Chapter 11

A transformational approach to superimposition in contemporary jazz voicings

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Abstract: This chapter explores the creative possibilities yielded by considering the voice-leading of superimposed chord structures in jazz. In traditional neo-Riemannian theory, operations such as "parallel" model one type of progression. However, triads and other structures may function as (partial) voicings for many different harmonies. Conceiving of simple chord shapes in this abstract fashion leverages neo-Riemannian theory to model an expanded repertoire of progressions. The essay also examines the relationship between underlying and superimposed voice-leading, an important consideration in repertoire where the structural significance of salience and stability fluctuates.

After exploring functionally tonal progressions generated from PL and LP cycles, various types of interval cycles are modeled, leading to a realization of Coltrane's "Giant Steps" using two different zero-sum cycles—one using lower chords tones that define the harmony, the other using extensions or alterations that reflect jazz performance practice. Seventh-chord and ninth-chord modeling are also explored, again using chord shapes as voicings for different harmonies. As a final demonstration, a "cantus firmus" of transformations is counterpointed in five contrasting ways.

Keywords: jazz, improvisation, salience, stability, counterpoint, Coltrane, "Giant Steps," neo-Riemannian theory.

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1. Introduction

This essay is a companion piece to my recent article in *Zeitschrift der Gesellschaft für Musiktheorie* (2022), which studies the transformations of

superimposed triads and demonstrates their analytical relevance through a Robert Glasper analysis. The present chapter focuses on the creative possibilities opened up by considering the voice-leading of superimposed structures in jazz, not only with superimposed triads but also with superimposed seventh chords and ninth chords.[1]

In a 2003 article on Wayne Shorter's "Yes and No," Steven Strunk argued that seventh and ninth chords should be used in neo-Riemannian work on jazz, since triads, seventh chords, and ninth chords with the same root are used interchangeably by jazz musicians.[2] Later research by Keith Waters, with interactive diagrams created by J. Kent Williams, was also concerned with modeling jazz harmonic practice more accurately and dealt extensively with ninth chords of all types (2010).

Waters and Williams's three-dimensional *Tonnetz* modeling ninth chords (their Example 10) is embedded below as Figure 11.16, and is referred to several times in this essay. They state that it "provides the playing field on which we may observe the progressions of these harmonies in jazz composition" (paragraph 9.4). Note that they refer to "jazz composition." Waters and Williams examine the chord changes of compositions abstractly, idealizing voicings as ninth chords, while recognizing that in performance, "chords are often multiply realized, and the chordal instrument often adds or subtracts harmonic extensions" (paragraph 5.1). By contrast, this study focuses on how chord changes may be realized in performance.

This approach opens up new possibilities due to the richness of contemporary jazz harmony and the freedom with which jazz musicians interpret chord symbols. For example, I will demonstrate how the "playing field" Waters and Williams describe—with the many types of trapezoids they model moving along the field via rotation, reflection, translation, or diatonic/acoustic dialogue—may be re-envisioned such that each trapezoid itself contains several different harmonic options, thus leveraging their *Tonnetz*, and neo-Riemannian

[1] Some material on superimposed triads is presented in this chapter, but the subject is more extensively explored in the *ZGMTH* article. Portions of this paper were presented at the 2017 annual meeting of the Society for Music Theory.

[2] Strunk (2016) uses some similar approaches but does not deal with ninth chords. For further discussion of Strunk (2003), see Park (2016). Park agrees with Strunk that theory should be brought more in line with practice by modelling ninth chords. Prior to Strunk's article, the issue of transformations between extended chordal structures was discussed by Callender (1998); Callender (2007) discusses this subject as well.

theory more generally, to model a larger array of progressions. In addition, I will accomplish this using idiomatic jazz voicings.

The voicings discussed in this chapter, while presented with ranges and stemming appropriate to the piano, are also idiomatic for guitar and for ensemble writing. Moreover, chord voicings are applicable to melodic improvisation on any instrument.

Many of the progressions in this essay are functionally tonal. Curious about the vast array of possibilities, I imposed various sets of limitations to test whether different voice-leading phenomena could be superimposed in different harmonic contexts while still using idiomatic voicings. In this regard, working within the strict confines of functional tonality presents an inherent challenge. The findings below are presented in this spirit of exploration, and illustrate the flexibility of my approach.

Lastly, while I emphasize voicings (and in some cases progressions) that are found in mainstream jazz starting around 1960, I do not make any claims as to *why* they "work." One reason for this is that North American academic music theory has historically been uninterested in such discourse, leaving the discipline bereft of any foundational work to build on in this regard. Tymoczko (2011, p. xvii) recalls how at Harvard in the late 1980s, "questions like 'does this chord sound good?' . . . were frowned upon as naive or even incoherent." However, I do claim to be able to identify voicings and progressions that are idiomatic within mainstream jazz, due to my experience as a jazz theorist, historian, composer, and performer. I also draw support from pedagogical sources. This is significant because academic music theory, with its now-acknowledged white racial frame, has only just begun to recognize the value of the numerous pedagogical works on jazz theory that have been published since the 1950s, many by African-Americans.[3]

I also do not claim that *any* progression automatically works or is idiomatic, although I do believe that exceptional musicians have the ability to make a remarkable number of voicings and progressions work. I mention this because I have encountered a strange complaint in the theory world about jazz theory

[3] For example, see Russell (1953), Lateef [1981] (2015), or any of the numerous volumes by David Nathaniel Baker. In connection with a table of JSTOR and RILM hits for various keywords, Tymoczko (2011, p. 390) observes that "just a handful of articles mention tritone substitution, whereas thousands mention serial music." In 2020, the Executive Board of the Society for Music Theory stated: "We humbly acknowledge that we have much work to do to dismantle the whiteness and systemic racism that deeply shape our discipline."

and even jazz itself. The issue seems to relate to an impression that "anything works" in jazz, and strangely it arises in the context of discussions about tonal jazz, not atonal jazz. (Some of the frustration and misunderstanding also seems to stem from the related question of how to notate complex sonorities with chord symbols.) It would be one thing to hear a complaint that a "free"/atonal jazz musician was playing "anything." Such a criticism could still be met—on the one hand by citing documentation that artists like John Coltrane (in his late, "free" period) do not just play anything, and on the other hand by pointing out that the same criticism, were it valid, would apply equally to atonal composers of Western classical music.[4] But this complaint is typically directed at tonal jazz, where almost by definition it cannot be the case that "anything goes."

So while it is true that chord voicings containing the flatted fifth, natural fifth, and raised fifth simultaneously may be found in the music of Thad Jones and Thelonious Monk, that does not mean that just anyone can use such voicings in tonal jazz and make them work, just like not many composers can get away with the two-voice intervallic succession 10-10-9-9-8-8, which can be found in the music of J.S. Bach.[5] In both cases, these "rule breaks" are greater reasons to marvel at their music, particularly since they occur in a tonal context.

At the heart of this issue lies the state of affairs described in Tymoczko (2011, p. 388):

> Schoenberg and Piston would have been shocked to see the form in which their prophecies were realized. First, the [modernist] synthesis was not achieved by the inheritors of the European notated tradition – composers of string quartets and symphonies, trained in the best conservatories and having access to the finest orchestras and concert halls. Instead the language was forged by improvising musicians, many poor and African American, who carved an alternative musical tradition out of the materials afforded by popular culture. Second, the modernist synthesis did not take the form of a robust alternative to tonality: instead, it created a hybrid style that incorporates modernist

[4] For example, O'Gallagher (2020) demonstrates that on "Iris," a recording from Coltrane's "free" period, John Coltrane's melodic lines and Alice Coltrane's chordal accompaniment both employ the 013 set class exclusively, strongly evidencing its purposeful utilization. Other significant cases of set-class organization in Coltrane's late period are presented as well.

[5] See the Allemande from J. S. Bach's English Suite No. 3 in G minor, BWV 808. The author has significant unpublished research on the passage in question.

> devices while continuing to exploit functionally tonal ideas. For the contemporary jazz musician, chromatic voice-leading, octatonic scales, quartal harmonies, and polychords are just more grist for the tonal mill.

