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Harmony and Syntax in Contemporary Pop Music

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Introduction

The study of popular music has been a burgeoning field for the past thirty-five or so years, especially in musicology, ethnomusicology, anthropology, sociology, and cultural studies; the advent of publications such as *Popular Music* have helped bring a critical eye to an oft-overlooked and oversimplified part of our culture. Unfortunately, the study of pop music within the field of music theory has been relatively limited to what we might refer to as "classic rock" and "metal." While there is some research on folk music and older forms of pop, very little has been done to explore the inner workings of the myriad forms of non-classical and jazz music.

This paper is an investigation of the structure of harmonies and harmonic syntax in contemporary pop music¹; I hope to successfully argue that, in general, contemporary pop has distinct syntactical patterns that allow for a unique definition and classification of "functional harmony" independent (but derived) from the idioms of jazz and music of the common practice period (CPP). Without even doing any serious analysis, it is clear to the trained musician that modern pop is known to be almost exclusively diatonic. The harmonic areas covered in much of pop are somewhere between strictly tonal and pandiatonic: individual and familiar sonorities (triads, at the very least) are often quickly identifiable, but are organized in unconventional ways.

Pop music is frequently structured in two- or four-measure chord progressions that may repeat for an entire section, or in some cases, a whole song. These progressions often can be reversed or even shifted over so that the initial and ending chords are different while the syntax remains identical. By far the most well-recognized is $I V vi IV^2$ (ordered by its most common syntactical arrangement). This grouping has been prominent in popular music since at least the late 1970s, and is so established that songs with this structure are often referred to as simply "four-chord songs."³ These types of chord sequences have *cyclical syntax*, a term describing harmonic progressions that are intended to be self-contained and repeated indefinitely. Clearly, these types of progressions are very common in pop, frequent in jazz, and occasionally in CPP (i.e. ground bass). The mostly diatonic patterns in popular music, however, allow for more flexibility in syntax, leading to *chordal modes*, a set of chords with cyclical syntax that can be phrased beginning with any chord. In other words, a chordal mode is a harmonic sequence that can be adjusted so that a musical phrase can theoretically begin on any chord in the sequence without compromising syntax.

¹ In this paper, I differentiate between "popular music" and "pop music." While these terms are typically treated as interchangeable in the literature, I tend to distinguish between them as a means to separate music that receive high record sales and heavy airplay on radio and television ("pop") and the broader tradition of music that stems from the beginning of the recording industry, but may not be very popular in a literal sense ("popular"). While this distinction may seem insignificant, there is an incredible variety of sounds possible in this realm — whether harmonic, rhythmic, timbral, and textural — that are not accounted for in this study and differ enough from "pop" to warrant a distinction.

 $^{^2}$ Roman numeral notation, pitch classes, chords, and keys will always be bolded in order to prevent confusion with letters.

³ See <u>https://www.youtube.com/watch?v=oOlDewpCfZQ</u> for a comedic example of how this chord sequence is portrayed in popular culture.

This observation begs the questions: what are the syntactical implications of chordal modes? Does harmonic syntax even matter in pop music? I will posit that while it is not entirely obvious or rigid, pop music does contain its own syntax, albeit based on short-term schemes of tension and resolution and lacking strict hierarchical relationships; the distinguishing elements of pop music's harmonic structure are not necessarily the underlying chord qualities, but the ways in which the chords are used.⁴ This study will be completed through a corpus analysis of very recent popular music (i.e. released or charted within the past five years) by performing a basic roman numeral analysis on every song and analyzing the patterns uncovered.

⁴ This way of conceptualizing syntax is similar to Aniruddh Patel's definition, which is described in the next section.

Literature Review

Within the field of music theory, most popular music scholarship has focused on "rock" rather than "pop," so virtually all of the literature I perused utilized "rock" as a subject for discussion and analysis. Though this stylistic distinction plays a significant semiotic role from the perspective of listeners (Fabbri 1980, 1999; Gjerdingen and Perrott 2008; Keil 1987; Stefani 1987), there are enough similarities to gauge potential patterns in music that would be considered more strictly "pop."

The study that influenced this research is a ongoing corpus analysis of rock harmony by Trevor de Clercq and David Temperley, with the results published online⁵ and in their two articles (de Clercq and Temperley 2011; Temperley and de Clercq 2013). I had originally planned to use their methodology, but after working through the corpus, I decided to modify both the data collection and analysis procedures; these changes will be discussed further in the methodology section. Their most significant finding is that the root motion asymmetries that frequently appear in common practice music are typically not present in rock, making pre- and post-tonic chord positions relatively equal. In addition, they investigated the most common *trigrams*, sequences of three chords that end with the tonic, which revealed the diversity of motion possible among diatonic chords (see de Clercq and Temperley 2011, table 7).

A number of authors have described tonal organization and types of harmonic motion in popular music (Everett 2004; Biamonte 2010; Moore 1992). Both Everett and Moore took a classification approach to understanding harmonic sequences in popular music, though they focused on different aspect of harmony. Moore addressed harmonic sequences of varying lengths and grouped them into classes based on structural characteristics, such as "static harmony" and "submediant sequences." Each sequence he identifies (of which there are hundreds) has at least one accompanying song provided as an example. Everett's classification scheme, however, outlines a spectrum of six primary tonal systems which involve modal harmony, combinations of major, minor, and pentatonic scales, and heavy chromatic motion. This theory takes more of a macro view of "tonality" in popular music and covers the whole stylistic gamut, from Motown to late-1990s alternative rock. Biamonte takes a functional approach, contrasting harmonic functions of tonal and modal triads and interpreting common cadences within a hierarchical paradigm, as well as looking at functions of repeated sequences. The analytical method I use later on is very similar to this procedure, though the corpus is significantly different.

