# Beyond borders : broadening the artistic palette of (composing) improvisers in jazz

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# 4. IMPROVISING WITH THE TONE CLOCK

## 4.1 Introduction: tonal and twelve-tone music

In the previous chapter, a variety of methods, implicitly or explicitly related to twelve-tone techniques, as alternatives to traditional chord-scale improvisation, were discussed. They were taken from publications by saxophonists who combine their practices as composing improvisers with their careers as leading jazz educators. After summarizing their systems and comparing their theories and practical applications, I discussed a number of applications of some of them to my own musical practices.

In this chapter I will summarize Peter Schat's Tone Clock in theory and in practice. Examples of Tone Clock application in jazz practices will be discussed using compositions by bassist Theo Hoogstins, pianist Frank Carlberg, and alto saxophonist John O'Gallagher. After the analyses of relevant fragments from their compositions and improvisations, I will discuss three movements of my saxophone quartet "Carillon", each of which is based on a distinct hour of the Tone Clock. The penultimate section of this chapter will display possible ways of constructing improvisational patterns with Tone Clock trichords as an alternative and addition to existing improvisational idioms.

The application of the twelve-tone system in this study is largely determined by my own search for a musical space that could serve as an alternative to my existing diatonic practices as a composing improviser. In section 1.4.4 I expressed certain dissatisfaction with my arrangements and improvisations, and a need for innovative harmonic issues as alternatives to my continuously filling in and ornamenting of existing forms within the tonal system. Inspired by Dutch bassist and composer Theo Hoogstin's article "Peter Schat's Tone Clock in Jazz and Improvised Music" I ended up experimenting with Schat's compositional model that pretended to bridge the tonal and twelve-tone systems.

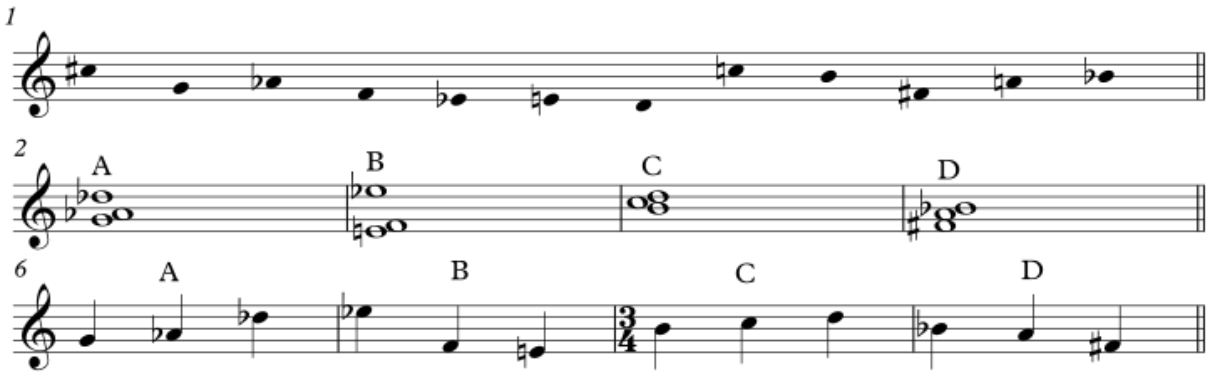
Before discussing Schat's Tone Clock, I look back to *Simple Composition* (1994) by composer and theorist Charles Wuorinen introduced in section 3.2.3. In the context of my experiences with the Tone Clock, an important element in Wuorinen's publication is his summary of both the differences and the similarities between tonal and twelve-tone music. According to Wuorinen, and put in its most simple way, tonality can be identified in terms of "content" and twelve-tone in terms of "order". That is, in tonal music the content of pitches and intervals is determined by their functions in the diatonic scale and its implied triads. We are able to identify such content as "the tonic", or "the root of the triad" independently, regardless of where the note or the interval appears in the melodic line, what register it is played in, or in whatever inversion of the chord. Contrarily, in

twelve-tone music the fundamental structure of the tone row is identified by the order of the pitches and their connecting intervals. The pitches do not have any functional content, and do not dominate each other. Only the order of the pitches and their connecting intervals identify the fundamental structure of a tone row.

Wuorinen explains how, both in the decades before the introduction of the twelve-tone system by the Austrian composer Joseph Matthias Hauer in 1920, and during its development until 1994, the two systems showed a number of similarities. Wuorinen uses the solemn term "reconciliation" to express these shared elements. Twelve-tone music can be seen as resulting from the evolution of the tonal system during the nineteenth century. New tones were added to the basic triads, resulting in extended chords that were hard to identify in terms of functional content. And by means of increasing melodic counterpoint, for instance in the music of Wagner, Stravinsky and the "freely" chromatic music by Schoenberg before he launched his 12-tone system, the amount of unresolved chromatic notes increased. So one could say that in the history of the development of Western classical music the two systems were intermingled before Arnold Schoenberg developed the idea of twelve-tone sets as a source for both the melodic and the harmonic material in a composition.

As to present-day practice, Wuorinen observes a blend of basic operations of twelve-tone composing, such as the derived tone row, the basic operations of transposition, inversion and retrogression of pitch successions, and the expansion of pitch successions to twelve-tone sets by adding other notes with tonal elements. The "reconciliation" results from the re-introduction of principles of pitch organization derived from interval content in small segments of twelve-tone sets, for instance trichords or tetrachords. By their small sizes these segments can be perceived as content groups rather than as rigidly ordered pitch successions (Wuorinen 1994: 21).

Wuorinen gives the following example as an illustration. The first line is a twelve-tone row in a strictly ordered succession. In bar 2 this line is divided into four groups of three notes. They are randomly arranged in vertical order. In the third line the notes of each group are internally re-ordered at pleasure, which in this case means in alternating ascending and descending directions.




[ex 4.1.1]

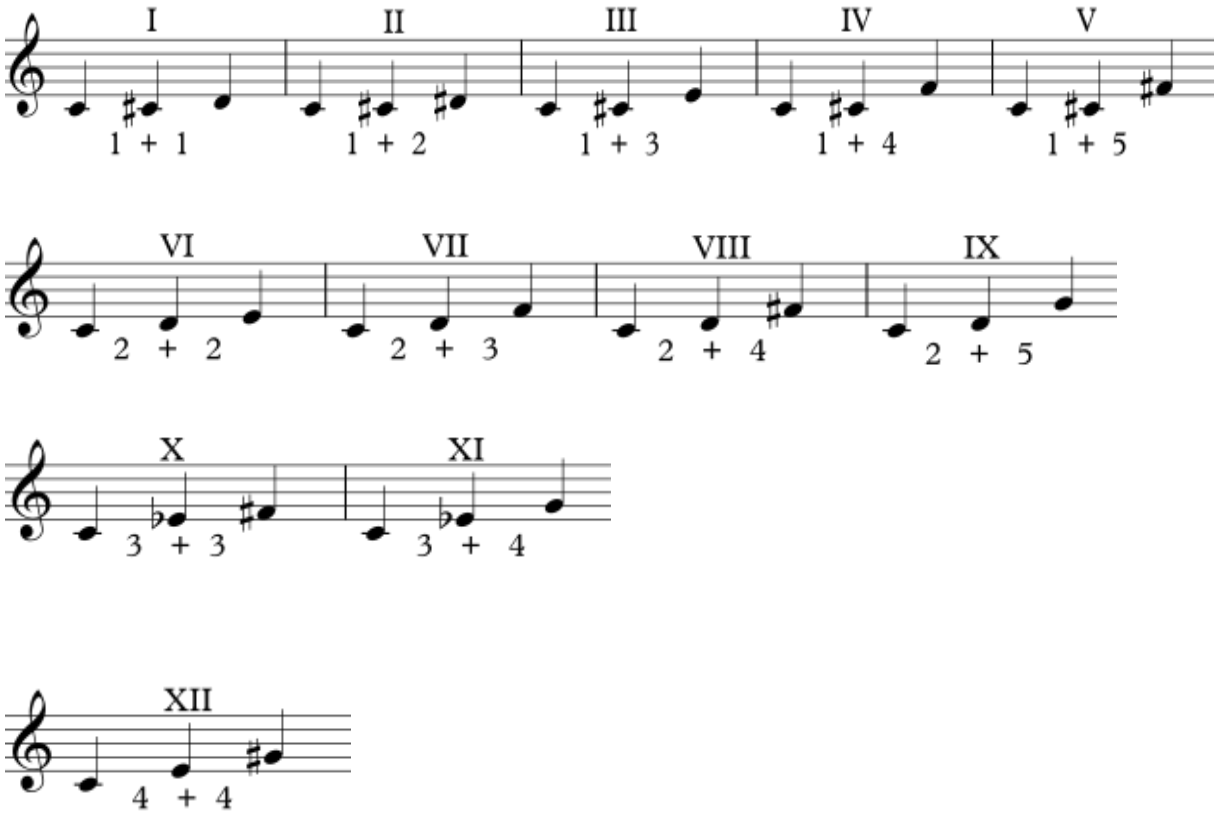
According to Wuorinen, the critical response to twelve-tone music is mainly due to its numerical notation allowing composers to translate the basic twelve-tone operations discussed above into arithmetic operations that could be applied to (segments of) the twelve-tone sets. In section 4.3.1, this will be illustrated by Schat's ferocious criticism on the numeric aspect of twelve-tone music.

### 4.2 Peter Schat's Tone Clock

Schat introduced the Tone Clock as "a tool for scanning the relations between the different notes of our tone-system" (Schat 1993: 57). With this definition, he intended to include both parts: the tonal system in which every pitch has its proper content at one side, and the twelve-tone system in which the order and the intervallic structure are the main elements of determination at the other.

At the core of what he calls his "system of pitch organization" is his inventory of twelve possible "triads" that can be combined in order to let all twelve pitches of the octave sound. He called each of these "triads" a "tonality" and marked them with the Roman numerals of the hours of the clock. To avoid confusion with traditional functional harmony, his term "triad" in this study is changed into the term "trichord", in accordance with conventional twelve-tone terminology. For the same reason, the term "tonal color" is used instead of his term "tonality" to characterize the distinct sounds of the twelve trichords.

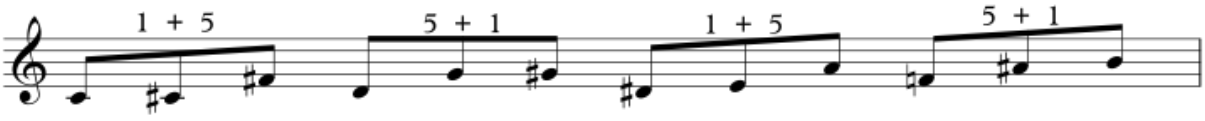
Below are the twelve hours of his Tone Clock, marked by Roman numerals above the staff. The numbers connected with a plus sign under the staff refer to the number of semitones between the pitches.




[ex 4.2.1]

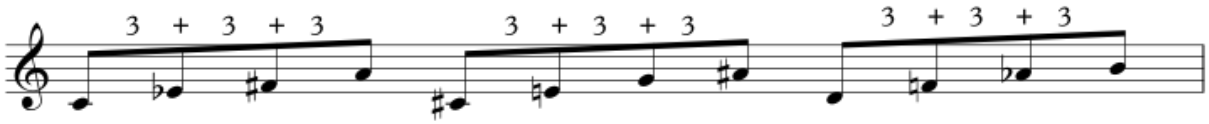
Schat could limit the number of possible trichords to a total of twelve by applying two rules. The first is: trichords containing similar intervals but in different order belong to the same Tone Clock hour. For instance, the trichords 1+5 and 5+1 in the example below both belong to the fifth hour. As a consequence of this rule, a succession of trichords from the same hour, but in different orders will be named by the trichord with the smallest interval first.