(I would add that there is also a significant amount of atonal jazz and a full spectrum of music in between.) In short, many theorists are uncomfortable with the circumstances described by Tymoczko, and are therefore willing to be hypocritical about things like chromaticism and complexity, which have historically been valorized when they occur in music composed by white people but have been diminished when they occur in music improvised by black people.

2. Harmony, voicing, shape, and chord

In this chapter, I use the terms "harmony," "voicing," "shape," and "chord" in a somewhat idiosyncratic way that requires explanation. I begin by providing my definitions of the terms, then present examples of their usage, and finally discuss my reasons for distinguishing among them in such fashion.

Harmony: The root and quality—including alterations—of the chord changes given in the lead sheet or performed in the head.[6]

Extensions (upper chord tones) do not change the harmony unless an extension is also an alteration. Alterations matter because harmonies in jazz are often conceived of as "chord-scales," as described in Michaelson (2018). For example, "9" does not change the harmony, but "♭9" does.

Voicing: The realization of a given harmony by a performer, composer, or arranger.

In this essay, I sometimes notate the chord tones present in a voicing as unordered pitch-class sets; e.g., {3, 5, 7, 9}, which indicates that the voicing contains the third, fifth, seventh, and ninth.[7] A given harmony is not necessarily realized with a single simultaneity—it may be realized in multiple ways, it may be realized contrapuntally, or it may not be realized at all. The

[6] See Michaelsen (2018, p. 137) for a discussion of how to determine what the harmonies (which he calls "chord-scales") of a jazz composition are.

[7] The order of pitch-classes in a voicing often does matter in this article, as I will consider the "upper structure" of voicings separately. However, when I use this particular notation, order does not matter.

study of chord voicings is also closely related to the study of melodic improvisation; as melodic lines often feature arpeggiations.

Shape: A simple, specific chord type that may be used as a reference when teaching, learning, performing, arranging, or analyzing voicings; any part of a voicing that might be more easily described self-referentially than in terms of the underlying harmony.

For the purposes of this article, shapes will be triads, seventh chords, or ninth chords; however, many other shapes are possible. The letter-name of the shape may or may not be indicated, depending on the situation. To speak of a shape analytically, the voicing should be segmented in such a way that the shape is salient (prominent), or at least distinguishable in its own right.

Chord: A general term that may refer to a voicing, a harmony, a shape, or something else; e.g., "chord changes" refers to harmonies, whereas "chord voicings" refers to voicings.

Figure 11.1 illustrates the use of the above terms with several harmonies, voicings, and shapes. In the first instance, a C major seven *shape* is used as a right-hand *voicing* for a D sus *harmony*.

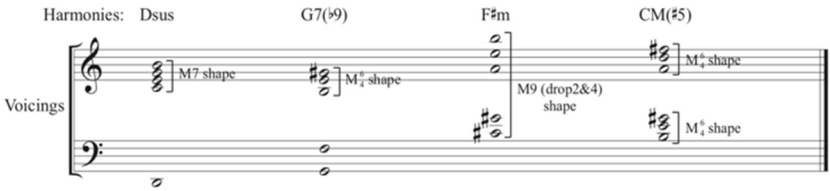


Figure 11.1. Voicings for four different harmonies employing major-third, major-seventh, and major-ninth shapes.

I distinguish between harmony and voicing because chord symbols are often intentionally general, leaving musicians to add or remove specific chord tones at will. If a lead sheet indicates Cm, that harmony may be realized with any combination of the root, third, fifth, seventh, ninth, eleventh, or thirteenth; i.e., any of the conventionally available chord tones.[8] Conversely, when the given chord symbols are more specific, they are often interpreted more generally, and indicated extensions are not played.

[8] Musicians may also add alterations at will, but take greater care in doing so to avoid unwanted dissonances with other players.

One reason indicated extensions are not necessarily performed is that they are often more descriptive than prescriptive, serving to inform the player of what is occurring in the rest of the texture or ensemble. For example, if an extension is featured prominently in the melody of a standard, it usually appears in the chord symbol. If one is performing a solo rendition of the standard, then this extension appears "automatically" in the melody and does not need to be added elsewhere in the voicing. Similarly, if one is accompanying another musician, it is often not appropriate to double the tones of the melody; doing so may not only detract from the freshness and expressivity of the tone itself, but may also limit the other player, who has many choices regarding articulation, intonation, timing, and special effects (slurs, smears, etc.). (An analogous situation presents itself in continuo playing when a cadential suspension occurs in the figured bass, but is featured in the soloist's line. In such cases, continuo players often avoid doubling the suspension in the accompaniment due to questions of timing, ornamentation, and intonation, which is a special consideration when dealing with period instruments and temperaments.)[9]

I distinguish between shape and voicing because in some cases a shape may be identical to a voicing; however, a voicing may be comprised of multiple shapes, or of no shapes (as I define them here). In addition, the chord-tone designations used to describe voicings—e.g., "{3,5,7,9}" are generic and do not specify exact interval relationships. Consequently, a {3,5,7,9} voicing for a major harmony will form a minor-seventh shape, but the "same" {3,5,7,9} voicing used for a minor harmony will form a major-seventh shape. In other words, one voicing may entail multiple shapes. Conversely, one shape may function as multiple voicings (see Figure 11.2).

Shape and voicing indications work in tandem. Voicing indications provide vital information about specific chord tones—with their attendant implications for harmonic functionality—but do so merely by enumerating them as a set of raw data. (In certain stages of teaching and learning this raw-data approach can be overwhelming.) Shape indications describe the presentation of the chords tones in a way that may be expedient, but that is

[9] As another example, piano parts in big band charts are somewhat notorious for containing rapid successions of similar chord symbols, such as Cm13, Cm9, Cm7, and Cm11. The extensions provided in such chord symbols are more descriptive than prescriptive, informing the player of what is occurring in the rest of the ensemble. In my view, the harmony in such a situation may be regarded as C minor, and the player should add extensions at will rather than attempting to match those played by the rest of the ensemble (in which case they would barely be heard anyhow).

divorced from harmonic context. Separately from these practical considerations, and more importantly, shape indications describe structures that may have significant aural relevance and that may combine with other shapes to form an independent layer, counterpointing the underlying harmony with its own harmonic or voice-leading logic.

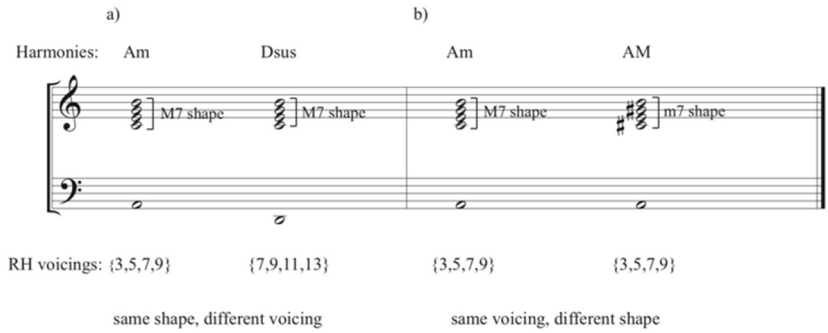


Figure 11.2. At a), the major-seventh shape is used as a {3,5,7,9} voicing and as a {7,9,11,13} voicing. At b), the {3,5,7,9} voicing appears as a major-seventh shape and as a minor-seventh shape.

I distinguish chord from shape, voicing, and harmony because "chord" can mean different things in different contexts. For example, it is possible to say that one *chord* acts as a (partial) *chord* voicing for another *chord*. I prefer to say that a shape acts as a (partial) voicing for a harmony.

3. Voicings featuring triad shapes

Voicings featuring triad shapes are idiomatic in jazz starting around 1960, and three main types are discussed in the pedagogical literature, including Mark Levine's influential treatises on jazz theory and jazz piano: slash chords (1995, chapter 5), "So What" chords (1989, chapter 12), and upper structures (1989, chapter 14).[10] With all three of these types, the triads are salient (prominent) due to their placement at the top of the voicing, but may be unstable, as they are often comprised mostly or entirely of upper chord tones (sevenths and

[10] For references to upper structures and slash chords in a more scholarly context, see Waters (2011). Waters (2005) discusses the voicings of "So What" in a section on modal harmony (pp. 335–36).

extensions). In addition, triads may be used similarly in melodic improvisation, where they may be even more salient.[11]

Because so many voicings feature triad shapes, a given triad may be used to (partially) realize numerous harmonies idiomatically; several such possibilities are shown in Figure 11.3.