Yim (2011) has articulated another theory of harmonic syntax based on the idea of affordances, an important concept in the ecological psychology of J. J. Gibson. He proposes that affordant chord transitions (those that are easiest to move to and from on guitar) play a large role in how harmonic structures are created in guitar-based popular music. Through analysis of de Clercq and Temperley's corpus, Yim measured the entropy of chord transitions based on technical difficulty of switching guitar fingerings and compared these results to functional analyses of the same data set. Yim concluded, however, that functional harmony plays a more significant role than affordant harmony in understanding chord sequences, though affordant factors are more prominent in guitar-based popular music.

⁵ See <u>http://theory.esm.rochester.edu/rock_corpus/</u> for more information, updates, and access to the harmonic and melodic data sets.

Many scholars have also noted certain patterns in popular music without developing overarching theories to explain these phenomena. Björnberg (1985) points out the prominence of the aeolian mode as the predominant "minor" paradigm rather than the more complex tonal behaviors of "minor." While many of his examples use minor chord sequences within a "bluesy" context,⁶ his observations ring even truer today than they did when he first wrote this paper. Moore (1995) attempts to explain the use of $\not > \hat{7}$ and $\not > VII$ in rock music, which was derived

from the blues, by using Schenkerian analytical techniques. Drawing upon his earlier research (Moore 1992), he breaks down the underlying assumptions of Schenker's theories by viewing rock as a "modal harmonic system" and arguing that "the leading-note/tonic relationship [is] axiomatic to the definition of common-practice tonality." (p. 187) In his article on the Beatles' early material, Nobile (2011) identifies the "cadential **I**," which is a root position **I** that functions as a predominant second inversion tonic (cadential 6/4). Though this feature is not used as frequently in contemporary music, it occasionally appears in songs emulating older styles. The term "cadential **I**" can also be used to describe a tonic chord that appears before a **IV** with cadential weight.⁷

David Temperley has authored a number of relevant publications. His 2007 article discusses the independence of melody and harmony in rock, relating this "divorce" directly to form through statistical analysis. While my research does not focus on melody, understanding melodic construction is crucial for proper harmonic analysis, especially since melodies often do not treat nonchord tones in traditional ways or follow an obviously tonal path in scalar lines. Temperley (2011a) also identifies IV in its cadential usage,⁸ classifying three types: the plagal stop cadence, where the texture briefly disappears after the occurrence of IV; the grand plagal cadence, which appears only at the end of a song; and the deceptive IV, where the subdominant acts similarly to vi in a typical deceptive cadence. In another publication, Temperley (2011b) develops his concept of "scalar shift" in popular music, in which songs utilize overlapping diatonic sets called a "supermode." The use of these sets often helps to delineate sections and create tensions and resolution that would not otherwise exist. Though this does not apply as much to the corpus I am studying, it is still an important model for understanding major harmonic and structural differences between popular and CPP music.

The backing tracks in hip hop sometimes present problems for harmonic analysis, as there may be very limited harmonic motion (e.g. one chord present for the entire song) or no discernible pitch content.⁹ These attributes, however, should not be understood as excessive simplicity or lack of composition sophistication. Walser (1995) points out that "the debate over rap's status as music should be seen in the light of a centuries-old tradition of cultural authorities and rival musicians missing the point of black music, popular music, rhythmic music, or timbrally complex music, and concluding that such musics are 'primitive.'" (p. 195) In his study of the hip

⁶ I placed "bluesy" in quotes here to refer to the often complex harmonic patterns that blues-influenced music often contains, such as minor pentatonic scales with an added tritone (often called the "blues scale") over a series of non-functional dominant seventh chords.

⁷ This usage of the "cadential **I**" is called the *preplagal* function using my taxonomy that is further developed in the "Theoretical Model" section.

⁸ Cadential IV occurrences (plagal cadences) will also be discussed in the theoretical model.

⁹ Some harmonic anomalies of hip hop will be mentioned in the methodology section.

hop group Public Enemy, he argues that decontextualizing and recontextualizing familiar sounds are essential to creating texture- and timbre-based songwriting, such as taking a prerecorded instrumental solo and playing it over different chords.

Some scholars, particularly those in the 1970s and 80s, have focused more generally on how to analyze popular music given the lack of a methodological paradigm. Tagg (1982) states that "no analysis of musical discourse can be considered complete without consideration of social, psychological, visual, gestural, ritual, technical, historical, economic and linguistic aspects relevant to the genre, function, style, (re-)performance situation and listening attitude connected with the sound event being studied." (p. 40) He then proposes a hermeneutic-semiological method for analysis with seven musical factors to be considered: aspects of time, melodic aspects, orchestrational aspects, aspects of tonality and texture, dynamic aspects, acoustical aspects, and electromusical and mechanical aspects. In one of the earliest music theory articles on popular forms, Winkler (1978) addresses the "embarrassment" that jazz historians have when discussing the apparently uncouth appropriation of Impressionist harmonies by directly analyzing different forms of harmonic clichés in order to understand the syntax of popular music rather than ignoring them. After identifying one such pattern, he acknowledges that the list of songs including that structure "includes a lot of bad music," but argues that "the value lies in what a great composer or soloist makes of it." (p. 11)