By alternating the order of the intervals in the trichords, Schat managed to derive twelve-tone rows with four trichords from the same Tone Clock hour. The next example shows his derivation of the row of the fifth hour. Of the four trichords in the twelve-tone row below, the first and the third are put in the order 1+5. The second and the fourth trichord are put in the order 5+1. Together they form a twelve-tone row.



[ex 4.2.2]

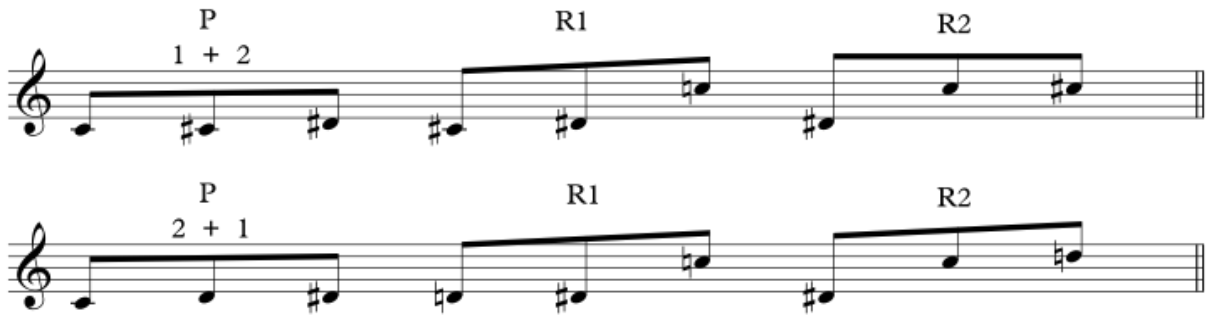
The only exception is the tenth hour, representing the diminished trichord 3+3. This is displayed as three tetrachords, because it is impossible to include all twelve notes with four 3+3 trichords.




[ex 4.2.3]

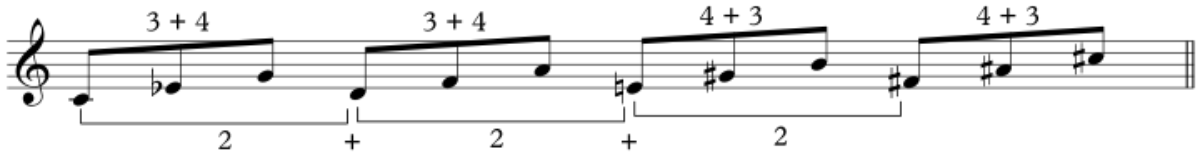
For his second rule to limit the number of possible trichords, Schat defined trichords containing an interval larger than 5 semitones (a perfect fourth) as an inversion of a smaller trichord. For example, the 1+6 trichord c–c$^{\#}$–g is regarded as the first inversion of the 5+1 trichord g–c–c$^{\#}$ and therefore belongs to the fifth hour. Likewise, the 2+6 trichord c–d–g$^{\#}$ belongs to the eighth hour as the first inversion of the 4+2 trichord g$^{\#}$–c–d. As another example, the 8+3 trichord c–g$^{\#}$–b should be regarded as the second inversion of the 3+1 trichord g$^{\#}$–b–c and therefore belongs to the third hour. Trichords with two intervals larger than a perfect fourth should also be regarded as inversions of trichords of these intervals in their smallest form. For instance, the trichord in wide voicing g–f$^{\#}$–c should be reduced to the first inversion of the 1+5 trichord f$^{\#}$–g–c, with the note c in octave displacement.

The Tone Clock hours I, VI, X and XII are symmetrical, which means that the intervallic structure of the inversions of their trichord types is the same as that of their prime forms. The hours II, III, IV, V, VII, VIII, IX and XI are non-symmetrical, which means that their types of trichords can be put in three different positions: prime form, first and second inversion. In accordance with the conventional twelve-tone terminology, the term "inversion" in this study is replaced by "rotation". The next example shows the prime form (P), the first (R1) and the second rotation (R2) of trichords 1+2 and 2+1 from the second hour.



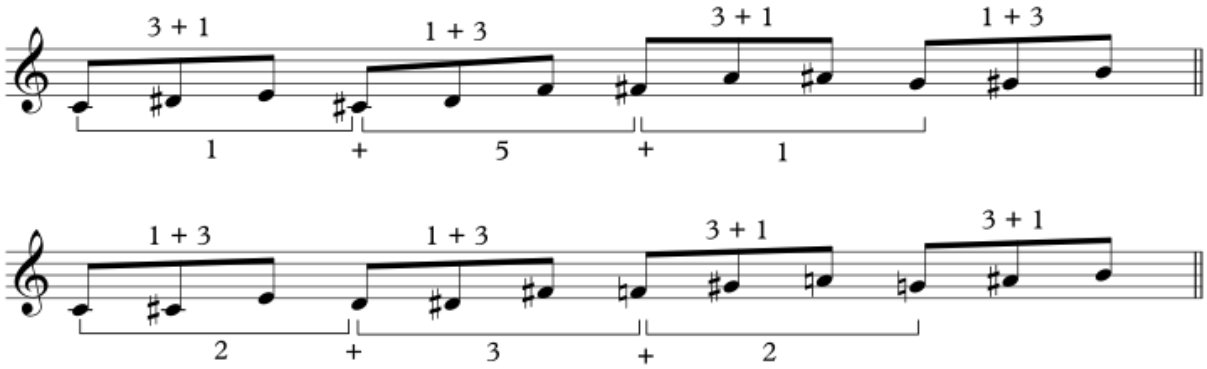
[ex 4.2.4]

Another principle of the Tone Clock is that every hour is "steered" by at least one trichord that belongs to another hour. For instance, the following example shows a twelve-tone row in which the 3+4 trichord of the eleventh hour is steered by the 2+2 trichord from the sixth hour. The trichords of the row are written above the staffs, and the steering trichord is written under the staffs.



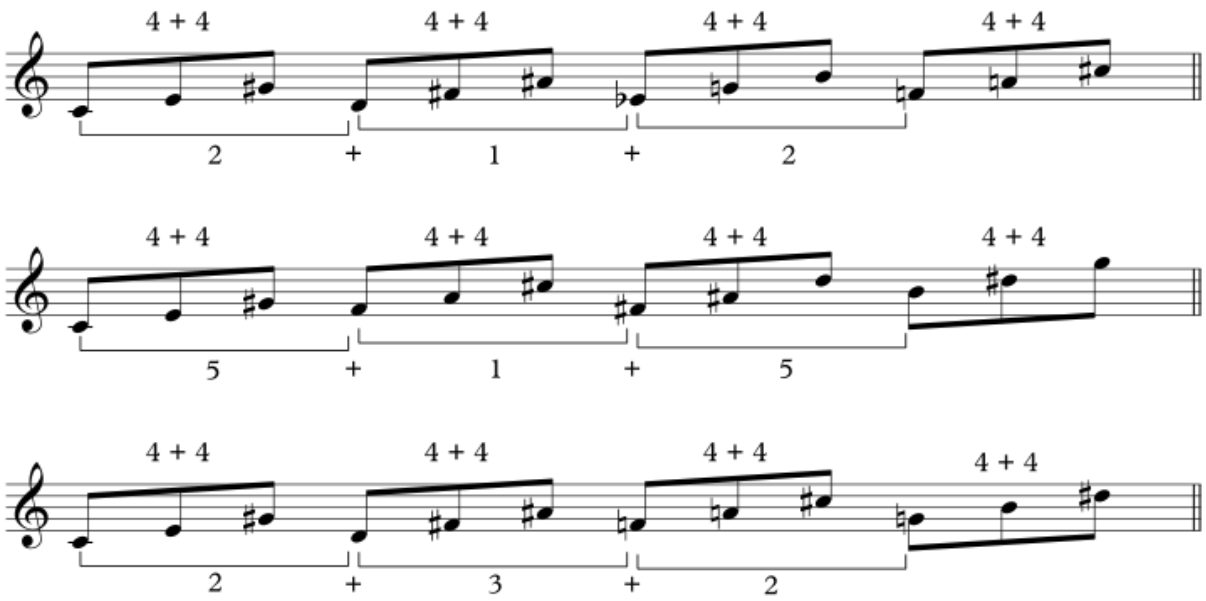

[ex 4.2.5]

The next example shows two variations of a twelve-tone row constructed with 1+3 trichords of the third hour. In the first variation, the 1+3 trichords are steered by the 1+5 trichord of the fifth, and in the second variation by the 2+3 trichord of the seventh hour. As a result of these distinct steering hours, these rows of the third hour sound notably different.




[ex 4.2.6]

The last example is about the row of the twelfth hour, containing four 4+4 trichords (augmented triads) that can be steered by the 1+1 trichord of the first hour. However, steering these trichords by the 1+2 trichord of the second, the 1+5 of the fifth, or the 2+3 of the seventh hour, results in notably distinct sounds.



[ex 4.2.7]

### 4.3 Theoretical context of Peter Schat's Tone Clock

#### 4.3.1 Allen Forte's pitch set class theory

How does Schat's Tone Clock relate to music theorist and musicologist Allen Forte's pitch class set theory? The principle difference lies in the aims of the two systems. Forte designed his for the harmonic analysis of post-tonal music, meant to discuss twentieth-century music in an objective way by avoiding references to individual compositional techniques or traditional harmony (Forte 1973). Schat proclaims a similar analytical practice, but the emphasis of his model is more on its compositional quality.

Concerning the layout of the models, the principal difference is that in Forte's system each pitch of the chromatic scale has its own "pitch class" number independent of the register in which it sounds: c has number 0, $c^{\sharp}$ has number 1, d number 2, etc. The term "set" is used for any combination of two or more, equal or different pitch classes, independent of octave displacement and enharmonic spelling. Thus Forte's three-pitch class sets correspond to Schat's trichords although they are presented in quite a different way. In contrast to Schat's relatively simple ordering of trichords alternating between prime and inverted forms in twelve-tone rows, Forte lists all prime forms of "cardinal number 3" according to their number of possible transpositions and inversions, to their interval vector (the total number of all intervals between the pitches in the set), and to a number of other categories enabling numerical analyses of post-tonal compositions.

Another difference concerns the number of intervals identified within the set and the trichord. Schat considers a trichord as a collection of two intervals a–b, and b–c; Forte considers a three-pitch class set as a collection of three intervals: a–b, b–c, and a–c. As a consequence in Forte's system the intervals between 1 (minor second) and 6 (tritone) are taken into account; in Schat's system those between 1 and 5 (perfect fourth).

In a reaction to an article by composer Maarten van Norden (1997) about possible compositional applications of Forte's set theory, Schat admits that there is a connection between his Tone Clock and Forte's set theory. The fact that Forte's theory indeed gives a complete overview of all harmonic possibilities of the twelve tones, he calls "attractive at first sight" (Schat 1998: 41). In the rest of this polemical essay he explains why he finds this theory unattractive from a composer's standpoint. Apart from his rejection of Forte's changing of the note names by numerical pitch notations, it was mainly the arithmetic concept underlying Forte's set theory, in order to facilitate a composer to calculate various relations between different sets, that was emotionally disapproved of by Schat, because "[he] studied to be a composer, not a bookkeeper" (Schat 1998: 42).

