

BEYOND MAJOR AND MINOR? THE TONALITY OF POPULAR MUSIC AFTER 1960¹

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While the functional harmonic system of major and minor, with its logic of progression based on leading tones and cadences involving the dominant, has largely departed from European art music in the 20th century, popular music continues to uphold a musical idiom oriented towards major-minor tonality and its semantics. Similar to nursery rhymes and children's songs, it seems that in popular songs, a radiant major affirms plain and happy lyrics, while a darker minor key underlines thoughtful, sad, or gloomy moods. This contrast between light and dark becomes particularly tangible when both, i.e. major and minor, appear in one song. For example, in »Tanze Samba mit mir« [»Dance the Samba with Me«], a hit song composed by Franco Bracardi and sung by Tony Holiday in 1977, the verses in F minor announce a dark mood of desire (»Du bist so heiß wie ein Vulkan. Und heut' verbrenn' ich mich daran« [»You are as hot as a volcano and today I'm burning myself on it«]), which transitions into a happy or triumphant F major in the chorus (»Tanze Samba mit mir, Samba Samba die ganze Nacht« [»Dance the samba with me, samba, samba all night long«]). But can this finding also be transferred to other areas of popular music, such as rock and pop songs of American or British provenance, which have long been at least as popular in Germany as German pop songs and folk music?

In recent decades, a broad and growing body of research on tonality and harmony in popular music has emerged. These musicological and theoretical studies are an important complement to otherwise predominantly culturally, sociologically or media-oriented research in pop music and are therefore

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sometimes referred to collectively as ›pop musicology‹ or ›popular musicology‹, in contrast to the interdisciplinary oriented ›popular music studies‹ (Moore 2007).² Certainly, studies on the tonality and harmony of popular music sometimes refer to the stereotypical semantics of the major-minor antithesis. Many, however, focus on the inadequacy and shortcomings of interpreting rock and pop tonality as functional major-minor harmony, and search for alternative interpretative approaches. This is particularly the case for studies of popular music after 1960. In the following, some of these approaches will be presented. The focus will be on popular African-American music, which is outside the European major-minor tonality; a proposal for an understanding of rock tonality as a modal tonality, and the tendency towards the dissolution of a conventional understanding of harmony, as displayed, for instance, by power chords without thirds or chromatically oriented harmony. While some authors restrict themselves to an exemplary analysis of individual songs, many studies now examine an extensive repertoire of pieces. Via this procedure, which sometimes uses computer-aided analysis and evaluation methods, the analytical findings derive from a broader and more differentiated data basis.³

African-American music and its influence on popular music after 1960

In blues, the most influential African-American music genre in the 20th century, there are mainly two design elements that contravene conventional European functional harmony: the so-called blue notes and the use of chords with major third and minor seventh (root, major third, fifth, minor seventh) that do not function as dominants. For this reason, in addition to the cyclical repetition of short chord patterns, the harmonic drive in blues-derived harmony and melody is much lower than in music based on the functional major-minor system.

As the music anthropologists and blues researchers David Evans (1982: 24) and Jeff Todd Titon (1977: 164) agree, blue notes are pitch ranges, especially around the minor and major third, which are used in a flexible manner. In many cases, sliding pitch movements, in particular from the minor to the

2 Regarding the history of research on popular music, see Pfleiderer/Grosch/von Appen 2014.

3 Nicholas Cook points to the great potential for a renewal of music research as ›a more data-rich discipline‹ through comparative and computer-based corpus studies, see Cook (2004: 123). Regarding the historic background of major-minor tonality, see the corpus study by Albrecht and Huron (2012).

major third, are characteristic and can be realized either vocally, in sung blues, or instrumentally, e.g., by pulling the guitar strings (»bending«) (Hähnel 2015). Minor thirds might also occur over a major chord accompaniment without being perceived as a dissonant tension that calls for a harmonious resolution. With regard to this practice and the general agility (or lability) of thirds in blues and in African-American music styles based on them (e.g., rhythm & blues, soul, funk, rap music), Richard Ripani concludes that »the very concept of major or minor is largely invalid in the analysis of a blues-mode melody« (Ripani 2006: 21). Other intonation peculiarities comparable to that of the third can be found around the fifth and the minor seventh (Ripani 2006: 23-29, see also Titon 1977, Evans 1982).

Another peculiarity of blues songs is that in contrast to dominant chords most chords with major third and minor sevenths are not resolved towards a subsequent tonic, but instead are accorded an intrinsic sonic value without propulsive force. The harmonic schema for twelve-bar blues (see Figure 1) allows for major chords with a minor seventh not only on the fifth but also on the first and fourth scale degrees. If the major chord with a minor seventh in bar 1 or 4 is followed by a major chord with a minor seventh on the fourth degree in the following measure, this is not to be understood as a movement from dominant to tonic.