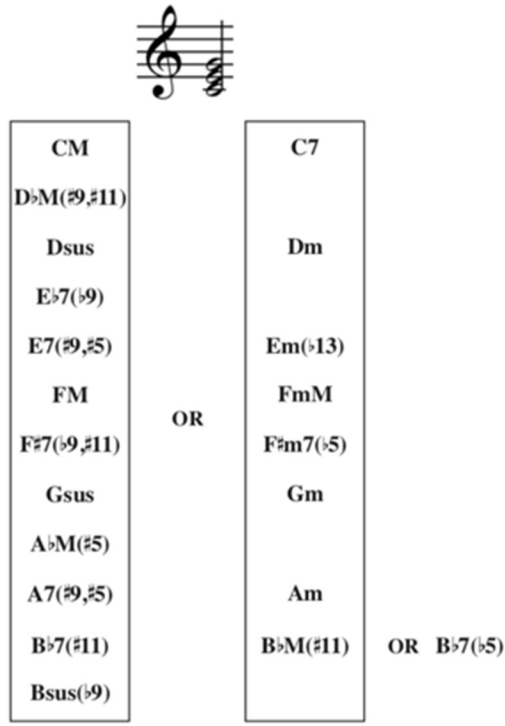


Figure 11.3. A C major triad may be used as a (partial) voicing for any of the harmonies shown. Triads usually appear at the top of a given voicing.

I am especially interested in the fact that triad shapes may be utilized successively, creating a separate layer where the triads themselves relate to

[11] Much of my research revolves around the distinction between salience and stability. However, for the sake of simplicity, I have mostly avoided such terminology in this essay. See Pellegrin (2013) for a detailed explanation of these concepts, and Pellegrin (2022) for more on how they relate to chord voicings and melodic improvisation based on arpeggiation.

one another in significant ways. For instance, the superimposed layer could contain parallel/leading-tone (***PL***) and leading-tone/parallel (***LP***) cycles (as in the Robert Glasper analysis of Pellegrin, 2022). Figure 11.4 shows zero-sum ***PL*** and ***LP*** cycles using triads drawn from the Northern hexatonic system.[12] Figure 11.5 uses the first column of harmonies from Figure 11.3 to illustrate some of the possibilities inherent in the ***PL/LP*** cycles from Figure 11.4. (The harmonies in the left column of Figure 11.3 are no more important than those in the right column; the right column simply lists additional possibilities, and all of them differ in basic chord quality—e.g. major, minor, dominant, etc. Any harmony in any column of Figure 11.5 may progress to any harmony in any other column using the zero-sum voice-leading of ***PL/LP*** cycles in their voicings.

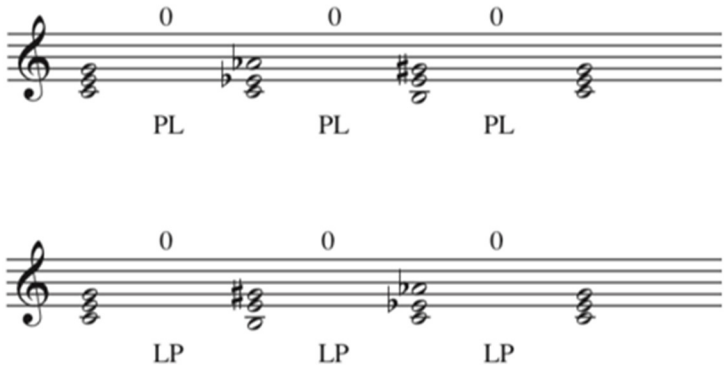


Figure 11.4. Parallel/leading-tone (**PL**) and leading-tone/parallel (**LP**) cycles drawn from the Northern hexatonic system. Voice-leading sums to zero. Accidentals apply only to individual chords.

Conceiving of simple chord shapes in this abstracted way vastly increases their harmonic possibilities. Figure 11.5 illustrates that ***PL*** can model not only the progression of the triads themselves, but many other harmonic progressions (or a portion thereof) if the triads are superimposed over different roots, as is so common in jazz harmonic practice after 1960. For example, when ***PL*** is applied to the C major triad in Figure 11.5, we move to the A♭ major triad, but each of these triads may be used as a voicing for any of

[12] See Pellegrin (2020) for more detailed explanation of zero-sum voice-leading and its relevance to Coltrane's ic4 cycles.

the twelve harmonies shown beneath them. This yields a total of 144 possible progressions (12x12). Moreover, Figure 11.5 omits the eight additional possibilities shown in the right column of Figure 11.3 (and B♭m7(♭5)). If those are included as well, then a total of 441 possible harmonic progressions are modeled with ***PL*** (21x21).

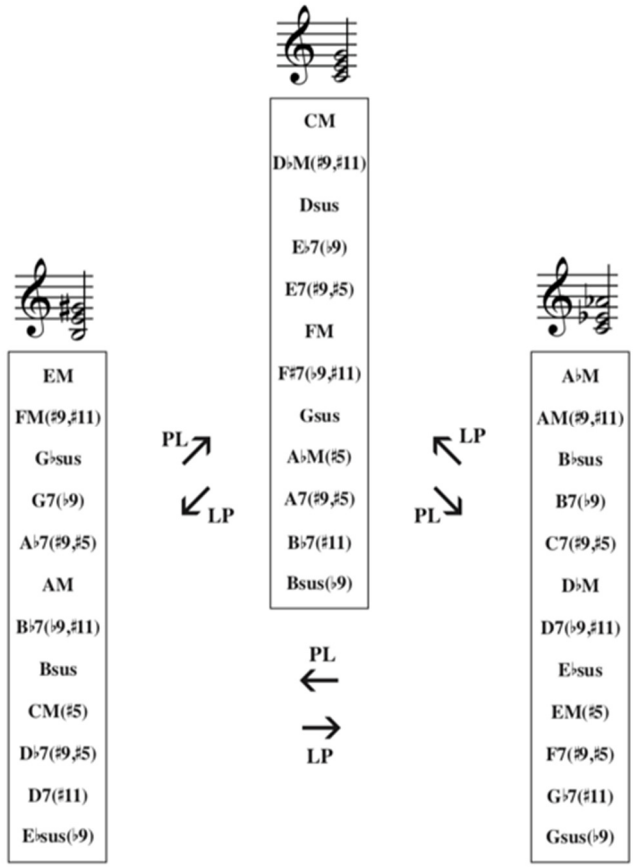


Figure 11.5. The triads from Figure 11.4 may be used as (partial) voicings for at least twenty-one different harmonies (Fig. 11.3), twelve of which are shown here in each column. Any chord in any column may progress to any chord in any other column using zero-sum voice-leading of **PL**/**LP** cycles.

To be sure, some of these progressions will only work in certain contexts, and some may simply not work well at all, especially given the triadic limitation. But with so many possibilities, a large number of progressions *will* work well.

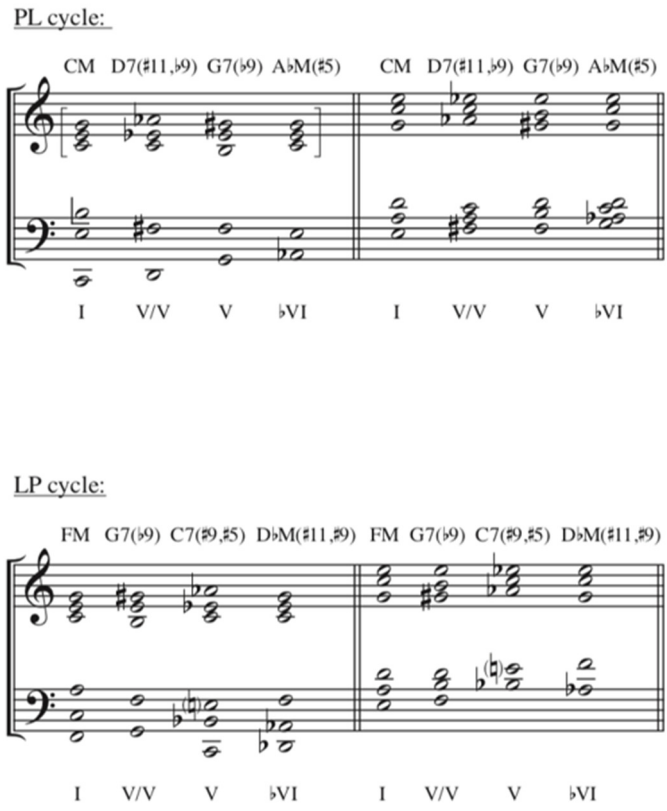


Figure 11.6. Zero-sum **PL** and **LP** cycles from the Northern hexatonic system used as right-hand voicings for the same functionally-tonal progression. Accidentals apply only to individual chords. Spelling of triads retained throughout to show **PL**/**LP** cycles.