Considering the actual summary comparison between Forte's extensive pitch–set class collection and Schat's limitation to compositional applications I endorse the latter's recommendation of the Tone Clock as a technique that is "self-explaining and therefore meets the most important requirement for a "common language"" (Schat 1998: 44).

### 4.3.2 The problem of the three-ness

Composer and organist Gerrit de Marez Oyens (1997) came up with the idea to divide the Tone Clock's twelve-tone rows into three tetrachord segments. He constructed a list of tetrachords corresponding with Forte's twenty-nine pitch class sets with cardinal number 4 and found seven tetrachords that could be manipulated to fit three times in the row. Six of these tetrachords also appear as the "all-combinatorial four-notes source sets" of composer Milton Babbitt that I found in music theorist George Perle's publication *Serial Composition and Atonality* (Perle 1991: 98, 130).

With his emphasis on tetrachords, De Marez Oyens addresses a problem with the trichordal approach of the Tone Clock that was already mentioned in the evaluation of O'Gallagher's method of twelve-tone improvisation in section 3.7.4. As to the rhythmical aspect, in their operations with this overwhelming "three-ness", performers are forced to either phrase their lines in three-note patterns and triple signatures (¾, 6/8, 9/8, 12/8, bars), or to inventively re-phrase the trichordal patterns into four-note groupings. But by dividing twelve-tone rows in three tetrachords, the constructions by De Marez Oyens and Babbitt show a way to combine the creation of twelve-tone patterns with the quadrature

that is such an important characteristic in most jazz meters. Sections 4.7.8 – 4.7.12 contain examples of patterns created with combinations of the actual tetrachords.

### 4.3.3 Controlled revolution and natural evolution

Music critic and author of Schat's biography Bas van Putten's (2015) argues that Schat in an early stage of his development had sacrificed the "natural" way of an artistic evolution to a "controlled" revolution. This assumption sheds an interesting light on the applications of his Tone Clock in this study. Schat's choice for a kind of serialism that he embraced in the traces of the international avant-garde in those days, forced him to break with the music tradition he had grown up with until then. This break was a decision by which he deliberately ignored his musical intuition and the comfortable, open-minded leaning on his beloved predecessors.

In the context of this study into the practices of jazz artists, such a break-up with existing tonal practices and historical examples is hard to imagine. As was mentioned at the end of section 3.7.1 in the discussion of O'Gallagher's twelve-tone method, the application by (composing) improvisers of a post-serial model such as the Tone Clock is principally not meant to break with their existing harmonic practices. It is rather considered a potential skill to enrich their techniques to improvise outside the pre-given chords. It can either replace or it can be used alongside the musicians' existing practices.

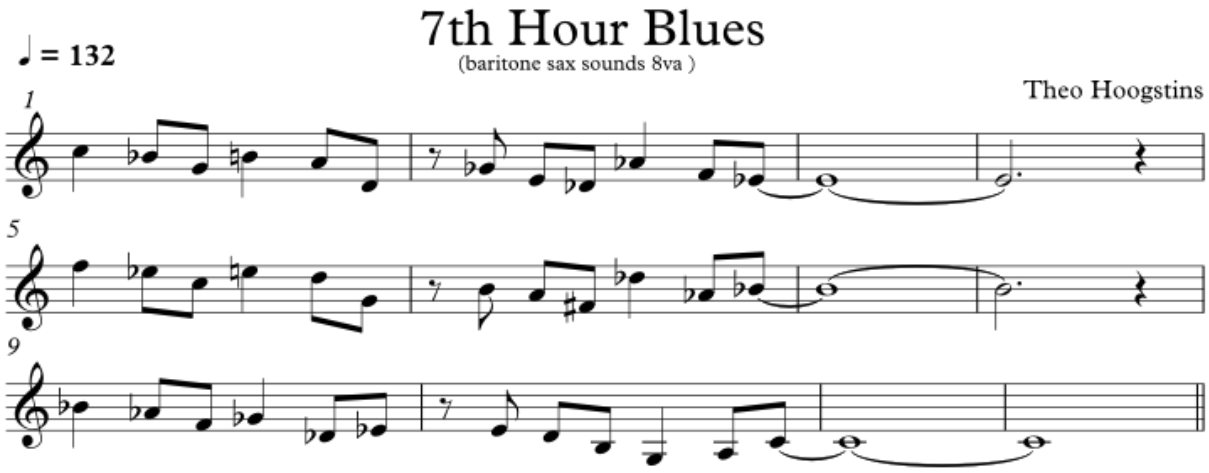
Yet, in order to at least learn to apply such a new tool, the students have to learn to sacrifice at least some of their "natural" habits to allow and embed new and "controlled" elements into their backpack of musical idioms. But is this not exactly what is expected from serious (composing) improvisers: importing "building blocks" taken from foreign musical idioms, in order to permanently refresh and enrich their expressive palettes? The obvious difference with van Putten's opinion about Schat's radical change as a young composer, is that for a saturated improviser, this process of innovation does not mean that existing elements should be radically discarded, but rather intelligently re-ordered.

### 4.4 Applications of the Tone Clock in jazz

In this subchapter, three compositions will be analyzed that are constructed with the Tone Clock. Hoogstins' relation with the Tone Clock is confirmed by the title of the first tune to be analyzed in this section: "7th Hour Blues". The second, "Green Room" was introduced by Carlberg to the Clazz Ensemble as being based on an hour of the Tone Clock, although he intentionally didn't give away on which one. The third example is both written and performed by O'Gallagher. By email O'Gallagher advised "Petulant Snoot" as a convincing example of his operations with the Tone Clock. In order to disclose the compositions of and improvisations on the tunes in this section I applied O'Gallaghers method of trichord analysis introduced in section 3.7.1.

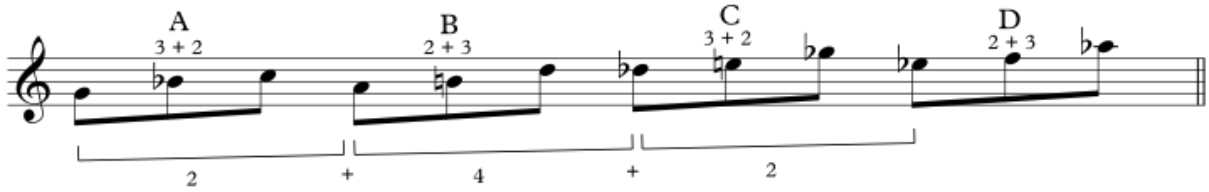
#### 4.4.1 "7th Hour Blues" (Theo Hoogstins)

In "7th Hour Blues" on the CD *Triosonic* (1997) Hoogstins superimposed the 2+3 trichords of the seventh hour of the Tone Clock on a twelve-bar minor blues form. Its blend of twelve-tone and tonal elements allows analysis from both sides.



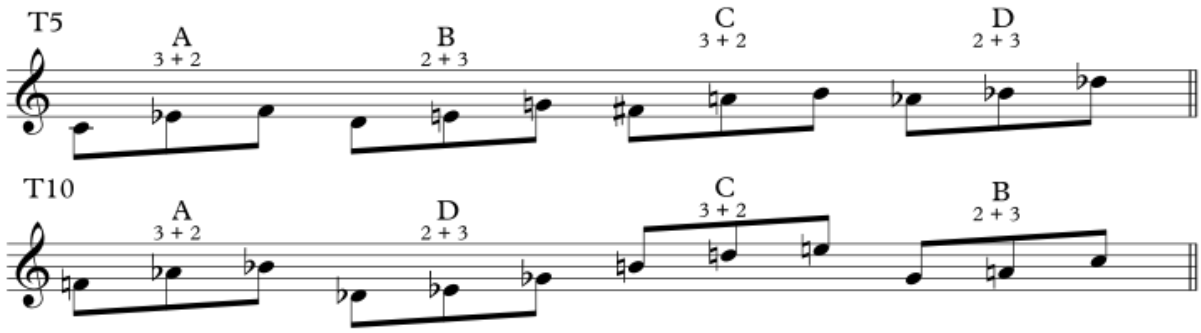

[ex 4.4.1.1 "7th Hour Blues" – theme]

The theme consists of three twelve-tone rows with the same rhythmic structure. The following example shows the derived row, the basic row with the trichords put in prime form.




[ex 4.4.1.2]

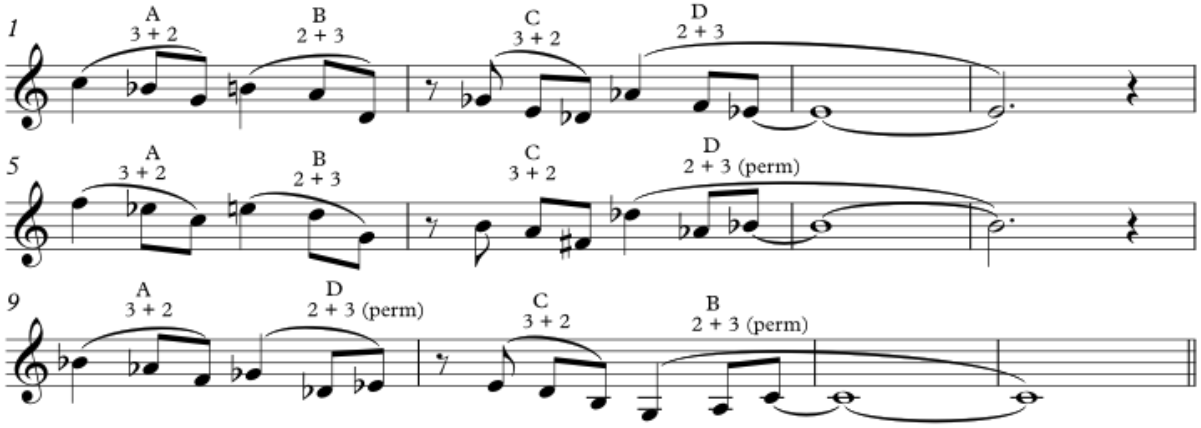
The second and third rows are transpositions of the first: the second is a transposition of a perfect fourth (T5), and the third is a transposition of a minor seventh (T10). In the third row the trichords are put in displaced order: A–D–C–B.




[ex 4.4.1.3]

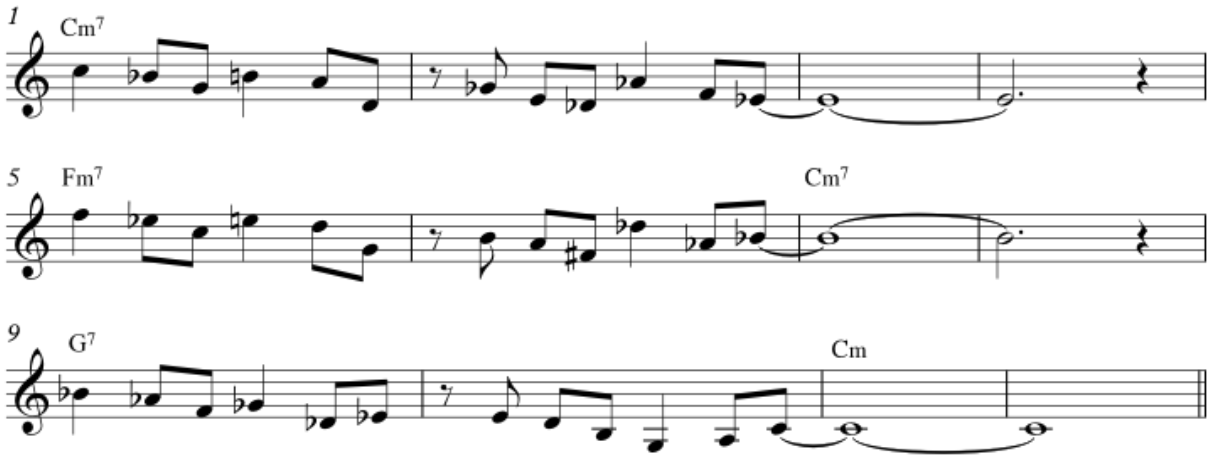
The next example shows the result at the surface of Hoogstins' manipulation of trichord 2+3. The order of the pitches in the trichords is changed, and to add variety to the transpositions of the first line, the order of the pitches in trichords D in bars 6 and 9, and of trichord B in bar 10 is permutated (perm).