I⁷ IV⁷ I⁷ I⁷
IV⁷ IV⁷ I⁷ I⁷
V⁷ IV⁷ I⁷ I⁷ (V⁷)

Figure 1: Twelve-bar blues harmony schema

The »blues cadence« in bars 9-11 reverses the movement of the conventional cadence (subdominant → dominant → tonic). In fact, in many songs derived from African-American music, the fifth degree is rare or entirely absent. The fourth degree (with a major third and often a minor seventh) has a much greater significance; the change from the tonal center to the fourth degree and back again in particular often identifies songs as blues or blues-like songs (Ripani 2006: 41).⁴

Ripani discusses a tendency towards a static harmony in African-American music, i.e., the use of chords and cyclic chord sequences, which do not follow a logic of tension and relaxation. Labeling chords in popular music with chord symbols rather than designations of function or degree is absolutely con-

4 Regarding comparable chord sequences in other areas of popular music see below; in general, cf. Temperley 2011a.

sistent with the prevailing tendency towards the blues or static harmony described here. In some extreme cases, songs do not feature chord progressions at all, but only a chord area that extends over the entire piece or over longer sections of the piece. Static harmonies such as these can be found in blues recordings by musicians from the Mississippi Delta, e.g., in John Lee Hooker's »Boogie Chillun« (1948), but especially in funk music, which evolved from soul music in the second half of the 1960s. In many recordings by James Brown two- or four-bar rhythmic-tonal patterns without chord movement, often with major or minor chords with minor sevenths, are repeated incessantly. Usually, there is a contrasting bridge section on the fourth scale degree in line with blues harmony, such as in »Cold Sweat« (1967) or »Say It Loud, I'm Black and I'm Proud« (1968). As Ripani notes, these pieces can be interpreted as neither major nor minor, since they have no dominant progressions or resolutions. He writes about Brown's »Say It Loud, I'm Black and I'm Proud«, in which only Bb⁷ (main part) and Eb⁷ (bridge) are played: »The Eb⁷ in this song simply represents another tonic level, and when we eventually arrive at the Bb⁷ again, we do not get a feeling of harmonic resolution as much as a realization that we are back at that ›other tonic level‹.« (Ripani 2006: 36)⁵

The harmony of the ›blues system‹—as Ripani terms the overarching design elements of African-American music—is thus closely related to the formal design of the pieces in question. Patterns consisting of a few chords that are repeated cyclically and often supported by repetitive melodic-rhythmic patterns such as ostinato bass lines or guitar riffs are widely used in popular African-American music. These pattern cycles last for two, four, or—less frequently—eight bars, and often consist of only four (or fewer) chords. The constant repetition and a frequent lack of cadence-like progressions produce a somewhat static harmonic effect. The use of cyclical forms on the basis of chord patterns increased over the period between 1950 and 1999, as illustrated by Ripani's statistical analysis of all the songs in the top 25 Billboard charts of the African-American music market during this time (see Ripani 2006: 174-182).⁶ While only 5% of all songs in the 1950s are characterized by these chord patterns, their share rose to 33% in the 1960s and reached 76% in the 1990s. The percentage of chords on the fourth scale degree was consistently higher in this repertoire than that of chords on the fifth degree. While about half of the chords in the 1950s and 1970s were first-degree chords,

5 James A. Snead (1984) refers to this as an African-American aesthetics of repetition and cut.

6 The Billboard charts for popular African American music bore various names during this period: ›rhythm & blues‹, ›soul‹ (1969), ›black music‹ (1982), and again ›rhythm & blues‹, or respectively ›rhythm & blues / hip-hop‹ (in the 1990s).

their proportion dropped to 39% in the 1980s (38% in the 1990s); the proportion of fourth-degree chords was only 13% (1990s: 18%) and that of fifth-degree chords was 11% (1990s: 14%).

Rock harmony as modal harmony?

Popular African-American music has strongly influenced popular music throughout the 20th century in the US and around the world. This formative influence is unmistakable, especially in rhythmic and tonal design.⁷ However, African-American musical genres—the different varieties of blues as well as soul and funk since the 1960s and rap music since the 1970s—also offer novel modes of design with regard to harmony and melody that were adopted by and, in some cases, developed further in other popular music styles. This was already evident in 1950s rock 'n' roll, which was founded on rhythm & blues, and has also been apparent in rock music, which was heavily influenced by rhythm & blues and older varieties of blues since the 1960s. Drawing on this observation, the British musicologist Allan F. Moore derives far-reaching conclusions for the harmonic analysis of rock music in his study *Rock: The Primary Text. Developing a Musicology of Rock* (Moore 2001) first published in 1993. In his comprehensive account, *Song Means. Analyzing and Interpreting Recorded Popular Song* (Moore 2014), Moore extends these considerations and transfers them to other stylistic areas of popular music.