Since the primary focus of this paper is on syntax and functional approaches to harmony, I have included some common explanations for these concepts so that my ideas will have a broader context. Nobile (2014) defines harmonic syntax as "the 'orderly or systematic arrangement' of...chords into formal units such as a musical phrase." (p. 20) Basing his definition off of theories of grammatical syntax, he claims that any theory of syntax (musical or otherwise) must contain hierarchy and function. Despite the fact that other music theorists "attempt to construct a harmonic syntax without prolongation,"¹⁰ Nobile does not consider these studies to actually be discussing syntax, though he admits that the information gained from this research is often useful.

One of the theorists he calls out includes Dmitri Tymoczko, in addition to de Clercq and Temperley. According to Tymoczko (2011), tonal functional harmony is a three-function model that consists of tonic, subdominant,¹¹ and dominant. Certain intervals and directions are more common than others, such as descending thirds and fifths (versus ascending) and ascending steps (versus descending). I will refer to this model later on when I develop my own explanation for syntactical behaviors in pop music.

Given that this research consists of a corpus analysis, it will be helpful to look at other corpus analyses for other styles of music. In his dissertation, Shaffer (2011) focused on the harmonic syntax of Ligeti's later works, which often contained triadic structures without the organization of tonality. To understand this music more completely, he compared chord root frequencies between de Clercq and Temperley's corpus¹² and Bach's chorales. He found that the

¹⁰ Harmonic prolongation is generally how theorists envision hierarchical relationships among chords, given that certain chords (and functions) are typically considered to be of more importance than others.

¹¹ From this point on, I will refer to the subdominant function as *predominant*, since "sub-" implies that the sonority is lower in pitch than the dominant, which is not always true. Any use of "subdominant" will refer specifically to **IV**.

¹² Ligeti's "tonal" works are widely acknowledged to have been influenced by rock music of the time.

distribution of chord roots in Bach followed the circles of fifths, with $\hat{1}$ having the largest frequency and $\hat{\flat}$ $\hat{5}$ having the lowest. The rock corpus differed in that the frequencies did not consistently decrease the further away a root was from the tonic; in addition, **IV** was much more prominent than **V**.

Hall's (2012) study of the choral music of contemporary composer Eric Whitacre also reveals interesting implications for research in pop music. Even though Whitacre's choral compositions are a far cry away from the subject of this paper, there are similarities between the two types of musics: they often contain primarily diatonic harmonies and ambiguous but tonal-sounding sonorities. In addition, Whitacre has acknowledged the influence of 1980s pop music on his writing.¹³ Hall determines straightforward methods to classify chord structure and voicings, and dedicates an entire section to "added-tone sonorities," a term that certainly has relevance in the analysis of chords in popular music.

I would also like to look at musical syntax from the perspective of those working in the cognitive sciences and linguistics fields. Lerdahl and Jackendoff (1983) have arguably developed the most well known theory uniting the cognitive processes underlying both music and language. Their Generative Theory of Tonal Music draws heavily from famed linguist Noam Chomsky's theory of generative grammar in order to construct a heavily hierarchical structure for tonal music. Unfortunately, their theory yields little insight into non-CPP musics. Other research in cognitive neuroscience from Patel et al. (1998) indicates that musical syntax and linguistic syntax are interpreted by the same cognitive mechanisms. Performing a statistical analysis on ERP waveforms, Patel concludes that neurological responses to expectancy errors in language, the P600, also occur when expectancy errors occur in music.

Though Patel is not a music theorist, his work in cognitive neuroscience focuses on similarities between music and language. Unlike Nobile, his definition of syntax (2008) does not include hierarchy or function; rather, he considers both musical and linguistic syntax to be "the principals governing the combination of discrete structural elements into sequences." (p. 241) He emphasizes the cognitive impact, stating that "the study of syntax deals not only with structural principles but also with the resulting implicit knowledge a listener uses to organize musical sounds into coherent patterns." (p. 242)

A study that I have neglected to mention up until this point is Serrà et al.'s 2012 article, "Measuring the Evolution of Contemporary Western Popular Music." This research is peculiar in that the keywords included in the body of the paper are "applied physics," "mathematics and computing," "evolution," and "statistical physics, thermodynamics, and nonlinear dynamics"; "music," "musical analysis," "music theory," or "music technology" are nowhere to be found. Serrà et al. used mathematical tools from the field of complex systems to demonstrate that music has gotten simpler over time from a harmonic, timbral, and dynamic standpoint.

This research is highly questionable for a number of different reasons. While the conclusion that the harmonic structure of popular music has become less "complex" may be accurate, the claim that timbres are more homogeneous is completely illogical. Since 1955 (the cut-off point), pop music has almost certainly become more diverse in timbre due to the advent of electronic music, which did not fully work its way into the mainstream until the 1980s. Even if pop music has decreased in timbral complexity, it would be extremely difficult to determine that

¹³ See <u>http://www.classicfm.com/composers/whitacre/news/pop-song/</u> and <u>http://www.unlv.edu/</u> <u>alumni/profiles/whitacre</u> for more information.

using software and statistical methods. Looking through their methods, however, it seems the team abstracted musical elements to such a degree that the results are virtually meaningless. For example, the researchers measured timbre by assigning one of three possible dynamic values to each band of an eleven-band equalizer, effectively measuring the timbral profile of an entire song and treating a complex texture as if it were one instrument.