Figure 11.6 uses the triads of the zero-sum **PL** cycle as right-hand voicings for a functionally-tonal harmonic progression—I, V/V, V, ♭VI.[13] This same

[13] The left side of each diagram shows voicings with roots in the lower register. The right side of each diagram shows voicings more appropriate for settings where a bassist is present (though are also used in settings without bassists). Jazz voice-leading is seldom discussed in the literature. But parallel or upwardly resolving sevenths seem fairly common to me, as they occur in left-hand shell voicings ({1,7} or {1,3}). I have, in any case, followed my ears in writing these examples, and worked within the strict limitations of the zero-sum cycles appearing in the right hand.

progression is then realized beneath using the **LP** cycle instead. The progression works with both the **PL** and **LP** cycles (with some minor differences in the extensions/alterations). While the resolution to ♭VI is not particularly common in jazz, the triadic voicings employed in the example are idiomatic and contain a wide range of extensions and alterations.[14]

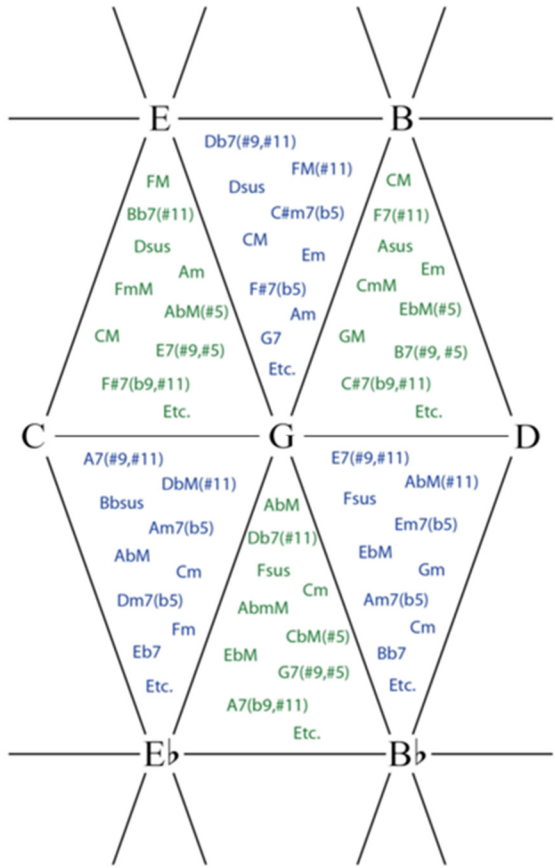


Figure 11.7. A *Tonnetz* showing several harmonic possibilities for each triad.

[14] Levine's US ♭VI or US VI are used for most of the dominant harmonies, and these upper structures are two out of three that he identifies as being "by far the most frequently played," out of a total of nine dominant upper structures (1989, p. 110). (Levine only uses this notation for dominant harmonies.)

Figure 11.7 provides another illustration of how NRO's may be leveraged by modeling voicings. A portion of a *Tonnetz* is shown where triads are considered as (partial) voicings, with several different harmonic possibilities indicated for each. One is free to construct harmonic progressions according to whatever criteria is desired—for example, that of functional tonality—but also has the option of superimposing transformations above them, as modeled here.

4. Voicings using seventh-chord shapes

I will now extend the above discussion to seventh chords, again demonstrating how familiar shapes with their own voice-leading logic may be superimposed to create idiomatic voicings that are applicable to a wide range of contexts.[15] Figure 11.8 shows a non-iterative master sequence of all seventh chords which stack major or minor thirds. (The chords do not contain augmented or diminished thirds.) There are seven types in total, and they have been arranged in order of sharps to flats, with -1 voice-leading throughout, adding one flat or subtracting one sharp with each new chord. The two chords in parentheses are mutually exclusive in terms of the -1 voice-leading. (The master sequence thus has two forms.)

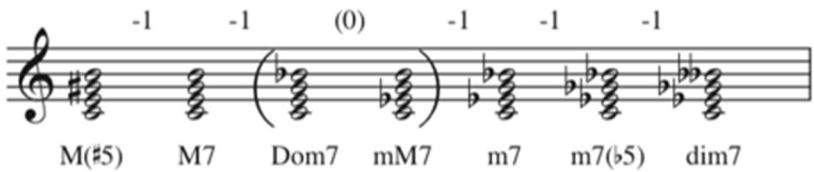


Figure 11.8. A master sequence of all seventh chords which stack major and minor thirds, arranged in order of sharps and flats, with -1 voice-leading throughout. Accidentals apply only to individual chords. The two chords in parentheses are mutually exclusive in terms of the -1 voice-leading.

In order to demonstrate the flexibility afforded by my approach, I will again limit myself to generating functionally-tonal progressions. Most types of sequences in the Western classical and jazz idioms occur in groups of two,

[15] The ideas in this section of the paper are not necessarily drawn from transformational theory, but are inspired by that area of inquiry. Transformations of seventh chord shapes are used in the final section of this paper (Counterpoint with Shapes: A Hypothetical Jam Session).

whether they are described as linear intervallic patterns (e.g., 10-7 or 8-5) or as harmonic sequences (e.g., D4/A2 or D5/A4).[16] The seventh chords shown in Figure 11.8 may be formed into sequences that are structured similarly. Such two-chord sequences are facilitated by the use of -2 voice-leading. Figure 11.9 shows all six of the possible two-chord, root position, -2 voice-leading sequences that can be formed by skipping one chord in the master sequence. (Other sequences could be formed by using inversions of the seventh chords.) The left side of each diagram gives the qualities of the seventh chords themselves, and illustrates how the -2 voice-leading produces an overall T_{-1} sequence. (The -2/-2 voice-leading of each iteration of the sequence adds to -4, creating the overall stepwise descent since the cardinality of the voicings is also four and the voice-leading motion is distributed evenly among the voices.)

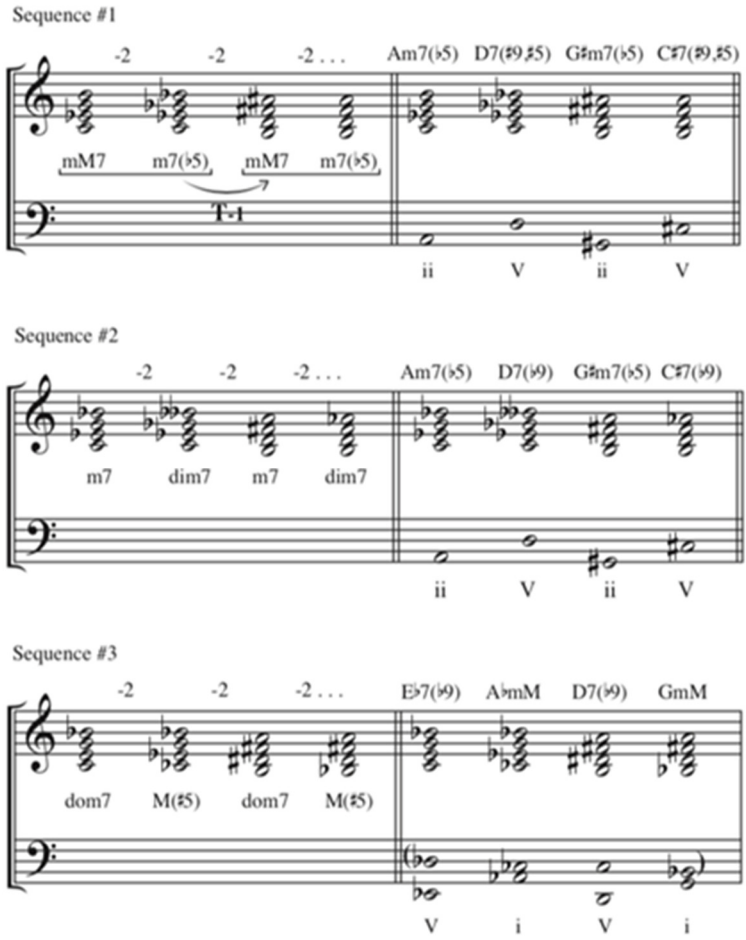
Each -2 sequence is then treated as an abstract, parent sequence (as with the PL/LP cycles) from which new sequences may be generated. The right side of each diagram presents one of several possible new sequences, using the seventh chord shapes as voicings for different harmonies. The new sequences are all functionally tonal, beginning with predominant-dominant progressions (sequences ♯1–3), then moving to dominant-tonic progressions (sequences ♯4–5), and finally to a plagal progression (sequence ♯6). The spelling of the seventh-chord shapes in the new sequences is retained for ease of comparison with the parent sequences, although this results in some unusual enharmonic spellings.[17]