In general, Moore views popular songs as hybrid forms of music as their mode of design derives from two traditions: African-American musical traditions and the traditions of American Popular Song. Tin Pan Alley publications of vaudeville and musical songs, so-called ›jazz standards‹, also became the harmonic foundations of wide areas of jazz from the 1930s to the 1950s (Moore 2014: 70). While harmony in popular song tradition can be described in terms of functional major-minor tonality (with cadences involving the dominant or at least descending fifths, cf. Winkler 2007), harmony in African-American music, according to Moore, opposes such an interpretation. On the contrary, non-functional seventh chords can be found here, as well as cyclic chord patterns, which can be repeated incessantly (›open-ended structures‹, Moore 2001: 53). In the appendix to his essay ›Patterns of harmony‹, Moore lists several hundreds of such chord patterns, which he categorized according to the criteria of the available pitches and the tonal center as well as the type of chord progression (stepwise, leaping by a third or fourth) (Moore

7 Regarding African-American rhythm design, cf. Pfleiderer (2006: 291-328).

1992). In order to be able to compare songs from the two different traditions in terms of harmony, Moore advocates the use of an overarching modal interpretation framework. In it, the major scale becomes the Ionian mode; the natural minor scale becomes the Aeolian mode.⁸ The Mixolydian and Dorian modes are also widespread, while Lydian, Phrygian and Locrian are less common.⁹ This understanding of modality is based on a concept of diatonic modes, so-called church modes, which is also common in jazz theory, but rather problematic.¹⁰ Moore emphasizes that the assignment of a chord pattern to a mode does not apply to the entire song, but often only works for the duration of the respective chord pattern. This is due to the songs' regular changes of modes, especially with contrasting parts: »Modal change is extremely common, and a first approximation should be to assume that a mode operates only for the length of the pattern it describes.« (Moore 2014: 71f.) The tonal center of chord patterns such as these—and thus the assignment to one mode—is usually made clear by the criteria of a longer chord duration, the position of the chord at the beginning and / or end of a pattern, and a particular emphasis such as with higher volume or a particular timbre (Moore 2014: 75).¹¹

Since the chord patterns often include both major third and minor third chords, the semantics of major and minor are barely significant in the analyses presented by Moore. Still, if they are brought into play, the attribution of meaning follows the conventional semantics of bright-dark or positive-negative. Moore draws on these semantics when it comes to determining the tonal center of a chord pattern, which in turn affects the designation of the respective mode as Aeolian or Ionian, Mixolydian or Dorian. In Moore's view, identification of the song's tonality is supported in a rather roundabout way by the semantics of the song's statement, which are probably derived primarily from the lyrics. For »the greater the number of minor intervals the mode contains between successive scale pitches and the modal tonic, then the more depressed / emotionally negative / lacking in energy the effect of the track is likely to be, all other factors being equal« (Moore 2014: 75).

8 Both harmonic and melodic minor scales are very rare in popular music. Even during the verses of »Tanze Samba mit mir«, the vocal melody renounces the leading tone e (major seventh) which does, appear in the dominant chords of the accompaniment, however.

9 David Temperley describes Ionian, Aeolian, Mixolydian and Dorian as the »most commonly used modes in rock« (Temperley 2004: 258).

10 On the problem of the understanding of modality in »modal jazz«, cf. Pfleiderer et al. 2016.

11 Here Moore gives several examples of problematic tonality mappings.

Moore thus applies major-minor semantics to the semantics of modal tonality: »the further down ... (from lydian to locrian) one moves, the more negative the modal connotations« (Moore 2014: 75). The American music theorist David Temperley took a similar approach in the context of his reflections on the »scalar shifts« often found in rock music, i.e., the change of modality between form sections (»sectional scalar shift«) or, more rarely, within a single section (»momentary scalar shift«) (Temperley 2011b). Temperley suggests a semantic interpretation of the movement in another mode in the sense that an upward movement within the circle of fifths corresponds to a lightening, a downward movement to a darkening effect: »the modes of operation commonly used in rock (Ionian through Aeolian) reflect a clear and gradual progression corresponding to their line-of-fifths order, with Ionian being happiest and Aeolian being saddest« (Temperley 2011b).

Ulrich Kaiser (2014) has pointed out that causal links between psychologically demonstrable perceptual qualities of »brighter« and »darker« and emotional effects frequently appear arbitrary in individual cases. He therefore generally opposes the assumption of any such causal relationships based on scientific theoretical considerations. Kaiser also uses Temperley's example to show that the tonal center of a chord pattern—and thus its mode—often cannot be clearly determined. However, Temperley and Daphne Tan have demonstrated relationships between modality and perceived / attributed emotion in an experimental study. In systematic pair comparisons between two versions of a melody, each in a different mode, the participants assessed the Ionian version in 84% of the melody pairs and the Mixolydian or Lydian version in 64% or 58% of the pairs as »happier«. However, in direct comparison only 40% of the Dorian, 34% of the Aeolian, and 21% of the Phrygian melody versions were considered »happier« (Temperley / Tan 2013).¹² Even if the major-minor system is generally rejected as inappropriate for popular music, and in many cases the mode of a melody cannot be determined unequivocally, the stereotypical major-minor semantics nonetheless appear to continue to be effective, albeit reinterpreted to apply to the interval structure of diatonic modes.