It should be noted that also in the trichord analyses in this study, trichords are represented in their root positions, i.e. in their smallest form in ascending direction. For instance in the first bar of this example the smallest ascending form of the first trichord is g–b♭–c. Therefore it is marked 3+2. And because the root position of the second trichord is a–b–d, it is marked 2+3. For ease of reading, markings of the positions (prime form, first and second rotation) and retrogrades of trichords are left out, except in cases where these are a relevant aspect of the discussion.



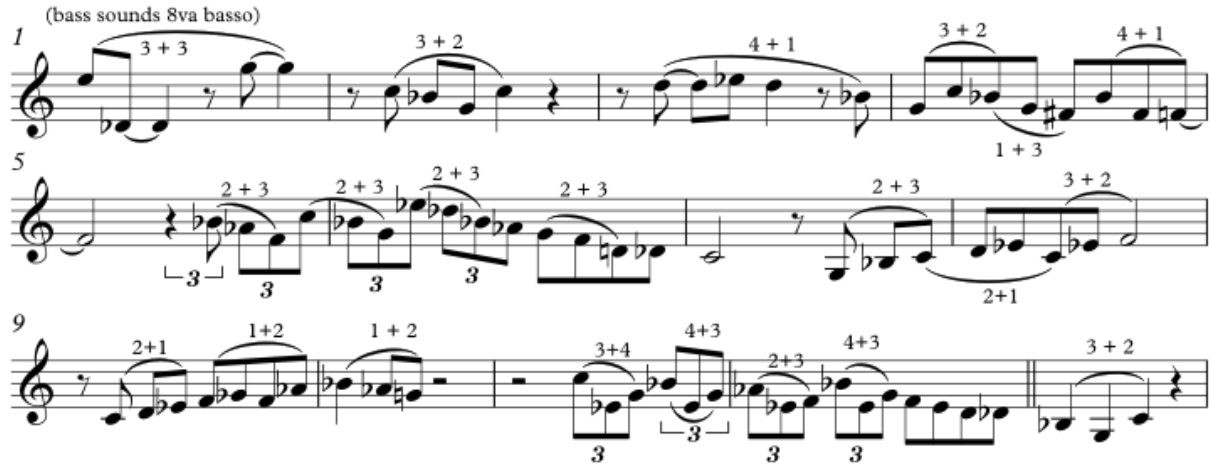

[ex 4.4.1.4]

In the next example the basic chords of the minor blues form are added to the theme. Considered from the tonal point of view, the first three notes of each row each contain basic or altered chord notes. All three lines move outside the chords from the second half of their first bar, and land on a chord note again at the last beat of the second bar. The root note of C minor, the key of this tune, only appears as the first and the last note of the theme.




[ex 4.4.1.5]

After the theme is played twice, Hoogstins plays the first solo chorus on the bass. In this improvisation he shows a preference for the 2+3 trichord as well. Out of the twenty-one trichords that are identified in the example below, ten are members of the 2+3 trichord family. In contrast to the theme these trichords now do refer to the bluesy minor pentatonic sound. Then, the 3+2 trichords in bars 2 and 4, and the sequences in bars 5–6 and 7–8, also confirm the (pull to the) key of Cm. The same goes for the bars in which successions of different trichords could be identified. For instance in bars 11–12, the 2+3 trichord is surrounded by 3+4 trichords, resulting in C minor and Eb major triads that explicitly emphasize the key of the tune.



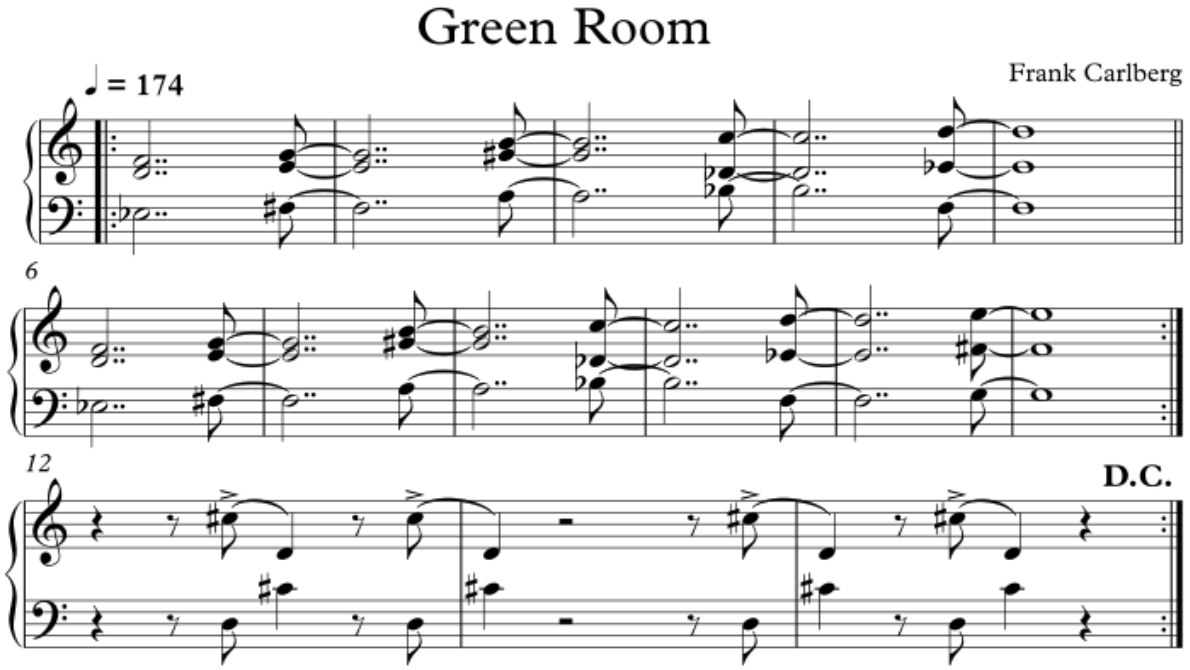

[ex 4.4.1.6 "7th Hour Blues" – bass solo]

**Evaluation**

In Hoogstins' theme, twelve-tone operations are intentionally limited to trichord 2+3 from the row of the seventh hour of the Tone Clock. His choice for this trichord seems inspired by its tonal reference to the minor pentatonic scale, although he manages to avoid this typical "bluesy" sound by his sparse permutations of trichords and rows. On the other hand, his improvisation is overwhelmed by his intuitive response to the compelling force of the Cm key, despite the numerical majority of the same 2+3 trichord. The minor pentatonic reference of this trichord together with the various trichords surrounding them confirm the soloist's emphasis on the tonal content of the blues. This is slightly disappointing in comparison to his intelligent avoidance of this tonal reference in the construction of the theme. I would rather have taken this as a point of departure for a less root-oriented improvisation.

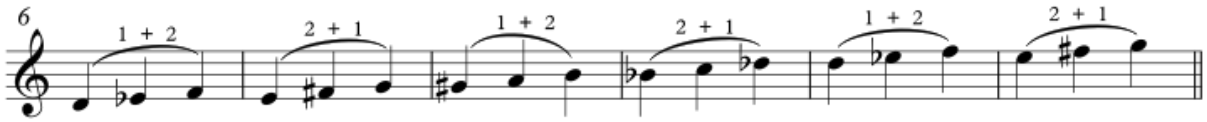
### 4.4.2 "Green Room" (Frank Carlberg)

Carlberg's composition "Green Room" on the CD *Federico On Broadway* (2011) is composed with the second hour of the Tone Clock. It has an eleven bar form that is repeated and followed by another three bars. The next example shows a mini-score of this tune.



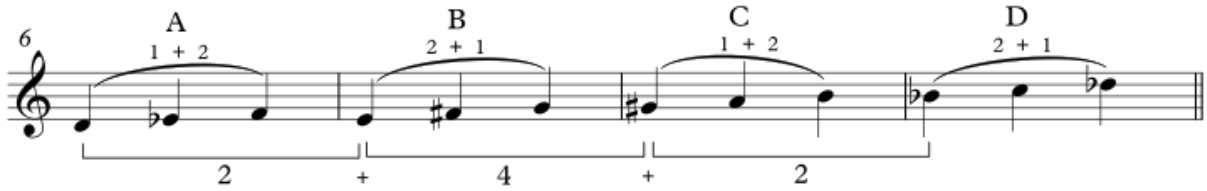

[ex 4.4.2.1 "Green Room" – theme]

Bars 6–11 contain all trichords of the tune. The next example shows them in their prime forms.