I do not mean to suggest that all of these exact sequences are played regularly by jazz musicians. However, sequences ♯1 and ♯2 are standard and

[16] See Salley and Shanahan (2016), Strunk (1996), and Larson (1998) for more information on linear intervallic patterns in jazz.

[17] Set-class 0148 is labeled in Sequence ♯5 because Waters and Williams (2010) originated as Waters (2004), a conference paper entitled "Riffing on [0148]: Maj7♯5, the *Tonnetz*, and Hexatonic and Acoustic Systems," and 0148 ninth-chord supersets are one focus of the article that followed. This emphasis on a particular tetrachord is significant, and I agree that the 0148 tetrachord figures prominently in post-1960 jazz harmony as ninth chord subsets. However, I also believe that it figures prominently in jazz voicings, irrespective of the underlying harmony. 0148 and its inversions (both Fortean and chordal) are attractive shapes to work with, for a number of reasons. Waters is no doubt aware of the significance of 0148 voicings as well, as indicated (for example) by his Example 7c (2005, p. 342), and because he is an accomplished jazz pianist. (A similar diagram appears in a pedagogical context in Levine (1995, p. 73).)

can be found in pedagogical works.[18] For the other sequences, the individual voicings themselves are generally quite idiomatic, as are most of the harmonic progressions. My point, in any case, is that while the harmony in these new sequences is governed by traditional tonal syntax, the voicings are organized according to a voice-leading logic that is separate from tonal syntax and that has been modeled in isolation from the chord roots.



[18] For example, see Gillespie (2000, p. 48).

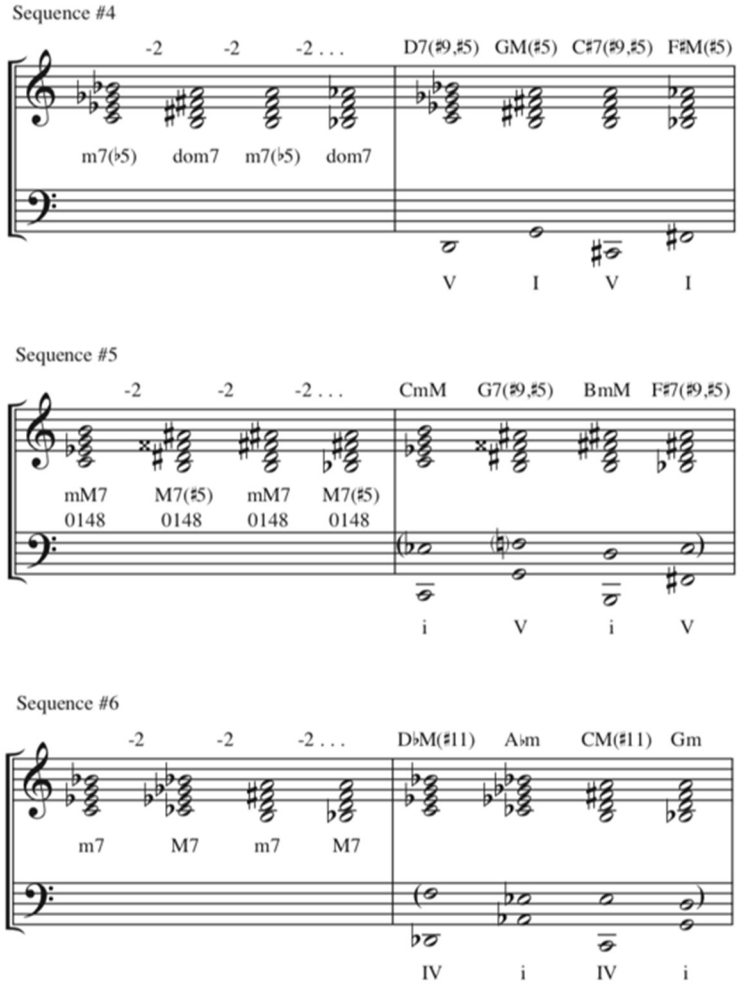


Figure 11.9. The six two-chord, -2 voice-leading sequences, with one of many possible derivative sequences shown on the right. Accidentals apply only to individual chords.

5. Voicings using ninth-chord shapes

Ninth-chord shapes, like triad shapes and seventh-chord shapes, may be featured in voicings for many different harmonies. Here I will depart from functionally-tonal progressions, presenting something more in the vein of Pat Metheny. My purpose again is to illustrate the range of possibilities facilitated by this approach.

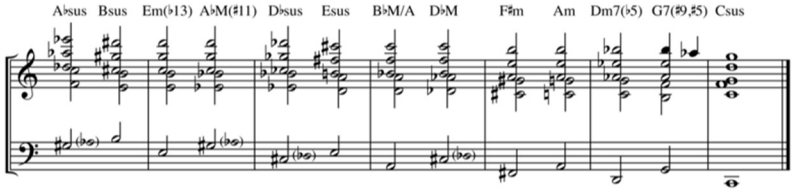


Figure 11.10. The M9 (drop2&4) and m9 (drop2&4) shapes used as voicings for many different harmonies. Alternating between the two shapes (upper staff) creates a chromatically-descending P/P' sequence (until the G7 chord). The roots cycle diatonically through the D3(D5/A3) sequence used chromatically in Coltrane changes and in "Giant Steps" (again until the G7 chord). Each voicing presented is distinct – there are no duplications.

Figure 11.10 deals with ninth-chord shapes and presents another homage to Coltrane and the peculiar logic of "Giant Steps."[19] In the upper staff, the thirds and sevenths of ninth-chord shapes have been lowered an octave to create idiomatic M9 (drop2&4) and m9 (drop2&4) shapes.[20] Alternating between these two shapes (upper staff) creates a chromatically-descending **P/P'** sequence (detailed below in Figure 11.11) until the G7(♯9,♯5) harmony at the cadence. (**P'** is defined in Waters and Williams (2010, paragraphs 7.1–7.3).[21]) The drop2&4 shapes also make the common tones easy to perceive, and the example has been stemmed to illustrate the voice-leading as well. (The upper and lower stems alternate common tones with chromatic descent.) The roots cycle *diatonically* through the D3(D5/A3) sequence used chromatically in "Giant Steps" (and in Coltrane changes generally), again until the G7(♯9,♯5) harmony.[22]

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[19] The first homage is the composition "Dual Duel," which appears in Pellegrin (2020). In addition, superimposed realizations of "Giant Steps" are presented in Pellegrin (2022).

[20] Drop2&4 voicings are formed by dropping the second and fourth voices from the top of a closed-position voicing down an octave.