Tonality types in popular music after 1960

Moore explains the departure from both the functional tonality concept of major and minor and the orientation towards a modal system as being mainly

¹² In the listening experiment, nine participants evaluated all possible pairings of modal versions of seven different tunes.

caused by the strong influence of African-American music traditions on popular music, especially in the US and Britain. Given the resulting hybrid nature of wide areas of popular music, Moore decided »not to regard popular harmony as a deviation from the norms of Western tonality, but as establishing norms in its own right, which may or may not accord particularly strongly with those found in the music of Bach, Beethoven and Brahms« (Moore 2014: 70).

Numerous pop music researchers, among them David Temperley and Philip Tagg (2014), follow this line of argument. Other scholars, on the other hand, remain faithful to the music theory approaches developed to analyze the ›common practice music‹ of the 18th and 19th centuries and describe the peculiarities of popular music harmonics as extensions of conventional functional major-minor harmony. For example, musicologist and rock guitarist Volkmar Kramarz consistently uses Riemann function designations to label the chord patterns he terms ›pop formulas‹. A chord on scale degree bVII thus becomes the double subdominant and ›subdominant chains‹ occur, e.g. SSSS, SSS, SS, S, T (for bVI, bIII, bVI, IV, I); these chord progressions can also be inverted and abbreviated (Kramarz 2007: 92ff.). Whether these chord progressions actually produce a progressive effect that justifies a functionally harmonic interpretation is questionable, however.

Analytical approaches based on the writings of Heinrich Schenker are also used with regard to popular music, especially in the English-speaking world. The Schenkerian approach attaches importance to correlating individual voice progressions (›voice leading‹) to the (functional) harmonic progression of chords: in principle, a functionally interpreted harmonic background movement always remains the decisive element.¹³ In the words of American musicologist Walter Everett, probably the most prominent representative of this ›Schenkerian Popular Musicology‹: »while the underlying principles of tonality are unchanging, rock has evolved several different ways of relating to that tonal background.« (Everett 2004). In addition to analyzing individual songs, Everett presents a comprehensive classification of the tonal systems of rock, illustrated by numerous examples and based on an analysis of more than 6000 rock songs from the 1950s and 1960s, which can be transferred to many other areas of popular music. In his book, *The Foundations of Rock: From ›Blue Suede Shoes‹ to ›Suite: Judy Blue Eyes‹*, Everett illustrates his approach by discussing numerous additional examples—distributed across four book chapters and over a hundred printed pages (Everett 2009: 190-301). In his classification system, Everett distinguishes between six categories (with additional subcategories), the first following the European major-minor tonality of the

13 Moore summarizes his criticism of the application of the Schenkerian approach to the analysis of rock music (Moore 1995).

18th and 19th centuries, while the other five categories gradually deviate from the associated rules:

- 1a: Major-mode systems with common-practice harmonic and voice-leading behaviors. May be inflected by minor-mode or chromatic mixture.
- 1b: Minor-mode systems with common-practice harmonic and voice-leading behaviors. May be inflected by major-mode or chromatic mixture.
- 2: Diatonic modal systems with common-practice voice-leading but sometimes not with common-practice harmonic behaviors.
- 3a: Major-mode systems, or modal systems, with mixture from modal scale degrees. Common-practice harmonic and voice-leading behaviors would be common but not necessary.
- 3b: Major-mode systems with progressive structures. Common-practice harmonic and voice-leading behaviors would be typical at lower, but not higher, levels.
- 4: Blues-based rock: minor-pentatonic-inflected major-mode systems. Common-practice harmonic and voice-leading behaviors not always emphasized at the surface, but may be articulated at deeper levels and/or in accompaniment.
- 5: Triad-doubled or power-chord minor-pentatonic systems unique to rock styles: I-bIII-IV-V-bVII. Common-practice harmonic and even voice-leading behaviors often irrelevant on the surface.
- 6a: Chromatically inflected triad-doubled or power-chord doubled pentatonic systems of early metal. Common-practice harmonic and voice-leading behaviors often irrelevant on the surface.
- 6b: Chromatically related scale degrees with little dependence upon pentatonic basis. Common-practice harmonic and voice-leading behaviors often irrelevant at deeper levels as well as surface. (Everett 2004)

In addition to harmonically traditional pieces in major or minor, there are pieces with modal tonality (2), which are characterized by the absence of leading tones. Furthermore, »progressive« mixtures of major-minor tonality and modality (3) occur, which either use a tonal provision that cannot be unambiguously assigned to a diatonic mode, or produce shifts and modulations without returning to the tonal center established at the beginning; and finally the blues harmony already discussed above (4). In the two remaining classes, the field of conventional major-minor tonality is largely abandoned: in rock and heavy metal, chord patterns that arise from pentatonic riff melodies (the minor pentatonic scale: 1, b3, 4, 5, b7), so-called power chords, occur (5). According to Everett, these chord sequences are not functional and

traditional voice-leading rules are severely restricted.¹⁴ In the final class, the chords on the pentatonic scale are extended by chromatic enhancements and shifts, rendering both conventional voice-leading rules and harmony according to major-minor tonality irrelevant on either the sonic surface (6a) or the Schenkerian background level (6b).