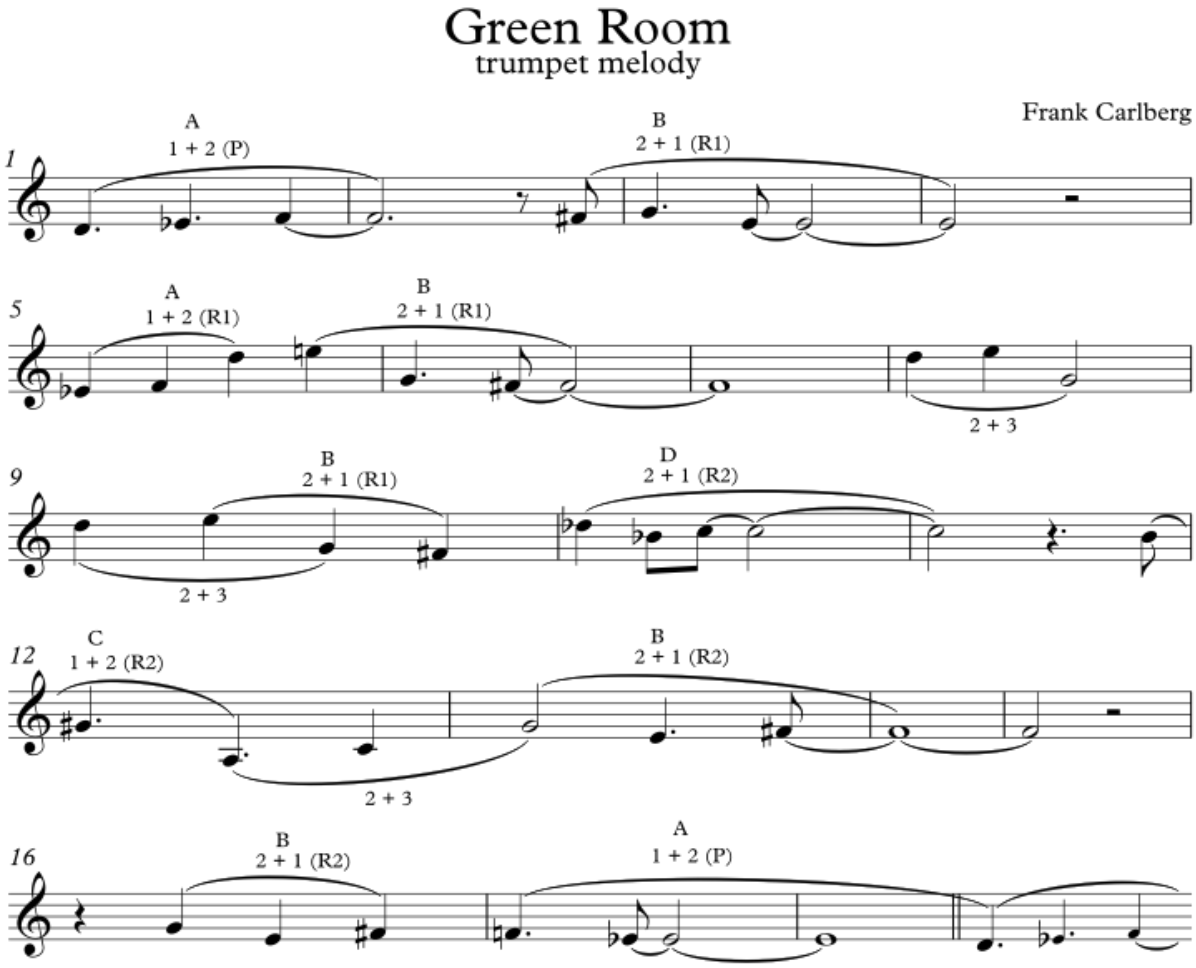

[ex 4.4.2.2]

The last two trichords are repetitions of the first two. Leaving these out, the following twelve-tone row of 1+2, steered by 2+4, appears.



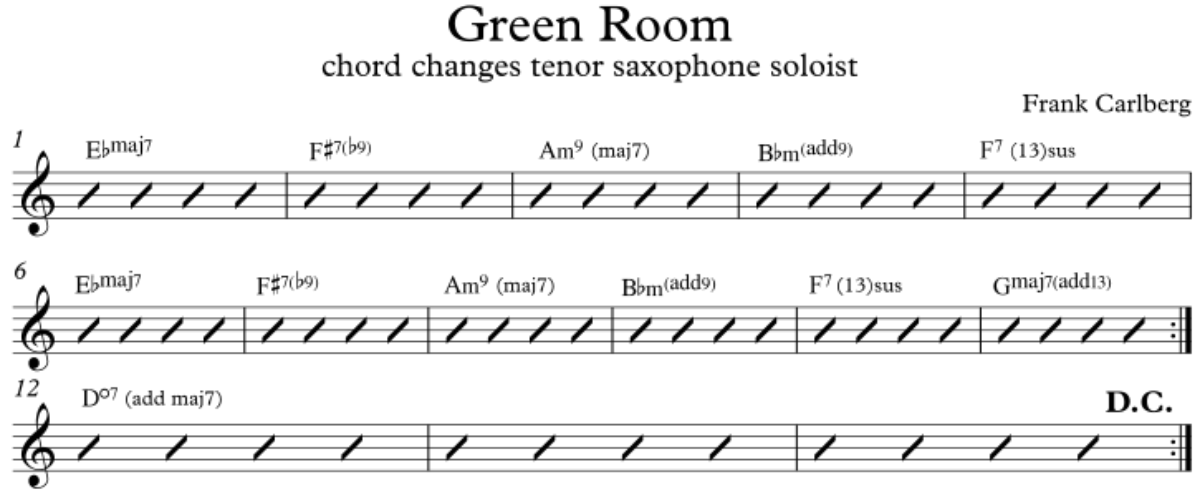

[ex 4.4.2.3]

The following example shows how all four trichords can be identified in the rubato trumpet melody, put in their prime forms (P), first (R1) and second (R2) rotations.




[ex 4.4.2.4 "Green Room" – trumpet melody]

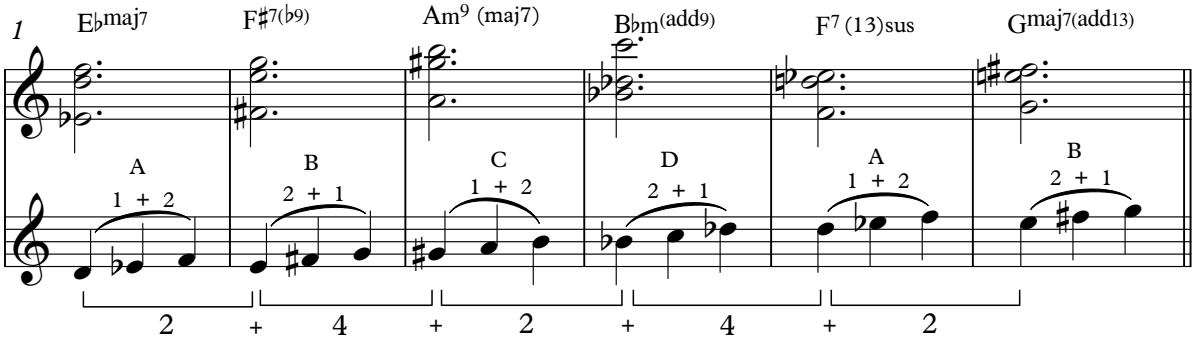
The example below shows the chord changes for the tenor saxophone soloist in Carlberg's arrangement for the Clazz Ensemble. Instead of writing a fixed melody, he gave the instruction to start off with sparse filling notes and to gradually increase the density of the improvised lines along the way.




[ex 4.4.2.5]

The next example displays the relationship between the basic row, written in the lower staff, the vertical orderings of the trichords (as in example 4.4.2.1), written in the upper staff, and the tenor saxophonist's chord symbols, written above the upper staff. It shows how the trichords are considered as content groups and how the pitches of the twelve-tone row are attributed tonal content. In bars 5 and 6 the trichords A+B are put in a different vertical order than in bars 1 and 2, which allowed Carlberg to construct different chords.

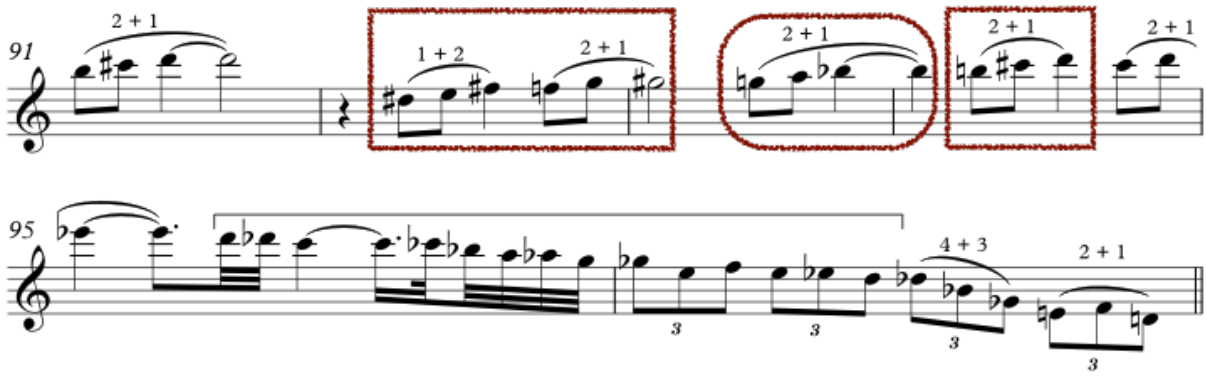
The lowest notes of the trichords have become the root notes of the chords. The remaining two pitches do not determine the tonality of the chords. They express the seventh (bars 1–3, and 5–6), the ninth (bars 1–4), and the sixth (bars 5–6) of the chords that Carlberg has created. Only in the fourth bar, the note d♭ determines the Bbm tonality.




[ex 4.4.2.6 ]

The transcription of my tenor saxophone solo on "Green Room" displays a combination of conventional tonal techniques and dodecaphony. In the following fragment, bars 91–96, I intentionally refer to the row of the second hour of the Tone Clock. I start and end my phrase with trichord 2+1. In bars 92–94 the trichords captured within the rectangles

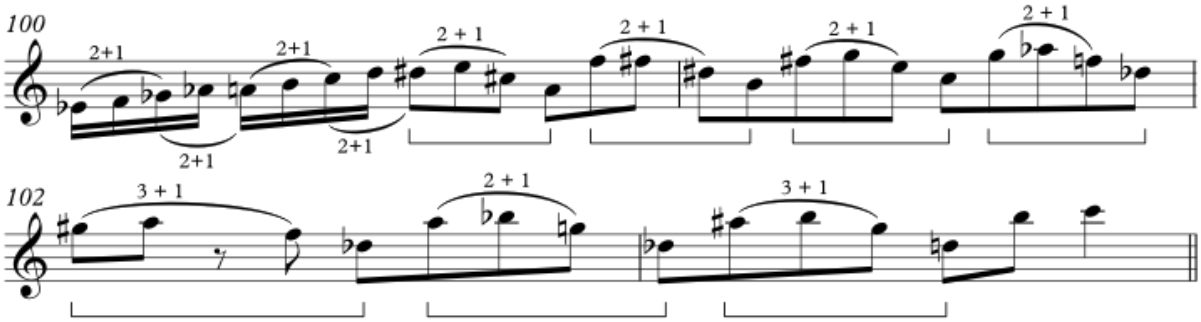
belong to the same twelve-tone row. The trichord in between, starting at the second half of bar 93, is only one note away from being the missing link to make this twelve-tone row complete. To achieve this, I should have played the 1+2 trichord a–b♭–c. The notes under the bracket in the second line are an embellishment of a descending chromatic scale leading to the 4+3 trichord that evokes the temporary tonality of Gbmaj.




[ex 4.4.2.7 "Green Room" – fragment tenor saxophone solo]

To get acquainted to the sound of the second hour and its trichords, I related it to the harmonic color of the diminished scale and to familiar practices of transposing motives by distances of minor seconds. These operations popped up in this solo as my intuitive response to the intended harmonic vagueness of the chord changes. The next example shows these two operations combined in bars 101–104.

The two first beats of bar 100 show the Eb diminished scale, marked as a succession of four 2+1 trichords. From the third beat of the bar, an ascending sequence of conventional diatonic triads can be identified. The brackets under the staffs mark the triads of A, B, C and Db. Because the first note of every triad is approached by an accentuated leading note, and because the line is phrased as a sequence of four tetrachords, these four 2+1 trichords can be identified. Thus, my assumption that these familiar operations of tonal chromatism would connect well with the Tone Clock hour is confirmed by the trichord analysis of this line.