Only one of the five authors works in the field of music (within music technology), while the other four are researchers in artificial intelligence and complex systems, field which at first glance have unclear relationships to the topic at hand. Their methodology, however, reveals that the researchers constructed something representing a neural network (without explicitly stating so) in order to model the human auditory system and allowing the analyses to be done automatically. The sample size consisted of nearly 500,000 songs, all of which were fed through software rather than individually analyzed. One has to question the accuracy of all the variables that were measured, given the immense quantity of data, completely computerized analysis, and lack of sufficient musical training on the part of the authors.

Serrà et al. make implicit value judgments, both about their methodology and their hypothesis. In comparing their results on chord transitions to those found by de Clercq and Temperley (2011), Serrà et al. state "evidence that such asymmetries are not present in contemporary popular music has already been reported for a reduced set of manually annotated pieces...our analysis confirms quantitatively the same evidence at a large-scale for the pitch networks and also for the timbre and loudness ones, a result never recognized before." (supplementary information, p. 8) Overall, this study is extremely problematic for its unusual methodology and overgeneralizing claims.

While not an academic work, the makers of the elementary music theory website Hooktheory completed a similar study to my own several years ago by harmonically analyzing 1,300 songs.¹⁴ There are, however, many flaws with their methodology. The most glaring issue is that the analyses are performed by users of the site, the majority of whom are assumed to be amateurs. While many of the roman numeral analyses are perfectly accurate, I've also come across some that attempted to explain chord motion using CPP syntactical rules (i.e. using secondary subdominants and assuming the aeolian usage of **VII** automatically implied a major key), written in the wrong mode, or simply contained chords that were incorrect. In addition, the sample that was used was not objective in any way (since any songs listed on the site were ones that the users explicitly chose) and contained songs ranging from late 1940s "traditional pop" to contemporary hip hop, which may have made the data more muddled and difficult to gain any real insights from.

My study will attempt to fill in some of the gaps created by the research presented here in several ways. First, my work focuses exclusively on the most popular music in the United States over the past several years, an era and style of music that hasn't been sufficiently studied within music theory. Second, rather than simply describe attributes of the music, I will attempt to construct a theoretical model to understand the basic harmonic structure of virtually any song in the corpus, as well as many that aren't discussed here.

¹⁴ The three parts to the study can be found at <u>http://www.hooktheory.com/blog/i-analyzed-the-chords-of-1300-popular-songs-for-patterns-this-is-what-i-found/</u>, <u>http://www.hooktheory.com/blog/music-theory-analysis-1300-songs-for-songwriting-part2/</u>, and <u>http://www.hooktheory.com/blog/chord-progression-search-patterns-and-trends/</u>.

Methodology

Many aspects of this study are based off of deClercq and Temperley's 2011 and 2013 articles, which describe their attempts to complete a corpus analysis of rock music. Using a number of self-developed computer programs, the team was able to determine harmonic frequency, harmonic sequences, and melodic data for a collection of 200 rock songs, all of which were chosen from *Rolling Stone*'s list of the "greatest" rock songs of all time. Since this research was intended to be a mostly objective account of what is considered to be "pop music" in the current era, my methods differed somewhat. I drew my sample from the "Year-End Hot 100" *Billboard* charts, which list the most popular 100 songs for any given year.¹⁵ In keeping with deClercq and Temperley's original study, I chose to analyze a total of 100 songs equally spaced over the years 2009 to 2013 by selecting the top 20 songs per year, shown in table 1. Some songs, however, needed to be removed from the list because they either lacked enough harmonic content to be analyzed adequately or were repeated on a subsequent year's chart, bringing the grand total to 97 songs.¹⁶

¹⁵ The method used to determine the most "popular" songs is somewhat unclear (in terms of factoring in record sales, radio plays, etc.), but the exact strategy employed by *Billboard* seems to be of less importance than simply having a list compiled by a third party that is well respected within the music industry.

¹⁶ These songs are marked with asterisks.

	Year-End Singles, 2009-2013				
Year	No.	Title	Artist	Featured Artists	
2009	1	Boom Boom Pow	The Black Eyed Peas	-	
	2	Poker Face	Lady Gaga	-	
	3	Just Dance	Lady Gaga	Colby O'Donis	
	4	I Gotta Feeling	The Black Eyed Peas	-	
	5	Love Story	Taylor Swift	-	
	6	Right Round	Flo Rida	-	
	7	I'm Yours	Jason Mraz	-	
	8	Single Ladies (Put a Ring on It)	Beyoncé	-	
	9	Heartless	Kanye West	-	
	10	Gives You Hell	The All-American Rejects	-	
	11	You Belong with Me	Taylor Swift	-	
	12	Dead and Gone	T.I.	Justin Timberlake	
	13	You Found Me	The Fray	-	
	14	Use Somebody	Kings of Leon	-	
	15	Knock You Down	Keri Hilson	Kanye West; Ne-Yo	
	16	Blame It	Jamie Foxx	T-Pain	
	17	I Know You Want Me (Calle Ocho)	Pitbull	-	
	18	Live Your Life	T.I.	Rihanna	
	19	Kiss Me thru the Phone	Soulja Boy Tell 'Em	Sammie	
	20	Down	Jay Sean	Lil Wayne	
2010	1	Tik Tok	Ke\$ha	-	
	2	Need You Now	Lady Antebellum	-	
	3	Hey, Soul Sister	Train	-	
	4	California Gurls	Katy Perry	Snoop Dogg	
	5	OMG	Usher	will.i.am	
	6	Airplanes	B.o.B	Hayley Williams	
	7	Love the Way You Lie	Eminem	Rihanna	
	8	Bad Romance	Lady Gaga	-	
	9	Dynamite	Taio Cruz	-	
	10	Break Your Heart	Taio Cruz	Ludacris	
	11	Nothin' on You	B.o.B	Bruno Mars	