It should be clear that major and minor are hardly relevant for this last group of hard rock, heavy metal and alternative rock songs. What about those songs, though, whose tonality can be interpreted as either major or minor? After all, according to Everett, these constitute most of the 1955-1969 songs examined by him. For Everett, the attribution of ›happy‹ to major and ›sad‹ to minor is merely a question of clichés, whose alleged validity he questions by listing numerous counterexamples (Everett 2009: 161ff.).¹⁵

Corpus studies: on the representativeness of tonality analyses

Both Moore and Everett develop their reflections and systems of harmony from the analyses of a large number of pieces, which they draw primarily from the repertoire of the 1950s, 1960s and 1970s, but in a rather unsystematic fashion. However, their findings are supported by the results of corpus studies that disclose their piece selection criteria and analysis steps, and are therefore, in principle, reproducible. Trevor de Clercq and David Temperley (2011) examine the chord distribution in a corpus of 100 rock songs, 20 per decade, from 1950 to 1999, taken from a list of the »500 Greatest Songs of All Time« published by rock magazine *Rolling Stone*. The authors transcribed all 100 songs and translated them into a computer-readable format.¹⁶ Their results with regard to chord distribution support those found in Ripani's study of African-American chart hits from the same period (see above). As Table 1 shows, fourth-degree chords are the most common in every decade, being far more frequent than fifth-degree chords:

14 »In the triad-doubled minor-pentatonic mode, expressed in I, bIII, IV, V and bVII chords, harmony is non-functional, and voice-leading is severely compromised; all voices, again, tend to move in strictly parallel doublings of root-position triads or empty power-chords.« (Everett 2004: paragraph 20). Kaiser (2014) displays three exemplary analyses of this tonality type.

15 In addition, Everett differentiates the semantics of the relatively few minor pieces so that they can express not only sadness but also tragedy, gloom, melancholy, loneliness, and mystery.

16 The project website provides details of the data and all transcriptions: <http://rockcorpus.midside.com/>.

	1950s	1960s	1970s	1980s	1990s
I	42,3	32,7	30,2	33,2	31,3
\flat II	0,1	0,0	0,4	0,8	0,8
II	0,4	7,4	3,8	0,5	5,0
\flat III	0,0	0,9	3,2	2,8	4,0
III	0,7	4,0	2,7	0,2	1,7
IV	32,1	23,9	22,6	22,0	18,7
\sharp IV	0,0	0,1	0,9	0,0	0,0
V	22,1	14,6	15,4	17,0	15,3
\flat VI	0,1	0,3	5,4	4,7	6,2
VI	1,1	7,2	6,3	8,1	10,0
\flat VII	0,7	8,4	8,9	10,8	6,4
VII	0,6	0,6	0,4	0,0	0,7

Table 1: Overall proportion of chromatic roots in each decade, 1950s-1990s in 20 songs per decade (de Clercq/Temperley 2011: 64).¹⁷

Looking at the transitions between chords, the same picture emerges: movements from the first to the fourth and from the fourth to the first degree are far more frequent than movements away from and to the fifth degree (Table 2). This finding is corroborated by the frequency of the sequences of three chords ending with a chord above the tonal center (Table 3). Although the classical cadence (IV-V-I) is most frequently represented here, it accounts for less than half of all progressions ending on the tonal center (along with the cadence II-V-I).

Cons \ Ant	I	\flat II	II	\flat III	III	IV	\sharp IV	V	\flat VI	VI	\flat VII	VII
I	0	25	132	94	44	1052	2	710	104	302	470	16
\flat II	31	0	0	0	2	0	0	0	0	0	0	12
II	120	1	0	2	20	58	0	97	0	24	10	0
\flat III	50	6	6	0	0	64	2	2	67	0	41	0
III	16	0	39	0	0	46	0	6	0	60	3	4
IV	1,162	14	30	98	45	0	4	514	57	72	90	4
\sharp IV	7	0	0	6	0	10	0	0	0	0	0	0
V	788	0	36	6	17	392	4	0	6	191	48	0
\flat VI	208	0	1	20	0	22	6	22	0	10	78	0
VI	144	0	87	0	32	260	0	124	21	0	3	0
\flat VII	386	0	0	11	2	188	2	26	114	6	0	0
VII	18	0	0	0	12	0	4	0	0	3	0	0

Table 2: Chord transitions in the 100 songs. Rows list the antecedent chords (Ant), and columns list the respective consequent chords (Cons); cells indicate the absolute number of transitions between two chords (de Clercq/Temperley 2011: 61)

¹⁷ No distinction is made between major and minor third chords in this or the following tables.

trigram	amount
IV V I	352
V IV I	292
bVII IV I	146
VI IV I	126
bVII bVI I	103
bIII bVI I	66
II V I	63
bVI bVII I	60
V VI I	42
IV bVII I	39

Table 3: Sequences of three chord progressions ending on the first degree: occurrences within the 100 songs in descending order of frequency (de Clercq/Temperley 2011: 63)