[ex 4.4.2.8 "Green Room" – fragment tenor saxophone solo]

**Evaluation**

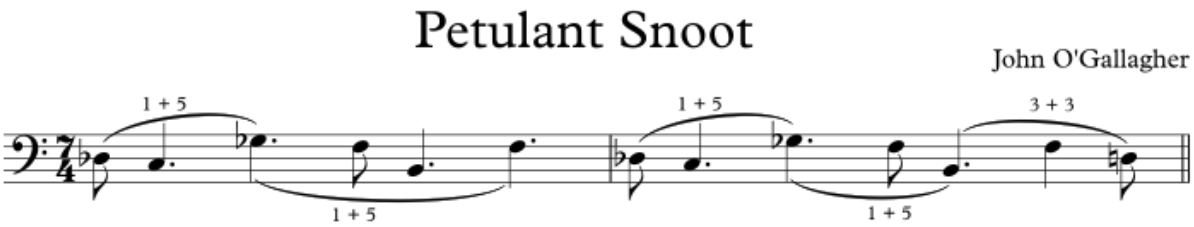
Just like "7th Hour Blues", "Green Room" is based on operations with a distinct hour of the Tone Clock. "Green Room" has a more complex structure and shows a more comprehensive approach to the Tone Clock, because the row of the second hour is applied both in horizontal and vertical orderings. Carlberg operates in the border area of twelve-tone and tonal music by combining the ordering principle of a twelve tone row with the tonal content of his trichords and the derived and extended chords.

As to the improvisations, in "7th Hour Blues" Hoogstins managed to manipulate his prevailed trichord better than I did in "Green Room", but he was unable to transfer the non-tonal structure of his theme into trichord manipulations in his solo. In my solo I deliberately operated in the musical space between a real chord-scale approach (almost impossible due to the rapid succession of the chords) and the yet poorly embodied knowledge of twelve-tone operations. As a result, it contains a mixture of sparse twelve-tone operations, tonal references and familiar chromatic techniques.

### 4.4.3 "Petulant Snoot" (John O'Gallagher)

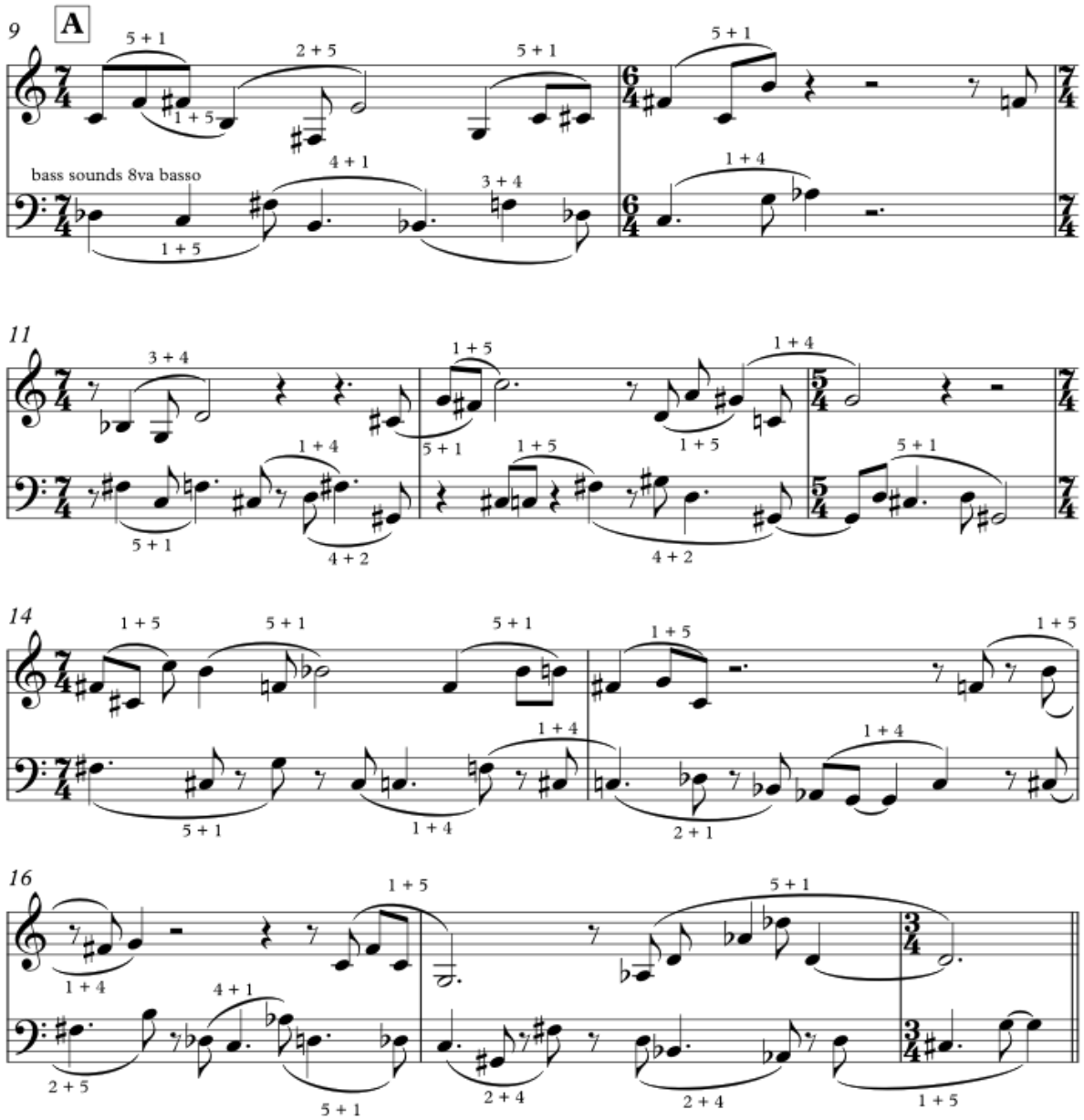
O'Gallagher's composition "Petulant Snoot" on his CD *The Honeycomb* (2015) was released after publication of his method for improvisation that was discussed in subchapter 3.7. In this subchapter I will discuss possible relations between the Tone Clock and the composition and the alto saxophone solo.

"Petulant Snoot" starts with a repeating bass ostinato that is constructed with trichords 1+5 only. Trichord 3+3 at the end of the second bar results from the note d that is added there just as a leading tone to the next bar.



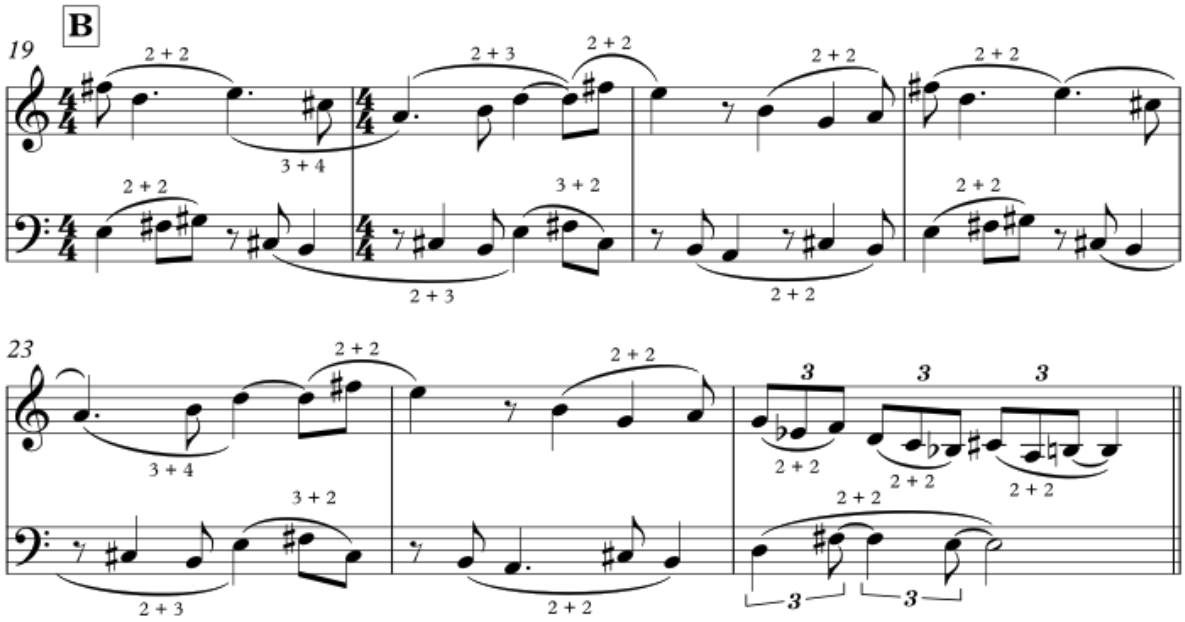

[ex 4.4.3.1]

In the following example trichord analysis of the alto saxophone melody in section A reveals a dominating number of trichords 1+5: fourteen 1+5 trichords, versus one 1+4 trichord, one 2+5 trichord, and one 3+4 trichord. Meanwhile the contrapuntal melody played by the acoustic bass shows a wider variation of trichords: seven 1+5, seven 1+4, four 2+4, two 3+4, one 1+2, one 2+5, and one 3+4 trichords can be identified.



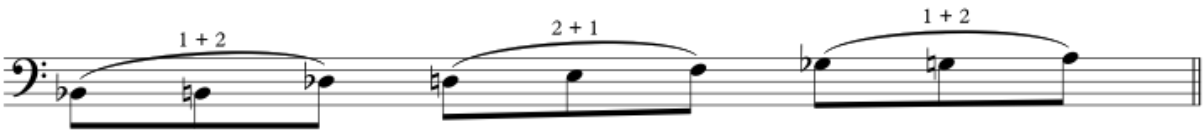

[ex 4.4.3.2 "Petulant Snoot" – section A melody]

In contrast to section A, bars 19–25 of section B do evoke a harmonic color: that of A7. Trichord analysis illustrates this by the types of trichords found. The alto sax plays seven 2+2, two 2+3, two 2+4, and two 3+4 trichords. The bass line contains five 2+2 and four 2+3 trichords. Except the two 3+4 trichords, all trichords played in section B, both by the alto saxophonist and by the bassist, are different from the ones they played before in section A.




[ex 4.4.3.3 "Petulant Snoot" – section B melody]

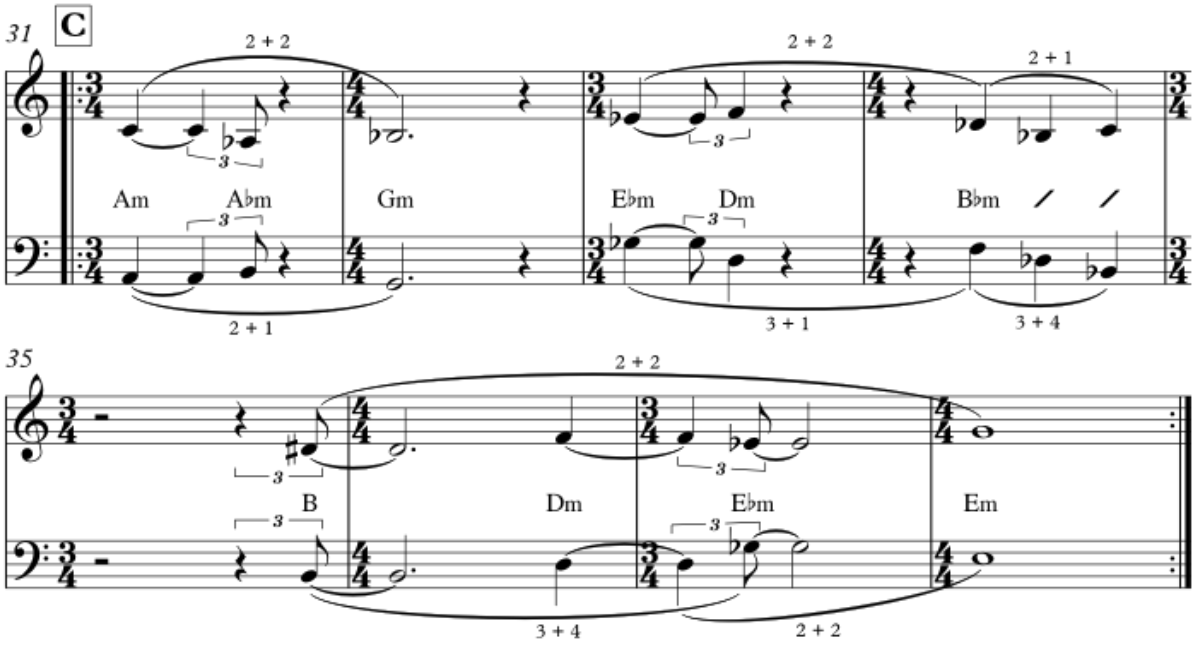
Compared to sections A and B, where the alto saxophone melody and the bass part are played as independent lines in contrapuntal movement, section C displays rhythmic accents on two-voice vertical harmonies. The notes of the alto saxophone's part together form the Ab major scale. The bass line displays two symmetric four-note groupings g♭–g–a–b♭ and d♭–d–e–f, with the note b in between. The following nine-tone row containing trichords from the second could be derived.




