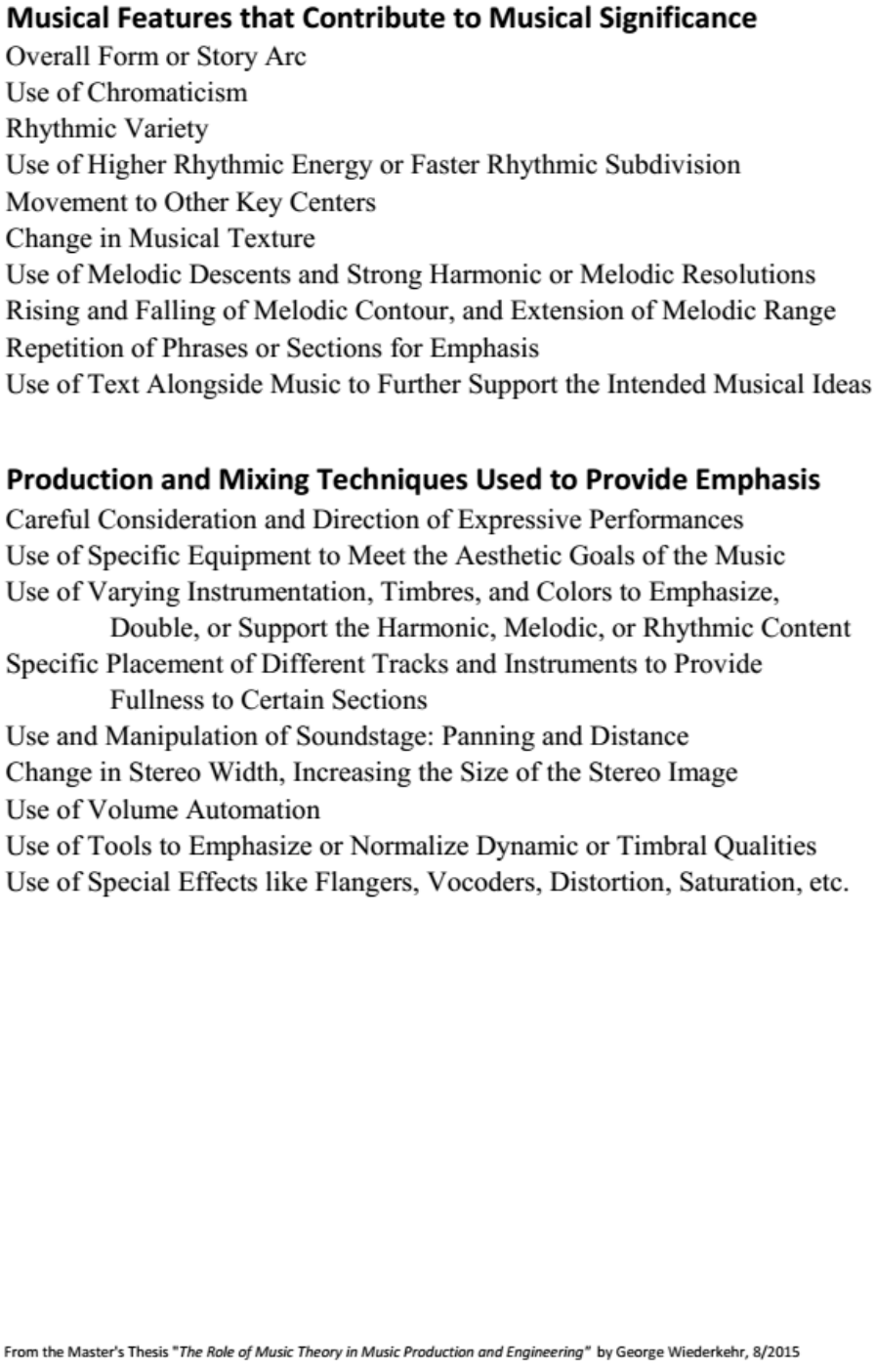
introducing new instruments in the left and right regions of the stereo field) to emphasize certain musical sections

-Use of volume automation to slightly bump up the loudness on certain sections for specific instruments (or perhaps the entire mix)

-Use of tools like compressors, equalizers, and saturation to bring out specific features of a recorded track, providing emphasis by reducing quiet sections, emphasizing attack or decay, or bringing out or reducing specific elements of an instrument or voice's timbre

-Use of special effects like flangers, vocoders, distortion, and so on

These techniques are some of the more common ones found in the analysis of the recordings. After having pinpointed the musically significant parts of a song, these tools can then be used to make sure that these musical features are presented in the most effective possible way for the listener. That is, as mentioned in the introduction, one of the most important roles that the producer and engineer must fulfill, and hopefully these guidelines can provide some ideas for mixing and production decisions for the readers of this thesis. For the sake of ease, I have provided a chart on the next page of the things listed above (Fig.13), which the reader can print and use as a reference during the creation of his or her recordings (or perhaps even during the creation of the song itself).