Unfortunately, the authors do not differentiate between different chord types (minor or major third, seventh chords, power chords). Moreover, the evaluations draw on the assumption that the tonal center remains stable within a song—an assumption that Temperley himself put in question. Finally, it can be argued that a corpus of 100 songs is relatively limited.¹⁸

By using computer-aided analysis methods, such as those developed in the field of music informatics and music information retrieval since the 1990s (see Casey et al. 2008, Müller 2015), music informatics specialists associated with Matthias Mauch were able to investigate chords and chord transitions in popular music across a much wider dataset (Mauch et al. 2008). In their study, Mauch et al. analyzed nearly 17,000 songs that were on the US Billboard Hot 100 charts between 1960 and 2010. Instead of transcribing the songs, they randomly selected excerpts from the digital audio files of the songs, each 30 seconds long. They subjected these samples to a spectral analysis with subsequent chroma assignment, drawing on automated methods of music information retrieval.¹⁹ Based on the chroma values, all possible transitions between the four most important chord types (triads with minor or major thirds,

18 In a follow-up study, the authors compare the harmonic and melodic design of an extended 200-piece corpus with the design in European ›common-practice‹ compositions; cf. Temperley/de Clercq 2013.

19 The corpus examined comprises 86% of all chart songs during the respective period. The audio files were supplied by the internet platform *last.fm*, which has been operated by one of the authors, Mark Levy. For the chroma determination, analysis windows with a length of 16,384 samples or 372 milliseconds were selected, which were shifted over the audio file at intervals of 1024 samples or 23 milliseconds. Both the random selection of the excerpts as well as a metrological

and four-note-chords with both minor sevenths and minor or major thirds) were identified, finally leading to eight harmonic categories that refer to different types of chords within the chord changes. By statistically calculating the frequency at which these categories occur in the songs of a single year, conclusions can be drawn about the distribution of a certain harmonic design in the popular music of the respective period. Figure 2 provides an overview of the relative frequencies of each category (H1 to H8) in all songs of each year.

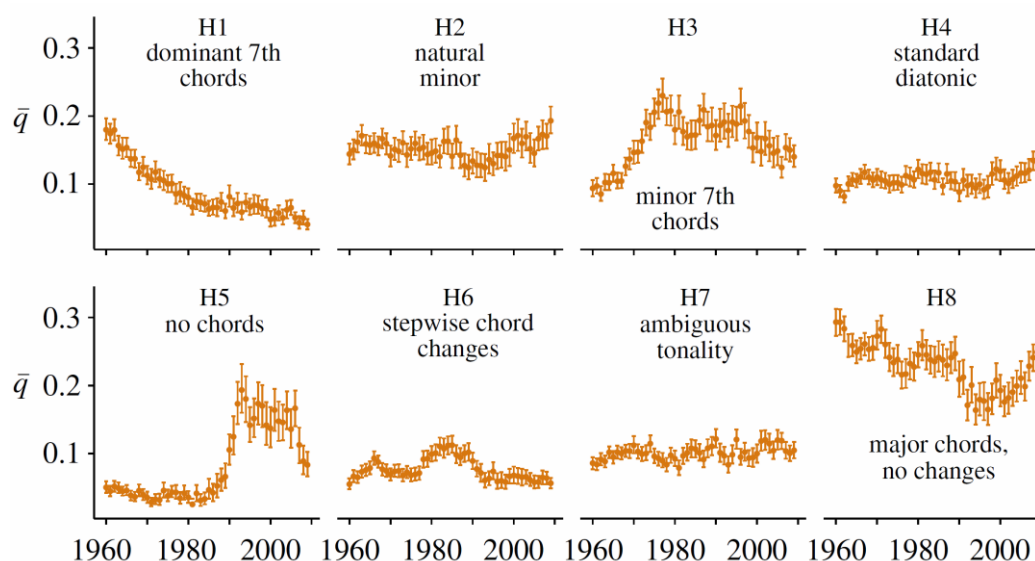


Figure 2: Relative frequency of eight harmony categories in the US Billboard Hot 100 charts between 1960 and 2010 (Mauch et al. 2014: 4)²⁰

What is striking at first is the fluctuating, yet consistently high proportion of major chords without recognizable chord changes (H 8). The proportion of chord changes involving a dominant seventh chord (H 1), on the other hand, declines steadily, from just under 20% in 1960 to around 5% in the 2000s. By contrast, the proportion of chord changes with minor seventh chords (H 3) increases sharply during the 1970s, which the authors link to the growing popularity of funk and disco over this period. The proportion of songs without recognizable chord changes or without chords (H 5), which in the early 1990s increases from less than 5% to up to 20% is equally remarkable. This can be

determination of the chroma values may lead to slight distortions, which, however, are unlikely to be statistically significant in view of the immense size of the overall corpus.