[ex 4.4.3.4]

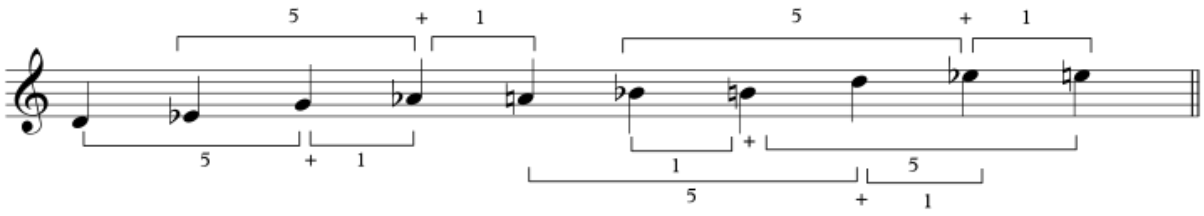
It seems as if O'Gallagher, after the tonality of A7 in section B, with this choice to continue in the tonality of Ab takes distance from his twelve-tone approach and the Tone Clock. Is he intentionally alternating between a twelve-tone (read: a trichordal) and a purely tonal approach? Is this the interpretation of his idea in section 3.7.1, stating that his operations with twelve-tone techniques are not exclusively reserved to twelve-tone use, but also can be combined with tonal settings? That would be a disappointing finding, because he recommended this tune as an intended application of the Tone Clock. Or

should it be worthy to take a closer look into the relationship between the lines of the bass and the alto saxophone to understand what operation is involved here?




[ex 4.4.3.5 "Petulant Snoot" - section C melody]

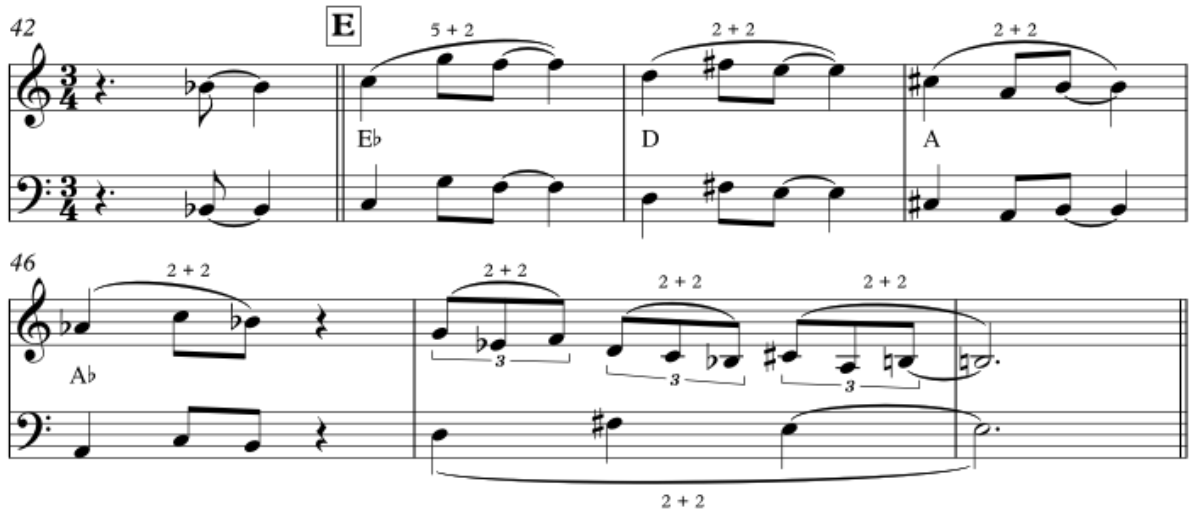
The example above shows how between the alto saxophone in the upper staff and the bass notes in the lower staff a succession of major and minor intervals in alternating directions can be identified. For ease of reading, they are notated as triads, but in fact the fifth is missing. This succession can be divided into two segments. The first segment sounds in descending direction: Am – Abm – Gm – Ebm – Dm. The second one sounds in ascending direction: Bbm – B – Dm – Ebm – Em. Now, if we consider the root notes of these intervals as pitches of a tone row, it is possible to derive the following ten-tone row, that hosts four 1+5 trichords. The re-appearance of these trichords obviously relates to the dominance of trichord 1+5 that was found in section A.



[ex 4.4.3.6]

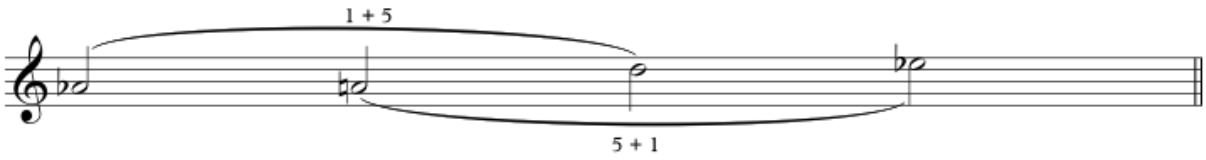
Thus, this analysis of section C reveals how O'Gallagher managed to combine a twelve-tone ordering principle with the interval relations between the two lines. Thus, the dominance of the 1+5 trichord in section C is continued in the deep structure instead of at the surface of the composition.

After the solo section D, to be discussed hereafter, section E displays trichord 2+2 six times, versus 2+5 once. Bars 43–46 display an eleven-tone row, with the note c repeated. Only the note d♯ is absent in order to complete the twelve-tone row.




[ex 4.4.3.7 "Petulant Snoot" – section E melody]

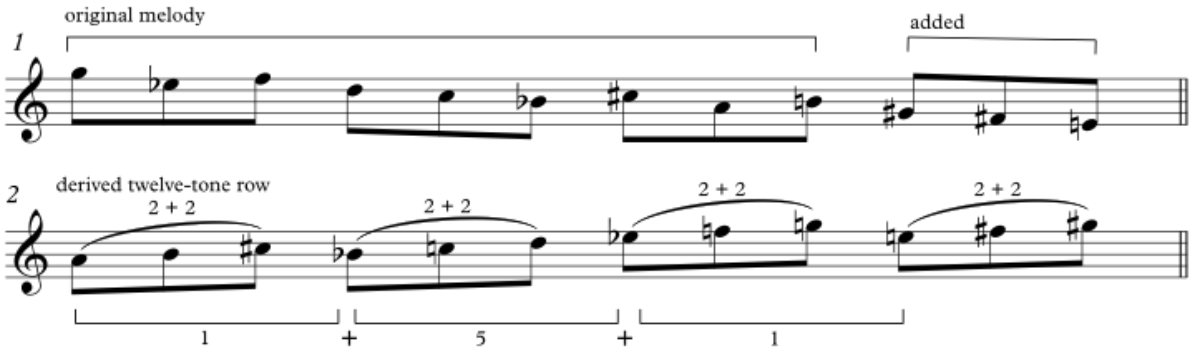
Although alto saxophone and bass play the same melodic line in octave intervals, bars 43–46 evoke the harmonic colors of the Eb – D – A – Ab triads. Between their root notes again two 1+5 trichords can be identified, as shown in the following example. The structural presence of trichord 1+5 that was confirmed in sections A and C is also evident in section E.




[ex 4.4.3.8]

The next example shows how from the original melody by the alto saxophone in bar 47 of the example above, a twelve–tone row with four 2+2 trichords can be derived. Interestingly, the 1+5 trichord appears again, this time as the steering trichord of this derived row.

The addition of this fourth trichord results from my interpretation of the twelve-tone technique called "derivation" which is defined by Wuorinen as "the generation of new sets from segments, which may themselves be segments of other sets previously employed in a composition" (Wuorinen 1994: 111). In this case the added trichord D is simply a transposition by a tritone interval (T6) of trichord B.

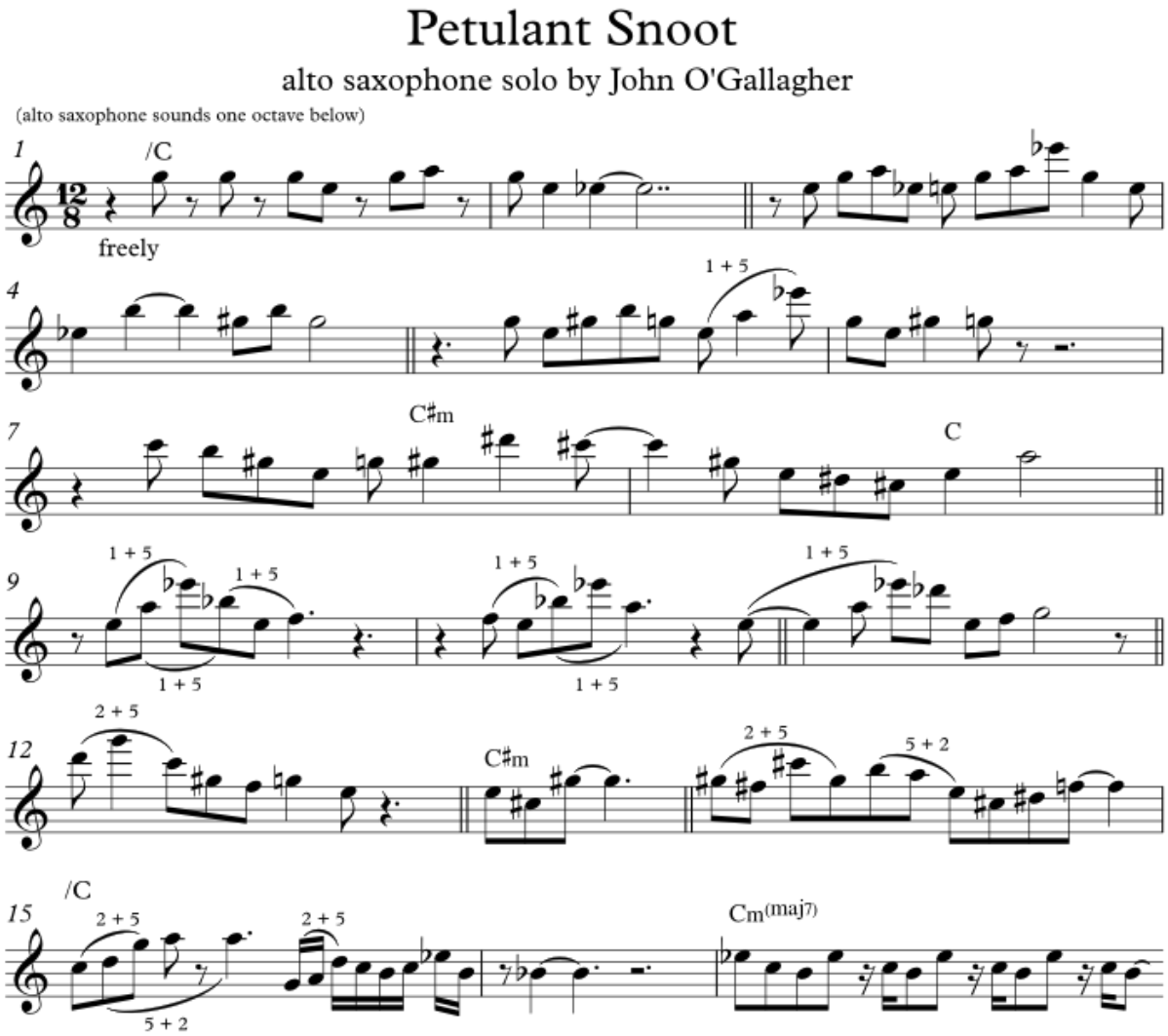



[ex 4.4.3.9]

To summarize my analyses of the composed parts of "Petulant Snoot", O'Gallagher's examples of the application of the Tone Clock are his operations with predominant trichords 1+5 from the fifth hour and 2+2 from the sixth hour. Trichord 1+5 can be identified both at the surface and in the deeper structures. Throughout the composition these operations are applied both in tonal and non-tonal contexts. Furthermore multiple derivations of Tone Clock rows can be identified in section E.