Year-End Singles, 2009-2013				
Year	No.	Title	Artist	Featured Artists
	12	I Like It	Enrique Iglesias	Pitbull
	13	BedRock	Young Money	Lloyd
	14	In My Head	Jason Derulo	-
	15	Rude Boy	Rihanna	-
	16	Telephone	Lady Gaga	Beyoncé
	17	Teenage Dream	Katy Perry	-
	18	Just the Way You Are	Bruno Mars	-
	19	Cooler Than Me	Mike Posner	-
	20	Imma Be	The Black Eyed Peas	-
2011	1	Rolling in the Deep	Adele	-
	2	Party Rock Anthem	LMFAO	Lauren Bennett; GoonRock
	3	Firework	Katy Perry	-
	4	E.T.	Katy Perry	Kanye West
	5	Give Me Everything	Pitbull	Ne-Yo; Afrojack; Nayer
	6	Grenade	Bruno Mars	-
	7	Fuck You	Cee Lo Green	-
	8	Super Bass	Nicki Minaj	-
	9	Moves like Jagger	Maroon 5	Christina Aguilera
	10	Just Can't Get Enough	The Black Eyed Peas	-
	11	On the Floor	Jennifer Lopez	Pitbull
	12	S&M	Rihanna	-
	13	Pumped Up Kicks	Foster the People	-
	14	Last Friday Night (T.G.I.F.)	Katy Perry	-
	15	Just the Way You Are*	Bruno Mars	-
	16	Tonight (I'm Fuckin' You)	Enrique Iglesias	Ludacris; DJ Frank E
	17	Raise Your Glass	Pink	-
	18	Born This Way	Lady Gaga	-
	19	Fuckin' Perfect	Pink	-
	20	What's My Name?	Rihanna	Drake
2012	1	Somebody That I Used to Know	Gotye	Kimbra
	2	Call Me Maybe	Carly Rae Jepsen	-

Year-End Singles, 2009-2013					
Year	No. Title		Artist	Featured Artists	
	3	We Are Young	fun.	Janelle Monáe	
	4	Payphone	Maroon 5	Wiz Khalifa	
	5	Lights	Ellie Goulding	-	
	6	Glad You Came	The Wanted	-	
	7	Stronger (What Doesn't Kill You)	Kelly Clarkson	-	
	8	We Found Love	Rihanna	Calvin Harris	
	9	Starships	Nicki Minaj	-	
10		What Makes You Beautiful	One Direction	-	
		Wild Ones	Flo Rida	Sia	
	12	Set Fire to the Rain	Adele	-	
1 1 1 1 1	13	Sexy and I Know It	LMFAO	-	
	14	Some Nights	fun.	-	
	15	Wide Awake	Katy Perry	-	
	16	Good Feeling	Flo Rida	-	
	17	Whistle	Flo Rida	-	
	18	One More Night	Maroon 5	-	
	19	Drive By	Train	-	
	20	The Motto*	Drake	Lil Wayne	
2013	3 1 Thrift Shop Macklemore and Ryan Lewis		Wanz		
	2	Blurred Lines	Robin Thicke	T.I.; Pharrell Williams	
	3	Radioactive	Imagine Dragons	-	
	4	Harlem Shake*	Baauer	-	
	5	Can't Hold Us	Macklemore and Ryan Lewis	Ray Dalton	
	6	Mirrors	Justin Timberlake	-	
	7	Just Give Me a Reason	Pink	Nate Ruess	
	8	When I Was Your Man	Bruno Mars	-	
	9	Cruise	Florida Georgia Line	Nelly	
	10	Roar	Katy Perry	-	
	11	Locked Out of Heaven	Bruno Mars	-	
	12	Ho Hey	The Lumineers	-	
13 Sta		Stay	Rihanna	Mikky Ekko	

Year-End Singles, 2009-2013				
Year	No.	Title	Artist	Featured Artists
	14	Get Lucky	Daft Punk	Pharrell Williams
	15	Royals	Lorde	-
	16	I Knew You Were Trouble	Taylor Swift	-
	17	We Can't Stop	Miley Cyrus	-
	18	Wrecking Ball	Miley Cyrus	-
	19	Wake Me Up!	Avicii	-
	20	Suit & Tie	Justin Timberlake	Jay-Z

TABLE 1. The corpus obtained from the Billboard Year-End Singles lists from 2009 through 2013

The analyses were completed using standard roman numeral notation¹⁷ within a spreadsheet so as to view harmonic syntax within the context of form and phrase structure. In this way, repetitive progressions were reduced to only a few lines and did not have to be written out manually, as demonstrated in figures 1a and 1b.