Musical Features that Contribute to Musical Significance

Overall Form or Story Arc
Use of Chromaticism
Rhythmic Variety
Use of Higher Rhythmic Energy or Faster Rhythmic Subdivision
Movement to Other Key Centers
Change in Musical Texture
Use of Melodic Descents and Strong Harmonic or Melodic Resolutions
Rising and Falling of Melodic Contour, and Extension of Melodic Range
Repetition of Phrases or Sections for Emphasis
Use of Text Alongside Music to Further Support the Intended Musical Ideas

Production and Mixing Techniques Used to Provide Emphasis

Careful Consideration and Direction of Expressive Performances
Use of Specific Equipment to Meet the Aesthetic Goals of the Music
Use of Varying Instrumentation, Timbres, and Colors to Emphasize, Double, or Support the Harmonic, Melodic, or Rhythmic Content
Specific Placement of Different Tracks and Instruments to Provide Fullness to Certain Sections
Use and Manipulation of Soundstage: Panning and Distance
Change in Stereo Width, Increasing the Size of the Stereo Image
Use of Volume Automation
Use of Tools to Emphasize or Normalize Dynamic or Timbral Qualities
Use of Special Effects like Flangers, Vocoders, Distortion, Saturation, etc.

From the Master's Thesis "*The Role of Music Theory in Music Production and Engineering*" by George Wiederkehr, 8/2015

Figure 13. Reference Chart.

As a secondary consideration, we can also use these three analyses to better understand how important timbre can be in a musical analysis. Whether it is a classical work using traditional acoustic instruments, or a modern work using synthesized sounds, the timbre and texture of music can greatly affect the listening experience, and it also provides composers and songwriters with an important tool for providing musical meaning and expression to their musical works. With the introduction of electronic technologies, musical instruments are limitless in their timbral potential nowadays, and we see their application in both art music and popular music genres.

In the three analyses featured in this thesis, the musical meaning of these songs became clearer and more reinforced after considering the layout of the instrumentation and their role in the song. In "Here Comes the Sun", the musical importance of the development and retransition are reinforced by the instrumental changes and layering that occur during those sections. In "Thriller", the higher energy chorus as well as the unique and expressive transitions and retransitions are also reinforced by timbral characteristics, especially with the addition of horns and synths, contributing to the brightness of the recording. "Instant Crush" features timbral emphasis in a similar way to "Thriller", with important transitions and choruses being reinforced with the addition of brighter instruments like tambourine, synths, and so on.

As these tools become more widespread, it is going to become increasingly necessary to consider timbre and texture during musical analysis in order to understand the musical meaning of a song or composition. Consider, for example, a piece written for all electronic instruments. Like a sort of 'variation set', the piece repeats a short chord progression and musical phrase for several minutes, but with each repetition, the timbre

of the instruments changes, and the instrumentation is presented differently. Hypothetically, this piece could be very compelling to listen to, and might have a lot of artistic value in its treatment of timbre and instrumentation, although a traditional musical analysis would reveal very little musical meaning, because the harmonies and melodies are simply repeated for the entire duration of the recording. In a situation like this, an analysis would only be effective if it considered the timbral, textural, and instrumental nature of the piece.

By providing graphs of instrumentation, brief descriptions of their timbre, and what role they play (whether it is rhythmic support, harmonic support, melodic support, and so on), and where they appear in the music, one can then consider if this coincides with pitch and rhythmic events, as I have done in the above analysis. This would allow the analyst to have a more complete picture of the expressive quality of the chosen work.

CHAPTER VII

SMALL RECORDING CASE STUDY

Now that a set of guidelines have been proposed for pinpointing and emphasizing areas of musical significance, these guidelines can be put to a small test, to determine their effectiveness in actual application. To do this, I have recorded a short cover version of "That's the Way" by Led Zeppelin, where my friend and relative Nate Farrell was singing and playing acoustic guitar, and I was playing all other instruments, as well as mixing and mastering the recording.

The recording was mixed in two separate ways, and exported as two separate versions. The first version is mixed in a fairly static way, with the levels, panning, and EQ all set from the beginning, and not changing as the song plays. The second version is mixed using some of the proposed guidelines above, in order to provide emphasis in what could be seen as the more musically important sections. These include changes to the stereo field, changes to reverb, instrumental doublings, timbral expansions, and subtle use of saturation. The supplemental files included with this thesis are these two versions of the recording in MP3 format. They are titled "That's the Way v1.mp3" and "That's the Way v2.mp3".

For the sake of conciseness, a full-scale analysis is not included, although having approached the piece in a similar fashion to the ones chosen above, there are a few points worth quickly noting. This song was originally released in 1970 on the album Led Zeppelin III, and could be considered to be in a folk-inspired acoustic style. This was the second of the more commonly featured styles that Led Zeppelin wrote in, with blues-inspired hard rock being the first, of course. The primary two instruments are acoustic

guitar and voice, and the first version features these two instruments alone. The second version includes others, set further in the back of the mix, for the sake of filling out the timbral and rhythmic content.