²⁰ In-depth tables provide detailed information on the eight categories and their distribution among genres and artists. They are available online: https://figshare.com/articles/Extended_Tables_Tags_Artists_Topic_Composition_/1399131, 16.4.2018.

attributed to the success of rap music with pieces that do not include tonal elements—just raps, non-tonal samples and percussive beats—in the 1990s and early 2000s. The percentage of the remaining four categories (H2: chord change within the natural minor scale or Aeolian mode, H4: simple diatonic chord changes in major, H6: stepwise chord changes, which indicate a modal tonality, H7: ambiguous tonality), remains constant over the decades, apart from minor fluctuations. So, even if minor distortions caused by the random selection of the 30-second excerpts or errors in the automated identification of pitch classes and, based on these, chords and chord changes are taken into account, the study leads to surprisingly clear results drawn from a broad data base: the harmonic-tonal design in popular music since 1960 is diverse and cannot be described solely in terms of the major-minor tonality.

Conclusion

While in most cases the tonality in Tin Pan Alley songs as well as in German Schlager can still clearly be described in terms of functional harmony and therefore predominantly as major or—far less often—minor, popular music since the 1960s has produced an increasing number of songs whose tonality defies a functional harmonic interpretation. Given the variety of harmonic concepts outlined above, the validity of a culturally traditional semantics of major and minor, rooted in European art music, also becomes questionable within this repertoire. If pieces cannot be described as major or minor, the associated cultural connotations are rendered invalid. Blues songs and pieces from other African-American music genres such as rap music or contemporary rhythm & blues, but also many pop and rock songs as well as tracks of electronic dance music, are located outside major or minor tonality and, due to the cyclical repetition of shorter chord sequences, are not open to interpretation in accordance with a harmonic logic of development or progression. The tonality in wide areas of recent rock and pop music, however, can be interpreted as modal, with Dorian and Mixolydian being just as prevalent as Ionian (major) and Aeolian (natural minor), while Lydian, Phrygian and Locrian modes are less common. According to empirical findings, these modes, which are all derived from the diatonic scale, are often perceived and interpreted as being lighter and more positive (more large intervals) or darker and more negative (more small intervals). In addition, there are innumerable pieces with chords that are assigned to the pentatonic scale and power chords, especially in hard rock, heavy metal and alternative rock. Finally, ever since the chart successes of hip-hop in the 1990s, there have been an

increasing number of popular music pieces that largely or completely dispense with chords whatsoever, so that, in addition to the rap vocals, they are constructed from either purely percussive sounds or just a bass line and short samples.

Popular music of the past decades developed a hybrid or transcultural kind of music that exhibits strong influences from African-American music traditions. At the same time, it increasingly aims for a global market and therefore a heterogeneous audience (cf. Negus 2001). Thus, for musicians, songwriters and listeners from different cultural contexts, European major-minor tonality is only one among many possible tonal frames of reference and the corresponding stereotypical connotations have lost their validity and binding character.

References

- Albrecht, Joshua D. / Huron, David (2012). »A Statistical Approach to Tracing the Historical Development of Major and Minor Pitch Distributions, 1400-1750«. In: *Music Perception* 31 (3), pp. 223-243.
- Casey, Michael A. / Veltkamp, Remco / Goto, Masataka / Leman, Marc / Rhodes, Christophe / Slaney, Malcolm (2008). »Content-Based Music Information Retrieval. Current Directions and Future Challenges«. In: *Proceedings of the IEEE* 96 (4), pp. 668-696.
- Clercq, Trevor de / Temperley, David (2011). »A Corpus Analysis of Rock Harmony«. In: *Popular Music* 30 (1), pp. 47-70.
- Cook, Nicholas (2004). »Computational and Comparative Musicology«. In: *Empirical Musicology. Aims, Methods, Prospects*. Ed. by Nicholas Cook and Eric Clarke. Oxford, UK and New York, NY: Oxford University Press, pp. 103-126.
- Evans, David (1982). *Big Road Blues. Tradition and Creativity in the Folk Blues*. Berkeley, CA: University of California Press.
- Everett, Walter (2004). »Making Sense of Rock's Tonal Systems«. In: *Music Theory Online* 10 (4); www.mtosmt.org/issues/mto.04.10.4/mto.04.10.4.w_everett.html (access 16 April 2018).
- Everett, Walter (2009). *The Foundations of Rock. From »Blue Suede Shoes« to »Suite: Judy Blue Eyes«*. Oxford, UK: Oxford University Press.
- Hähnel, Tilo (2015). »»Blues Falling Down Like Hail«. Vokaler Ausdruck in drei Spielarten des Blues«. In: *Stimme, Kultur, Identität. Vokaler Ausdruck in der populären Musik der USA (1900-1960)*. Ed. by Martin Pfeleiderer et al. (= texte zur populären Musik 8). Bielefeld, DE: transcript, pp. 233-268.
- Kaiser, Ulrich (2014). »Fraktale Strukturen im Hard Rock. »Back In Black« (AC/DC), »Highway Star« (Deep Purple) und »The Future Never Dies« (Scorpions) im Fokus einer musikanalytischen Perspektive«. In: *Samples*. 12, www.aspm-samples.de/Samples12/kai_ser.pdf (access 16 April 2018).
- Kramarz, Volkmar (2007). *Die PopFormeln. Die Harmoniemodelle der Hitproduzenten* (updated ed.). Bonn, DE: Voggenreiter (1st ed. 2006).