[21] Waters and Williams derive the ***P'*** operation for ninth chords from Morris (1998). See Strunk (2003, pp. 48–49) for a different rendering of the ***P*** operation for ninth chords. Callender (2007) defines a *Slide* operation derived from Lewin [1987] (2007) for use with extended harmonic structures. This transformation moves one of the stacks of fifths of a "tall chord"—two "indefinitely large stacks of fifths" separated by a major or minor third—down by semitone (pp. 45–47). The $ic_{3/4}$ cyclic slides discussed in Baker (2019) are closely related to Callender's *Slide*. McClimon (2017) defines a $SLIDE_7$ operation, also derived from Lewin [1987] (2007); this is equivalent to one direction of Waters and Williams's ***P'*** operation, without the ninths (paragraph 2.6).

[22] In the B♭M/A chord, "root" may not be a completely accurate descriptor for the bass note. However, it should be observed that more extended harmonies are less possible to

Sharps are used consistently, in accordance with the diatonic nature of the sequence; enharmonic equivalents are shown parenthetically. Counterpointing the **P/P'** chromatic sequence with this diatonic sequence facilitates the continuous presentation of distinct voicings—there are no duplications in this example.[23]

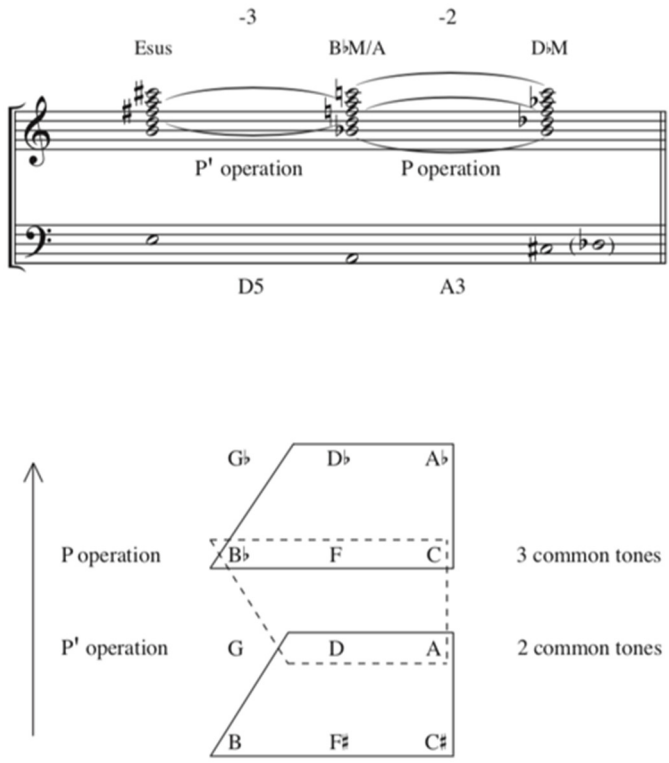

Figure 11.11. Above: three chords from Figure 11.10, showing the **P** and **P'** operations and their attendant common tones with ties. The drop 2&4 voicings have been restored to stacks of thirds for simplicity. The -3/-2 cardinality of the voicings is now 5. Below: the three ninth-chord shapes plotted as trapezoids on an extended diatonic portion of Waters and Williams's *Tonnetz*, illustrating the P and P' operations as reflections (2010, 7.1-7.3). The two-note portion of each trapezoid contains the two notes lowered an octave in the drop2&4 voicings.

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invert. (If a thirteenth chord is "inverted" it simply becomes a thirteenth chord with a different root.) Thus, the bass in jazz frequently defines the root of the harmony.

[23] The parallel octaves at the cadence arise from using the idiomatic ♯9-♭9 quarter-note resolution into the tonic, and I prefer the sus sound here (with no seventh or added sixth).

Figure 11.11 examines three voicings from Figure 11.15. (The three voicings were chosen merely for simplicity, aiming to avoid enharmonic spellings.) The upper part of the diagram shows the **P** and **P'** operations and their attendant common tones (the latter with ties); the drop2&4 voicings have been restored to stacks of thirds, again for simplicity. The -3/-2 voice-leading adds to -5, creating the chromatic sequence since the cardinality of the voicings is now five. In the bottom half of the diagram, the three ninth-chord shapes have been plotted as trapezoids on an extended diatonic portion of Waters and Williams's *Tonnetz*, illustrating the **P** and **P'** operations as reflections (2010, paragraphs 7.1–7.3). (The upper row of their Example 8, which is a three-dimensional hyper-acoustic row, has been replaced here with an additional two-dimensional diatonic row. The bottom row has also been omitted, thus creating a strictly diatonic *Tonnetz*.) The two-note portion of each trapezoid contains the two notes lowered an octave in the drop2&4 voicings.

Waters and Williams note that *Tonnetze* (including their own) are limited by consistently treating harmonies as stacks of thirds (paragraph 9.3). How, then, does the notion of stacked thirds apply to the drop2&4 voicings employed above? In the drop 2&4 voicings, the parsimonious voice-leading of these stacked-thirds ninths chords is retained; the constituent voices have merely been rearranged. This occurs in triadic neo-Riemannian contexts as well, where parsimonious voice-leading is often facilitated by the use of chord inversions. These chord inversions, in the language of jazz, constitute different voicings of stacked-thirds models. For example, in the **PL** and **LP** cycles used above (Figure 11.4), the chord inversion (i.e., root position, first inversion, and second inversion) must change throughout in order for the zero-sum voice-leading to be preserved.

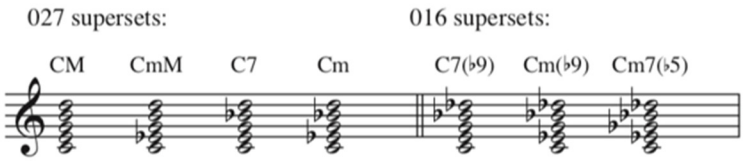

Figure 11.12. Ninth chords containing 027 and 016 trichords. Accidentals apply only to individual chords.

The fact that voicings may be rearranged opens up additional possibilities for the approach I have taken above. For example, none of the shapes I have dealt with thus far contain the significant 016 trichord. However, the 016 trichord is a subset of three different ninth chords (see Figure 11.12). The 027

trichord also appears frequently in jazz voicings, especially as a stack of fourths. I have not shown such voicings in any diagrams thus far, although stacks of fifths are used in Figure 11.10. The 027 trichord is a subset of four different ninth chords, as also shown in Figure 11.12.

Figure 11.13 (a) shows one of three ninth chords that contain 016 trichord. At (b), the pitch-classes of the chord at (a) have been rearranged so that the 016 trichord occurs in its most common shape. Part (c) of the diagram shows an idiomatic shape shown from (b), which is commonly used as a voicing for eight different octatonic harmonies. (The alterations associated with these octatonic harmonies have been omitted for simplicity.)

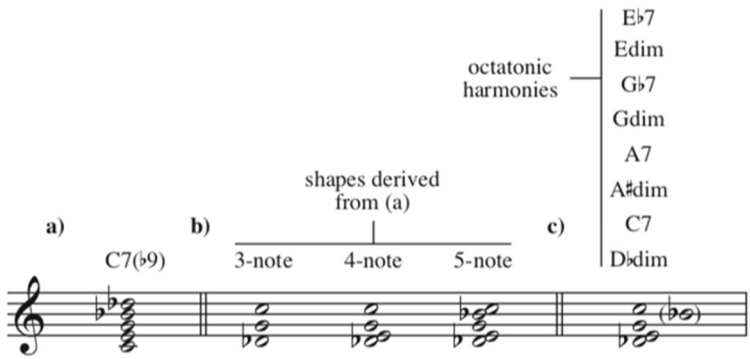

Figure 11.13. (a) One of three ninth chords which contains an 016 trichord. (b) The pitch-classes of the chord at (a) rearranged so that the 016 trichord occurs in its most common shape. (c) This idiomatic shape from (b) is commonly used as a voicing for eight different octatonic harmonies (octatonic alterations omitted for simplicity).