FIGURE 1A. "Lights," one of the simplest analyses

Intro	No Repeat		
П. іі.	1	П. іі.	1V6
Verse	4-Bar		
vi . I .	ii	V	I.iii64.
Prechorus	No Repeat		
vi	iii	bVII	164 . V .
Chorus	No Repeat		
IV . V .	1	IV . V .	L
IV . V .	vi . II .	IV. iv .	L
C-V Trans.	No Repeat		
1IV	I iii64		
Bridge	No Repeat		
IV	V	I.V6.	vi . iii6 .
П	ii	V	

FIGURE 1B. "When I Was Your Man," a more complex analysis formally and harmonically

¹⁷ "Standard" in this context refers to non-Schenkerian forms, where capital letters correspond to major chords and lowercase letters correspond to minor chords.

As was stated previously, form and phrase structure are syntactically important, especially in popular music. (de Clercq 2012; Hughes 2011; Lerdahl and Jackendoff 1983) For this reason, each section of a song was marked by names commonly employed in popular music, such as verse and chorus. Any section that repeated (and likely to be a chordal mode) was marked off with the number of bars the pattern took up. The analyses were all placed into four-bar groups, which eased the process of manually inspecting a large data set for chordal modes.

Some songs in the dataset are modally ambiguous, in that determining whether it is in a major or minor key is sometimes not entirely clear due to the saturation of diatonic harmonies. Though these methods were not used in my research, there are statistical approaches for effective key finding. (Temperley and de Clercq 2013)

When deciding on my analytical techniques, it seemed wise to only notate triads, even if seventh chords were obvious. The reasoning behind this was to prevent the notation of complex extended chords or chords with added tones, which are abundant.¹⁸ In addition, minor is assumed to be aeolian mode, so **VII** is equivalent to what would normally be labelled \flat **VII**.

Ambiguities

Because the structure of pop music is so different from CPP music, there were a number of issues with the harmonic analysis. For example, "Boom Boom Pow" (in figure 2) has clear bass and root motion, but no real harmonic content to speak of. In cases like this, chords were extrapolated based on the tonal context, so this analysis was ultimately reduced to **i VI iv** in **A minor**.



FIGURE 2. Introduction to "Boom Boom Pow"

¹⁸ While I am not entirely sure of the origins of this phenomenon, I hypothesize that added tones generally result from the "exploration" of diatonic sonorities due the lack of formal musical training in pop songwriters. Added tones are also often used to create pedal tones across an entire chord sequence.

Other songs had melodic content or basslines, but no chords to help ultimately determine which notes are structurally important and which are simply nonchord tones. In figure 3, the baseline for "The Motto" shows a contour that perhaps implies a **i III ii**° **V** sequence in **B minor**. The vocals are entirely rapped, however, and there is no other pitched instrument to explicitly indicate that harmonic sequence, so this song ultimately had to be removed from the corpus.



FIGURE 3. Bassline in "The Motto"

Similarly, some songs have limited harmonic or bass content with expressive melodic lines. A prime example of this occurs in "Single Ladies (Put a Ring on It)," which contains an implied prolonged tonic¹⁹ for most of the verses and the choruses, as seen in figure 4. At the bridge, however, the mode changes from major to minor, until it reaches a climax on the dominant. This extreme example of harmony affecting form is unusual, but is a prime example of the stark differences between pop and CPP music.



FIGURE 4. Melody in the first verse and chorus of "Single Ladies (Put a Ring on It)"

On the other hand, some songs are notable for their lack of tonic. Both "Tik Tok" and "Nothin' on You" are both clearly diatonic, yet **I** never seems to arrive. In "Tik Tok," a deceptive progression tricks us over and over again into thinking that the tonic will arrive, but "Nothin' on

¹⁹ "I Know You Want Me (Calle Ocho)" is another clear example of a prolonged tonic.

You" has no clear indication that we will ever hear I (and we don't, given that the entire song is one four-bar chordal mode).

There are also certain songs that have an ambiguous tonic that falls outside of the typical major/minor problems. "You Belong With Me," "Wide Awake," and "Radioactive" all fit the **ii IV I V** mode, though "Radioactive" is more accurately described as **i III VII IV**. Many of these cues are only solvable through extensive attention to the melody, which often does have important scalar functions.

Results

For the analysis, the scope was narrowed down to four-chord sequences with cyclical syntax, which allowed the syntax to be studied more discretely and without disrupting the formal structure. After completing the general harmonic analysis for the 97-song corpus, each song was inspected carefully for any instances of cyclical syntax, which were then recorded separately. These instances are known as *occurrences*, which is considered to be any section of a song that contained a chord sequence with cyclical syntax. The use of occurrences mean that any given song may appear several times or not at all, depending on how chord sequences are used.

The highly diatonic nature of pop music necessitates transposition to relative keys to be accounted for when counting occurrences: for example, $\mathbf{I} \ \mathbf{V} \ \mathbf{vi} \ \mathbf{IV}$ in major is considered equivalent to **III VII i VI** in minor, not **i v VI iv**. This second sequence would instead be classified as *affiliated*, since it is a modal variation (aeolian versus ionian). Variations based on additional, structurally insignificant chords or substitution of other chords with similar functions (usually **VII** or **v** instead of **V**) were counted as identical. For example, if an extra chord was present but fell on a weak beat, it was ignored when grouping the occurrence into one of the predefined sequences. Sequence names were determined by the mode in which they first appeared and do not have any significance otherwise. Sequences marked with an asterisk have one chord that appear twice, though non-consecutively so as to create a consistent harmonic rhythm,²⁰ and sequences that are underlined are chordal modes.