This song was chosen for a few reasons: First, it has a fairly sparse texture normally, so any changes to the mixing would likely be more perceptible for the listener. It also has a strong contrast in musical energy between the A and B part. Formally, this cover version is shortened, and its form is: intro-ABAB-fade out, with both the intro and the fade out being on A-part content. The A part is fairly mellow, while the B part is higher energy, transitioning to a distant key center, using a higher melodic register, a higher dynamic level, and more general chromaticism as well. There are ^5-^1 descents in the vocal melody throughout both the A and B part, although because the B part descends from a higher point, it could be considered the more important descent, with the *Urlinie* descending in the second B part. From an analytical standpoint, the second B part seems to be the most expressively important.

After these two versions were completed, I sent the recording to a number of friends, family, and acquaintances, and asked them which version they preferred, without first telling them what the differences are. The recordings, for the time being, can be downloaded either as supplemental files or at these links, if the reader wishes to listen to and assess them.

Version 1: goo.gl/4iuvCX

Version 2: goo.gl/gQeeZo

I then asked about twenty acquaintances, friends, and relatives to listen to both, back to back. Two of the twenty people asked have a background in the music, while the

others do not. Of the roughly twenty people that have so far listened to and judged the recordings side-by-side, each person had concluded that they enjoyed the second version better, saying that it was richer, more involving, and during the B parts, carried more energy. Some of the comments were:

- "The second version was fuller, richer, more clear."
- "The second version was more colorful, and had more clarity."
- "The second was more encompassing, had a purer sound. Vocals are cleaner and crisper."
- "I like the simplicity of the first, but the second was my favorite. It had a richer sound, instruments fill everything up a lot better. The voice sounded stronger too."
- "I could hear the subtleties better in the second one, and it was much more dimensional."
- "They are both good, sharp and clear, but the second one does sound more full. It seems to have more of a stereo surround sound."

Although the test was not very thorough or large, it nonetheless demonstrates that these proposed guidelines do indeed have a noticeable impact on the listening experience, for both musicians and non-musicians alike.

CHAPTER VIII

SUMMARY

Music theory has wide-reaching analytical power, and it has been shown that analysis originally intended for art music is also successfully applicable to popular music. The original hypothesis of this thesis was as follows: If music theory enables us to point out what makes music special and what features are significant, engineering and production might be able to take these noted features of a recorded musical work, and using different tools and techniques, bring out these special features in the most effective way possible, allowing the music, on its own expressive terms, to be more effective for the listener. Secondarily, a more careful consideration of timbre and instrumentation (as is common among producers and engineers) can potentially inform music analysis.

Throughout the process of completing this thesis, I have discovered a clear answer to my hypothesis: in many cases, musical analysis does indeed provide useful insight to the expressive nature of a song, and using certain production and mixing techniques, it is very possible to emphasize these techniques in an effective way. Understanding the role of timbre and instrumentation has also shown to provide a clearer insight to the expressive nature of these three songs, and such understanding can provide a great deal of benefit for the analysis of many musical genres.

The current literature regarding music production and engineering generally consists of techniques and methodology. There has been no apparent literature written about the potential relationship between musical analysis and production/engineering, and this thesis will hopefully be a catalyst for more producers, engineers, theorists, and musicians to think about and expand upon the relationship between musical analysis and

production/engineering.

The current music theory literature does not entirely dismiss the importance of timbre and instrumentation, although it is a relatively new consideration in musical analysis. In the analyses of this thesis, it has been shown that timbral and instrumental considerations can provide insight to the expressive nature of a musical work, producing a more comprehensive analysis as a result. These three analyses will hopefully be one of the many that begin to explore the importance of timbre in music analysis.

There are no easily accessible detailed analyses (using multiple analytical approaches) of the three chosen songs, “Here Comes the Sun”, “Thriller”, and “Instant Crush”. Walter Everett’s insightful, although brief analysis of “Here Comes the Sun” demonstrated the importance of formal and timbral considerations, and the analysis here delves deeper into this song using Schenkerian reduction, more thorough harmonic and motivic analysis, and an analysis of the recording and production techniques employed.

“Thriller” and “Instant Crush” have not been subjected to a detailed and multi-faceted musical analysis until now. Through these two analyses, these two songs have shown to contain artistically significant features and patterns, and this will hopefully spur more interest in analyzing the works of modern musicians like Michael Jackson and Daft Punk.

The results of the thesis do have potential significance and practicality for many modern musicians, producers, engineers, and academics. It not only gives insight into how to more effectively produce and engineer a recording, and how to analyze a musical work more comprehensively with the consideration of timbre, but also provides potential insight into the original creative process as well. As far as I can tell, there has, up until

now, been no literature exploring the relationship between music analysis, music production and engineering. With the intention of presenting this thesis in as practically applicable way as possible, hopefully it can contribute to both academics and professionals alike, and provide a sort of starting point for thinking more about the relationship between music theory, music production, and engineering.

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