Figure 11.14 (a) shows one of four ninth chords which contain an 027 trichord. At (b), the pitch classes of the chord at (a) have been rearranged so that the 027 trichord occurs consecutively as a stack of fourths. The four-note chord is a subset of the highly idiomatic, five-note "So What" voicing.[24] Part (c) of the diagram shows how the five-note chord from (b) may be used as a voicing for eight different harmonies.[25] The asterisked harmony (Bm7(♭5)), while missing its fifth and seventh, nevertheless functions well as a supertonic

[24] For more on "So What" voicings, see Levine (1989, chapter 12) and Waters (2005, p. 336).
[25] For the five-note chord, it might be more typical to place the E and B above the stack of fourths, but I like the sound of the voicing as given, with the "bite" of the minor-ninth interval. (The same harmonies may be used with it either way.)

chord in minor. (Some stock voicings do not contain their thirds or sevenths, such as the 7-9-♯11-13 voicing for a dominant chord or the 3-5-6-9 voicing for a minor chord.)

6. "Hearing the changes"

As mentioned above, neo-Riemannian theory models the parsimonious voice-leading of chords that may be arranged as stacks of thirds, but which may appear differently in actual music, and even in theoretical models—as in **PL**/**LP** cycles.[26] When parsimonious voice-leading does not appear on the surface of the music, it is the underlying voice-leading that is modeled by transformational theory. (Stated another way, parsimonious voice-leading may appear in pitch-class space but not in pitch space. In such cases, our observations assume idealized voice-leading.)[27]

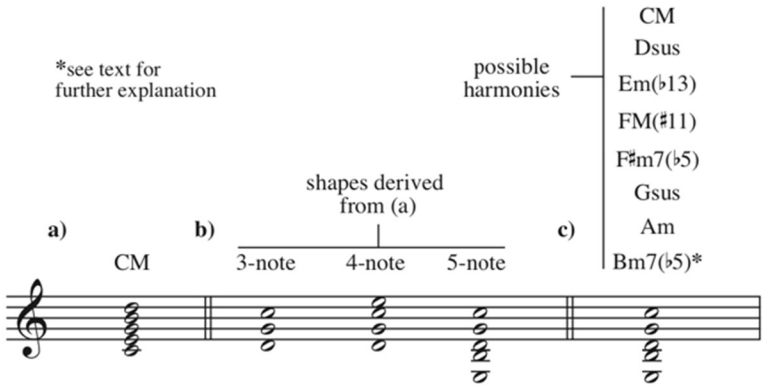

Figure 11.14. (a) One of four ninth chords which contains an 027 trichord. (b) The pitch-classes of the chord at (a) rearranged so that the 027 trichord occurs consecutively as a stack of fourths. (c) This shape from (b) may be used as a voicing for eight different harmonies.

The above remarks apply to both Western classical and jazz repertories, but in somewhat different ways. In the opening example of Cohn (1996), a passage from the Brahms double concerto, the surface of the music itself

[26] In other words, Neo-Riemannian theory models triads, seventh chords, and ninth chords in root position or in inversion. It does not model any other trichords, tetrachords, or pentachords.

[27] See Cohn (2012, p. 6) for more.

cycles around the Northern hexatonic system with maximally-smooth voice-leading (pp. 13–15). However, in the "Resurrection" and second *Parsifal* examples, the surface of the music does not employ maximally-smooth voice-leading (pp. 22–23).

In addition to non-parsimonious voice-leading, the surface of the music may include melody, embellishing tones, counterpoint, texture, registral extremes, and so forth. It is a foreground-level reductive process that transforms the music itself into a maximally-smooth, closed-position, triadic progression. When we listen in this way, we must hear beyond the salient surface to the underlying structure.

A similar process occurs in jazz—particularly during performances of originals and of the head—although jazz harmony is usually more extended.[28] Waters and Williams (2010) focuses on the opening progression of Wayne Shorter's composition "Vonetta."[29] The excerpt they provide (and "Vonetta" in general) is complex. Even the opening harmony, indicated as "Cmin9," stands in naked contrast to the sustained melodic tone occupying nearly the entire measure, C♯, and this melodic tone is neither treated nor resolved as a non-chord tone.[30] In addition, the C♯ creates a four-note chromatic cluster: C (root), C♯ (melody), D (ninth), E♭ (third).[31] Waters and Williams note that "the progression of the six chords seems to resist standard tonal interpretation. The motions through the *Tonnetz* do show something of the harmonic logic of the progression, however" (paragraph 5.2).

Yet, before we can understand the logic of the chord changes, we first have to "hear the changes," as jazz musicians say (or, in this case, hear them in the idealized form of stacked-thirds ninth chords). This can be challenging, even during the head (as in "Vonetta"), but is especially so after the head has been

[28] Extended harmonies (harmonies containing extensions or alterations) do of course occur in Western classical music of the nineteenth (and eighteenth) century, but far less frequently than in jazz.

[29] "Vonetta" appears on Miles Davis's album *Sorcerer*, Columbia CS 9532 (1967, recorded 1962 and 1967).

[30] If the F♯ is ignored, the C♯ could potentially be considered as an unprepared (since it opens the tune), upwardly resolving suspension, with a change of bass. This analysis also rests to some extent on considering the D♯ of the next measure as a chord tone, which is possible if Shorter's chord symbol is understood as a shorthand for a hexatonic harmony.

[31] Waters and Williams consulted Shorter's copyright deposit at the Library of Congress and transcribed the excerpt (and the corresponding measures in other choruses) to arrive at the harmonies they indicate (see 5.1). See Waters (2011, pp. 175–82) for extensive transcriptions and analysis of "Vonetta."

presented. After the head, mainstream jazz begins to operate in different fashion than music in the Western classical idiom generally does.[32] (In the case of standards, liberties may already be taken with the head.)[33] In jazz, the (hyper)metric, harmonic, and sometimes the melodic structure of the head—i.e., "the form," as jazz musicians often refer to it—typically recurs continuously during the improvised solos, creating an additional layer of stability and normativity.[34] The head of "Vonetta," as complex as it is, becomes the stable norm over which the solos and accompaniment are then superimposed.[35]

7. Counterpoint with shapes: a hypothetical jam session

Pianists (and others) often like to "noodle"—to experiment freely with different harmonies, voicings, and melodic ideas, without thinking of any particular composition or predetermined harmonic progression. Sometimes they do so with roots, using voicings more typical of solo piano, and sometimes they do so without roots (i.e., without necessarily knowing or deciding what the root is),

[32] Some parallels between the two idioms are discussed in Pellegrin (2016).

[33] Liberties are often taken with originals as well, but it may be more difficult for a listener to know when this is taking place, since the composition is not previously familiar. There is also the question of what specifically constitutes the composition: 1) a lead sheet copyrighted by the composer (problematic because it is often unknown what written music, if any, musicians had in front of them at a given recording session); 2) a note-for-note transcription of a canonical recording (problematic since alternate takes and live recordings generally differ greatly in many respects); or 3) a lead-sheet style transcription of the recording. The last option may seem reasonable, but can also be problematic. For example, in his work with the second classic quintet of Miles Davis, bassist Ron Carter sometimes plays just the seventh in the bass, even during the head, and sometimes even plays the "wrong" seventh, apparently with intention. Miles Davis has stated, "Ron would start playing major sevenths in the bass and he and Herbie [Hancock] would lock that up and Tony [Williams] would dig it and you know Wayne [Shorter] and I dug it, too" (1990, p. 276). This quotation somewhat implies that Hancock would play major sevenths to match Carter's sevenths, but I have found instances where Hancock's and Carter's sevenths are not consistent (which could certainly still be intentional on the part of one or both players).

[34] Michaelsen's (2018) concept of chord-scales is again useful as we consider what constitutes the form; he speaks of them as being "abstract potential macroharmonies" (p. 137).

[35] See Pellegrin (2022) for a full presentation of my Stable Norms, Salient Deviations (SNSD) model. In the case of standards, or other well-known jazz tunes, the head is often not presented straightforwardly, and may even be omitted. Before the advent of the long-playing record, this was sometimes done to save time, as the tunes were so well-known by the public that they were recognizable even when the theme was only referenced subtly during improvisation.

using voicings more typical of playing with a bassist. Sometimes they do the latter sort of noodling at jam sessions, and bassists add roots to their rootless voicings.