The full list of 23 four-chord sequences with cyclical syntax appears in table 2. Interestingly, only nine are definitely chordal modes, meaning that they appear in more than one mode. It is definitely possible that the other sequences could also be modes, but the corpus would have to be expanded in order to find as many possible.

²⁰ Originally, chord sequences with cyclical syntax had been collected where the first and last chords were the same (e.g. $\mathbf{I} \not\models \mathbf{VII} \mathbf{IV} \mathbf{I}$), but these are essentially modes of three-chord groups ($\not\models \mathbf{VII} \mathbf{IV} \mathbf{I}$).

Sequence	Occurrences	Tonality (M, m)	Mode Distribution (1, 2, 3, 4)	Affiliations
<u>I V vi IV</u>	31	21, 10	12, 0, 16, 3	i VII VI iv
<u>i III VII iv</u>	9	1,8	8, 1, 0, 0	I V ii IV
<u>i VII VI iv</u>	8	1,7	3, 0, 5, 0	I V vi IV
<u>IV V vi I</u>	6	1,5	5, 0, 0, 1	
<u>I V ii IV</u>	5	4, 1	1, 0, 4, 0	i III VII iv
<u>i VII v VI</u>	4	1, 3	2, 0, 1, 1	
<u>I vi IV V</u>	4	4,0	1, 2, 1, 0	
i VII VI v	3	0, 3	3, 0, 0, 0	
<u>I IV vi V</u>	3	3, 0	2, 0, 1, 0	i iv VI VII
I ii vi IV	3	3, 0	3, 0, 0, 0	
I IV vi IV*	2	2,0	2, 0, 0, 0	
<u>I IV I V*</u>	2	2, 0	1, 1, 0, 0	
IV I vi V	2	2,0	2, 0, 0, 0	
v i VI VII	1	1,0	1, 0, 0, 0	
IV ii iii V	1	1,0	1, 0, 0, 0	
ii iii IV V	1	0, 1	1, 0, 0, 0	
i v VII v*	1	0, 1	1, 0, 0, 0	
IV V vi V*	1	1,0	1, 0, 0, 0	
i iv VI VII	1	0, 1	1, 0, 0, 0	I IV vi V
I vi ii IV	1	1,0	1, 0, 0, 0	
IV I iii V	1	0, 1	1, 0, 0, 0	
i III IV V	1	0, 1	1, 0, 0, 0	
I V vi V*	1	1,0	1, 0, 0, 0	

TABLE 2. List of sequences with cyclical syntax contained within the corpus

Theoretical Model

Based on the results found on chordal modes, a model was constructed to reflect these syntactical patterns. Since pop music arguably owes some of its harmonic content to traditions started in the common practice period, the model I have designed is built off of the typically three-function theory: tonic (**T**), predominant (**pD**; often called subdominant), and dominant (**D**). I posit, however, that pop music has four additional functions: tonic substitute (**Ts**), pseudodominant (**psD**), plagal (**P**), and preplagal (**pP**).²¹ In figure 5, the simplified model shows a *multiple pathways* approach to harmonic functions: chord sequences can either go down the more typically dominant path, or use the plagal function to eventually reach the tonic. Figure 6, on the other hand, shows the complete functional model with all seven functions.



FIGURE 5. The basic functional model for contemporary pop music

Before getting into detail about the more extensive model, let me explain the general definitions of the added functions. The plagal function appears when **IV** or **iv** are used cadentially. The preplagal function incorporates any chord that is shown to precede a plagal cadence. The pseudodominant function contains cadential chords that use $\oint \hat{7}$ over the leading tone. Finally, the tonic substitute is any chord containing $\hat{1}$ where the tonic would be expected,

 $^{^{21}}$ The capital letters in the abbreviations indicate the primary functions that the other four are constructed in reference to.

	Major	Minor
Tonic	Ι	i
Predominant	IV, ii, vi	iv, ii°, VI
Dominant	V, vii°	V, vii°
Pseudodominant	♭ VII, v	VII, v
Preplagal	II, ii, III, iii, b VII, vi	VI, III
Plagal	IV, iv	iv, IV
Tonic Substitute	vi, þVI, i	VI, I

which often occurs in the third phrase in a set of four. Some example chords within these functions are shown in table 3.

TABLE 3. An incomplete list of chords that can fall under each function in both major and minor

In figure 6, predominant and preplagal chords are placed in parentheses because they are technically optional: while they can prepare the dominant and plagal chords (as well as elongate a harmonic structure), there are many situations in which they do not appear at all. We can also see that the predominant function further branches off into both the dominant and pseudodominant functions. The pseudodominant function is much more important in minor keys, where the traditional use of raised $\hat{6}$ and $\hat{7}$ is almost universally replaced with strict usage of the aeolian mode, leaving **v** and **VII** to serve the dominant roles. Pseudodominant chords also appear in major songs that borrow from the mixolydian mode or are heavily based in the blues, though these types aren't typically represented in the corpus.²² The most unusual function on the chart is the tonic substitute, which is represented as circle instead of a rounded rectangle. Chords that can be considered tonic substitutes are essentially subsets of the tonic, but in my model only **I** or **i** can actually be regarded as serving a tonic function. Dominant, pseudodominant, and plagal chords can move directly to a tonic substitute, which can then go on to a predominant or preplagal chord.