- Kramarz, Volkmar (2014). *Warum Hits Hits werden. Erfolgsfaktoren der Popmusik. Eine Untersuchung erfolgreicher Songs und exemplarischer Eigenproduktionen*. Bielefeld: transcript.
- Mauch, Matthias / MacCallum, Robert M. / Levy, Mark / Leroi, Armand M. (2014). »The Evolution of Popular Music. USA 1960-2010«. In: *The Royal Society Open Science* 2, <http://rsos.royalsocietypublishing.org/content/royopensci/2/5/150081.full.pdf> (access 16 April 2018).
- Moore, Allan F. (1992) »Patterns of harmony«. In: *Popular Music* 11 (1), pp. 73-106.
- Moore, Allan F. (1995) »The So-Called ›Flattened Seventh‹ in Rock«. In: *Popular Music* 14, pp. 185-201
- Moore, Allan F. (2001). *Rock. The Primary Text. Developing a Musicology of Rock. Second Edition*. Aldershot, UK: Ashgate.
- Moore, Allan F. (2014). *Song Means. Analysing and Interpreting Recorded Popular Song*. Aldershot, UK: Ashgate.
- Moore, Allan F. (ed.) (2007). *Critical Essays in Popular Musicology*. Aldershot, UK: Ashgate.
- Müller, Meinard (2015). *Fundamentals of Music Processing. Audio, Analysis, Algorithms, Applications*. Cham, CH: Springer.
- Negus, Keith (2001). »The Corporate Strategies of the Major Record Labels and the International Imperative«. In: *Global Repertoires. Popular Music within and beyond the Transnational Music Industry*. Ed. by Andreas Gebesmair and Alfred Smudits. Aldershot, UK: Ashgate, pp. 21-31.
- Pfleiderer, Martin (2006). *Rhythmus. Psychologische, theoretische und stilanalytische Aspekte populärer Musik*. Bielefeld, DE: transcript.
- Pfleiderer, Martin / Grosch, Nils / Appen, Ralf von (2014). »Populäre Musik und Wissenschaft. Forschungstraditionen und Forschungsansätze«. In: *Populäre Musik. Geschichte, Konzepte, Forschungsperspektiven*. Ed. by Martin Pfleiderer Nils Grosch, and Ralf von Appen (= Kompendien der Musik 14). Laaber, DE: Laaber, pp. 200-209.
- Pfleiderer, Martin / Klaus Frieler / Wolf-Georg Zaddach (2016). »Pitch Class Hierarchies in Miles Davis' ›So What‹. Reconsidering Modal Jazz Improvisation with Computer-based Analysis Tools«. In: *Beitragsarchiv zur Jahrestagung der Gesellschaft für Musikforschung Halle/Saale 2015 ›Musikwissenschaft: die Teildisziplinen im Dialog‹*. Ed. by Wolfgang Auhagen and Wolfgang Hirschmann. Mainz, DE: Schott, <http://schott-campus.com/pitch-class-hierarchies-in-miles-davis-so-what> (access 16 April 2018).
- Ripani, Richard J. (2006). *The New Blue Music. Changes in Rhythm & Blues, 1950-1999*. Jackson, MS: UP of Mississippi.
- Snead, James A. (1984). »Repetition as a Figure of Black Culture«. In: *Black Literature and Literary Theory*. Ed. by Henry Louis Gates Jr. New York, NY: Methuen, pp. 59-79.
- Tagg, Philip (2014). *Everyday Tonality. Towards a Tonal Theory of What Most People Hear*. New York, NY and Huddersfield, UK: The Mass Media Music Scholars' Press (1st ed. 2009).
- Temperley, David (2004). *The Cognition of Basic Musical Structure*. Cambridge, MA: MIT Press.
- Temperley, David (2011a). »The Cadential IV in Rock«. In: *Music Theory Online* 17 (1), www.mtosmt.org/issues/mto.11.17.1/mto.11.17.1.temperley.pdf (access 16 April 2018).

- Temperley, David (2011b). »Scalar Shift in Popular Music«. In: *Music Theory Online* 17 (4), www.mtosmt.org/issues/mto.11.17.4/mto.11.17.4.temperley.pdf (access 16 April 2018).
- Temperley, David / Clercq, Trevor de (2013). »Statistical Analysis of Harmony and Melody in Rock Music«. In: *Journal of New Music Research* 42, pp. 187-204.
- Temperley, David / Tan, Daphne (2013). »The Emotional Connotations of Diatonic Modes«. In: *Music Perception* 30 (3), pp. 237-257.
- Titon, Jeff Todd (1977). *Early Downhome Blues. A Musical and Cultural Analysis*. Urbana, IL: University of Illinois Press.
- Winkler, Peter K. (2007). »Toward a theory of popular harmony«. In: *Critical Essays in Popular Musicology*. Ed. by Allan F. Moore. Aldershot, UK: Ashgate, pp. 251-274.