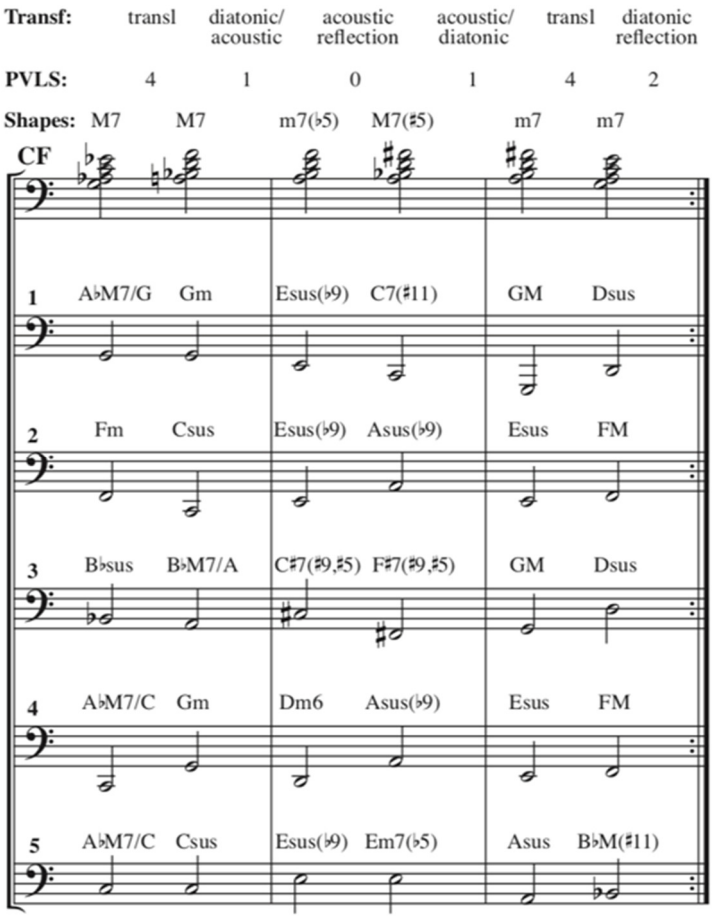

Figure 11.15. In the top stave, a cantus firmus of left-hand shapes which progress via transformations from Waters and Williams's Example 10. Parsimonious voice-leading sums (PVLS) are provided for each transformation. Beneath the top stave are five contrasting counterpoints against the cantus firmus, creating new harmonic progressions.

Suppose a keyboardist shows up at a jam session and begins playing the left-hand voicings shown in the top stave of Figure 11.15. These left-hand voicings are all four-note chords and consist of fairly simple shapes with stepwise voice-leading. More specifically, they are seventh-chords that progress via acoustic reflection, diatonic reflection, acoustic-diatonic dialogue, and translation.

These transformations are all drawn from Waters and Williams's interactive Example 10, shown here as Figure 11.16, and have been adapted for this diagram by eliminating the ninths (paragraph 8.1).[36] (Waters and Williams do not specifically name these transformations, but the names I have used are based closely on their work.)[37] Parsimonious voice-leading sums (PVLS) are provided for each transformation, illustrating the small amount of voice-leading work required for each.[38]

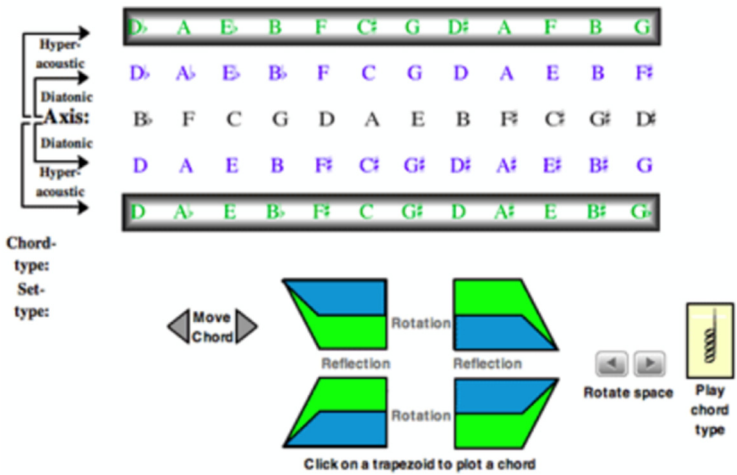

Figure 11.16. Waters and Williams (2010), Example 10: diatonic and acoustic harmonies.

[36] Waters and Williams's rotation operations (diatonic and acoustic) are not used in my example because they cannot be adapted to seventh chords. I chose seventh chords as opposed to ninth chords for these left-hand voicings for clarity.

[37] For example, Waters and Williams do not use the term "acoustic reflection," but they do refer to "acoustic harmonies" and "reflection" in the text. Acoustic reflection occurs when an acoustic harmony—a green trapezoid in their diagram—is reflected by toggling to the green trapezoid above or below.

[38] Santa's PVLS (2003, pp. 15–16) is a variation of Cohn's (1998, pp. 285–87) directed voice-leading sums (DVLS). Voice-leading is idealized when using either. PVLS uses directed pitch intervals to measure the most efficient voice-leading between two chords, then takes the absolute value of the result (i.e., converting any negative results to positive). PVLS indicates how much total motion in one direction is required to move between two chords, but does not specify the direction of the motion. (Component motions are directed, "canceling out" contrary motion, but the overall motion is undirected.) PVLS are distinct from Cohn's (1998, pp. 283–84) "voice-leading efficiency" (VLE), Straus's (2003, pp. 321–22) "total displacement," and Rings's (2011a, p. 490) absolute voice-leading sums (AVLS).

Table 11.1 provides specific instructions for how to map the path of these voicings on Waters and Williams's three-dimensional *Tonnetz*. All motions consist of a single transformation, and are thus modeled with just one click on an adjacent trapezoid (although the translations require two clicks in order to move by whole step).[39] The opening instruction has two steps but simply helps the reader locate the initial trapezoid.

	Voicing	Transformation	PVLS	Instructions for progressing through W/W Example 10
1	AbM7	(opening position)		click the upper-left blue trapezoid; "move chord" once to the right
2	BbM7	translation	4	"move chord" twice to the right
3	Bm7(b5)	diatonic-acoustic dialogue	1	click the upper-left green trapezoid
4	BbM7(#5)	acoustic reflection	0	click the lower-left green trapezoid
5	Bm7	acoustic-diatonic dialogue	1	click the lower-left blue trapezoid
6	Am7	translation	4	"move chord" twice to the left
(1)	AbM7 (repeat)	diatonic reflection	2	click the upper-left blue trapezoid

Table 11.1. Parameters for the cantus firmus of left-hand voicings in Figure 11.15 (top stave), and instructions for how to plot the progression on Example 10 of Waters and Williams (2010).

In response to the keyboardist, a bassist will seek to counterpoint the voicings as convincingly as possible, and has many options for doing so. Below the cantus firmus of shapes in the top staff of Figure 11.15, five contrasting counterpoints (numbered) are shown, along with the harmonic progressions that are created. The first features tonal root motions (and

[39] The lower-left blue trapezoid is adjacent to the upper-left blue trapezoid because the green trapezoids, which seemingly intervene, engage the third dimension.

somewhat tonal harmonies); the second contains a profusion of sus chords, each using a different shape for the voicing; the third consists of ic1, ic4, and ic5, each occurring twice; the fourth sequences continuously through ascending fifths, except for one-half step; and the fifth is fairly static. There are many other possibilities as well.[40]

8. Conclusion

In the "Vonetta" example above, we saw that Waters and Williams aimed to demonstrate how "the motions through the *Tonnetz* do show something of the harmonic logic of the progression." The main purpose of the hypothetical jam session I have presented is to demonstrate that while musical logic sometimes resides in the harmonies of jazz, sometimes it resides in the voicings instead. The balance of stability and salience in jazz constantly shifts according to numerous factors. Because of the dynamicity created by this shifting, it is advantageous to be able to model both harmonies and voicings, which function in tandem, as doing so enables us to render a more detailed and accurate picture of this repertoire, one that more closely models practice.

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[40] In genuine "time, no changes" solos where there are no chord progressions—although the listener may not be aware that this is the case—a situation like the sample jam session of Example 11.18 may apply, with Carter searching for a counterpoint to Hancock's often rootless voicings during his solos (and vice versa), but with no repetitions of the voicings from which to work. This may be partly why Hancock chooses not to play many chords during such solos.

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