One of the most important differences from CPP theory is that functional prolongation generally does not exist, meaning this structure presented in the model might occur within a single phrase. In addition, a given sequence of chords can start at any point in the chart, which is a side effect of cyclical syntax. Because of this, the tonic doesn't inherently "begin" the sequence, since many songs have sections that do not start on the tonic or do not even contain the tonic. These types of sequences are visualized through the area labeled *harmonic limbo*, which implies that chords in this region can move back and forth without ever reaching the tonic.

²² A few examples include "I Like It" and "Born This Way."



FIGURE 6. The complete functional model for contemporary pop music

It can be argued that the traditional model of cadences considers the chromatic resolution of $\hat{7}$ to $\hat{1}$ and $\hat{4}$ to $\hat{3}$ as essential structures.²³ In pop syntax, however, these types of cadential indicators can be used to signify either a dominant or plagal function. Figure 7a shows the similarities between these two functions: excluding the common tone between the cadential chord and the tonic, the upper voice moves by a whole step while the lower voice moves by a half step. The difference, of course, is that dominant triads resolve upwards while plagal triads resolve downwards.



FIGURE 7A. Voice leading in dominant and plagal cadences

The augmented dominant and minor plagal chords, which are arguably the most common alternatives to IV and V, also share this relationship. The voices, however, both move

²³ Of course, motion from $\hat{4}$ to $\hat{3}$ would imply that the dominant is either \mathbf{V}^7 or **vii**°, and not simply \mathbf{V} .

by half steps, leading to sonorities that are chromatic and functionally dissonant (the added tones #2 and $\flat6$ are altered from the normal . In figure 7b, the similarities between **V**⁺ and **iv** resolutions to the tonic are even clearer than in the last example.



FIGURE 7B. Voice leading in dominant and plagal cadences with chromatically altered tones

By changing the interval motion to exclusively whole steps, we obtain the pseudodominant cadence, shown in figure 7c. Performing this same operation on the plagal function produces a $\#iv^{\circ}$ sonority, which we may be tempted to call a "pseudoplagal" chord. Of

course, this last example is purely theoretical, but it's plausible that this structure could be used to extend the existing paradigm of tonality in popular music.



FIGURE 7C. Voice leading in pseudodominant and the theoretical pseudoplagal cadences

Conclusion

Generally, pop music lacks large-scale harmonic structures (an idea in stark opposition to Schenker), which is reflected in my model of harmonic function. Instead, form may play a role in how syntactical groupings are reordered and rhythmically altered. Rather than try to construct a different model that unreasonably forces harmonic material into a larger structure that doesn't exist, I hypothesize that each function has a level of tension which is interpreted semantically, with tension increasing as they approach the dominant or plagal, and resolving once it reaches the tonic. As we saw earlier, syntax is often based off of smaller, repeated groupings of tension and release, which may in fact have more in common with the notion of musical semantics; a number of studies in cognitive neuroscience have found results indicating that harmonic expectancy violations are more associated with semantic violations over syntactical ones (Koelsch 2011; Steinbeis and Koelsch 2008; Steinbeis et al. 2006).

In addition, the results of Featherstone et al. (2013) seem to indicate different types of neurological responses to syntactical errors based on the musicianship of the listener. When encountering an expectancy violation, both musicians and non-musicians had a response associated with linguistic syntax, but when the violation did not resolve, musicians tended to have a secondary syntactical response, whereas non-musicians were more likely to interpret the event in a manner often associated with musical semantics. These findings, combined with the model laid out in the previous section, indicates that syntax in pop music may actually be more linked to semantic conceptions of tension and relaxation than a hierarchical, highly structured musical grammar. This hypothesis is also consistent with the creation and audience of pop music: songwriters and listeners are often musically untrained, so the syntactical violations that are not "allowed" in common practice period grammar are perfectly at home in the pop world. Contemporary pop music, however, is influenced by many different styles of music, so the musical language used in any two songs may be wildly different, which is why the functional model developed in the last section needs to be so flexible.

Clearly, there is a significant need for further research on pop music within the field of music theory. Using the same corpus, a number of other studies could be completed. I did not look at groupings of three chords in my data, so an investigation into how these patterns fit into the model would be extremely useful. In addition, work could be done on the various types of sonorities that exist in pop music, using Hall's (2012) classification scheme. Though Temperley (2007) discusses some patterns in older rock music, melodic patterns in relation to key, chord, and scale should be analyzed, since melody in pop music is no longer constricted to harmony.

Since the world of popular music changes rapidly with the tastes of mainstream culture, I would also suggest completing a yearly corpus analysis of *Billboard*'s charts. Since the beginning of this paper, I have come across many songs released in 2014 that could have illustrated many of the same claims I made with stronger conviction. Contemporary rock, pop, and electronic music has been neglected for too long by theorists in favor of "classic" rock, and the world of popular music is far too vast to restrict ourselves to styles that no longer have the attention of mainstream American culture. Studying contemporary music will arguably allow scholars to connect more with current events and integrate more easily with the social sciences, a feat that will ultimately benefit our understanding of music as a form of cultural expression.

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