In the following section three fragments of O'Gallagher's alto saxophone solo will be analyzed to find out how his applications of the Tone Clock in the composed part are reflected in his improvisations. It should be noted that this tune was played in a free rhythm. For ease of reading and to give priority to the melodic and harmonic qualities of his melodic lines, they are transcribed into a 12/8-meter, and in some cases notation of the rhythms is simplified.

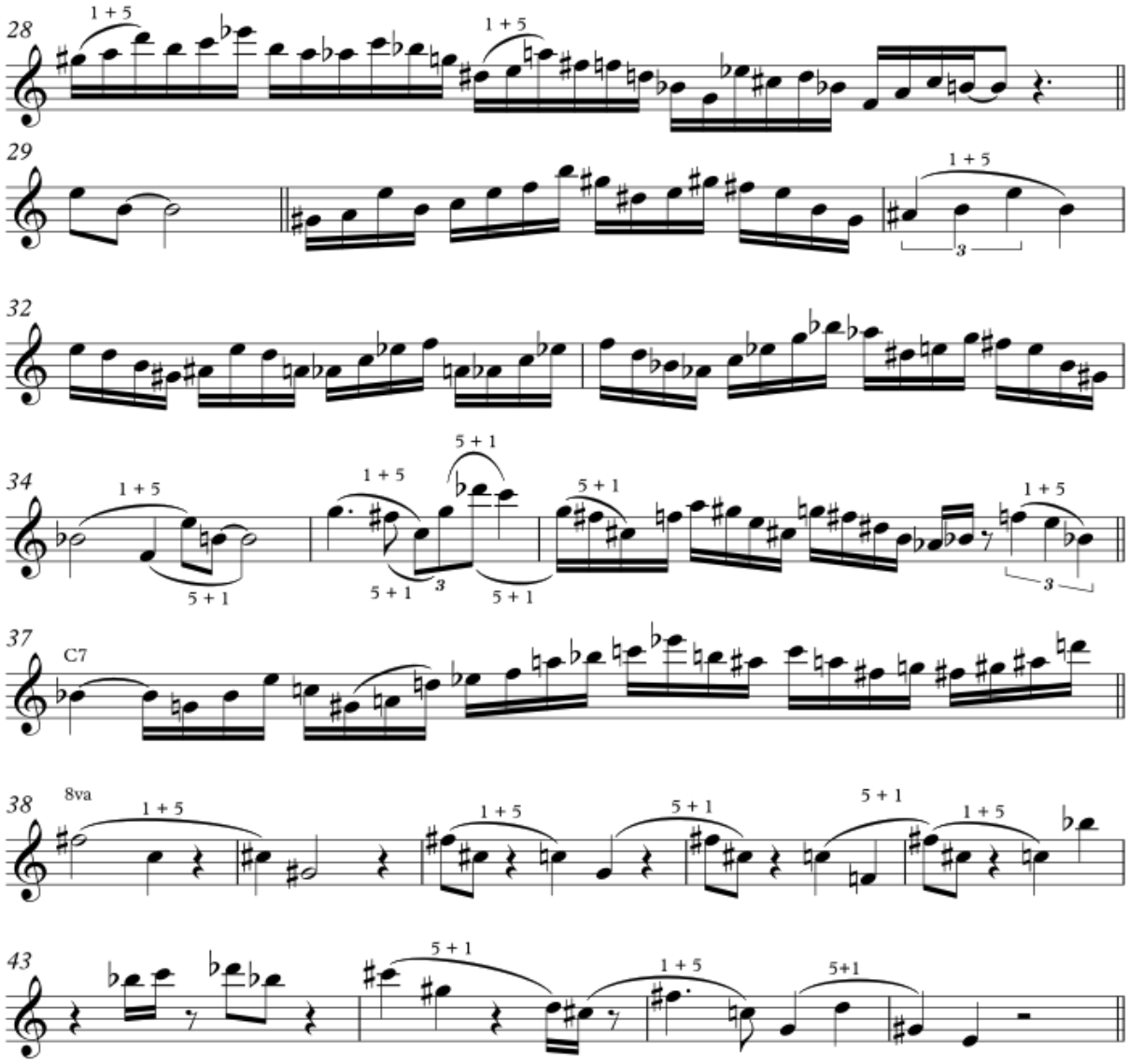
In the first eight bars of the following fragment, O'Gallagher is mainly concerned with the embellishment of a C pedal tonality by means of stressing certain notes. In bars 1–6 the notes e$^{\flat}$–e–g–g$^{\sharp}$–a–b, together with the pedal point C played by the bass, evoke the harmonic color of Cmaj$^{\#5}$.
In bars 9–16 O'Gallagher displays a deliberate trichordal approach. In bars 9–11 the emphasis is on the trichord 1+5, and in bars 12–15 a number of 2+5 trichords. These trichordal operations sound as short excursions outside the C pedal tonality that, apart from two sideslips to C#m in bars 7 and 13, is omnipresent in the whole fragment.




[ex 4.4.3.10 "Petulant Snoot" – alto saxophone solo fragment]

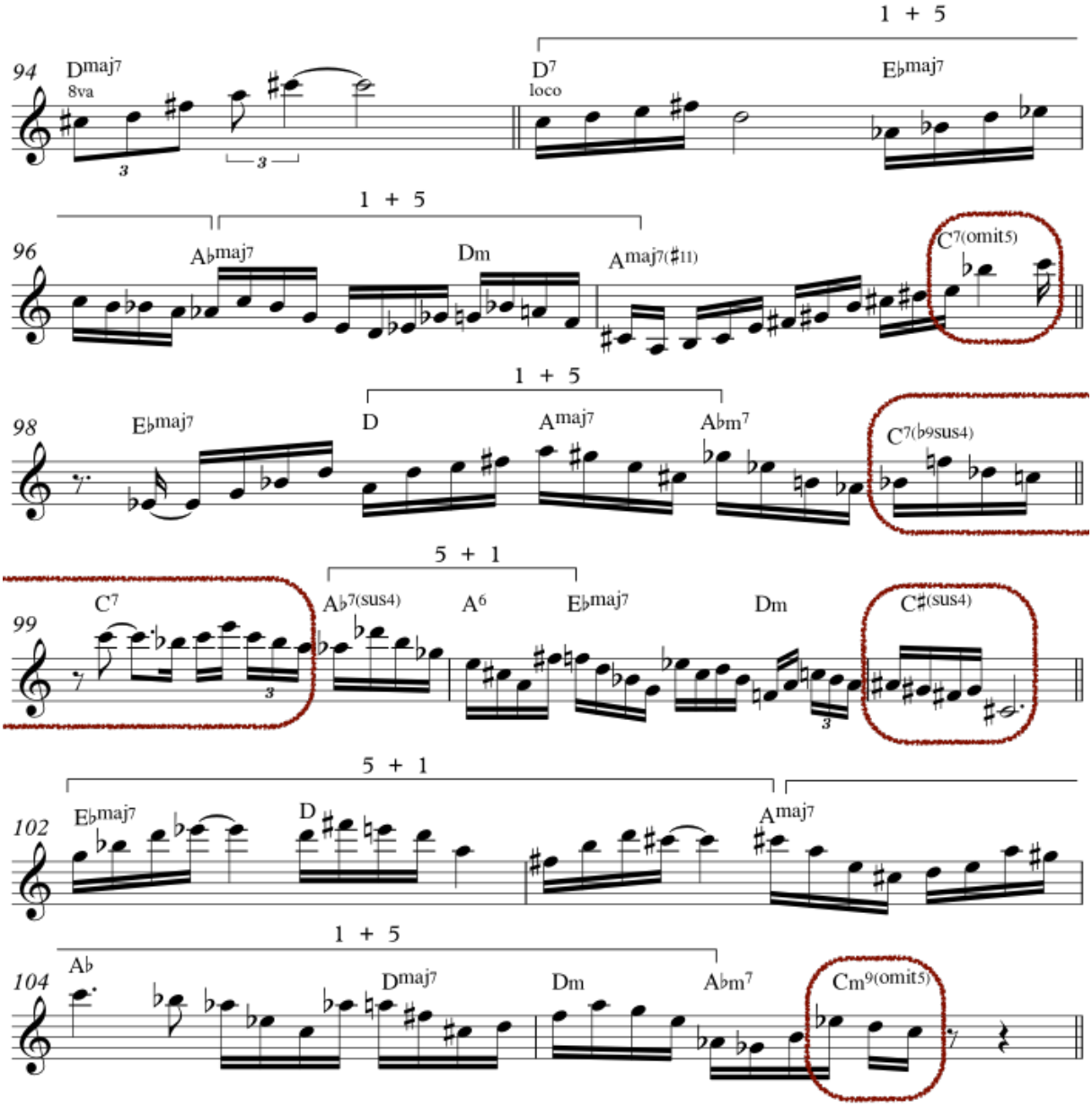
Hereafter, in bars 28–37, fast sixteenth-note runs are alternated with short patterns that sound as rest areas between the dense textures of these fast passages. Apart from the perfect fourth interval in bar 29 that points forward to the trichord in bar 31, these short patterns are constructed with 1+5 trichords exclusively. The transcription also suggests a connection between the two 1+5 trichords in bar 28 because they are both played at the start of six-bar patterns. I assume that O'Gallagher played them deliberately, but due to the fast tempo these trichords have minimum effect.

Finally, bars 38–46 show a large emphasis on the 1+5 trichord. This fragment displays a chromatically descending sequence of four trichords. The top note of each group, an f♯, remains unchanged, while the lowest notes are descending: g♯, g, and f.




[ex 4.4.3.11 "Petulant Snoot" – alto saxophone solo fragment]

In the following fragment of the solo O'Gallagher connects his improvisation to the composition in a different way. Instead of emphasizing the predominant 1+5 trichord in his melodic lines, it is now implied in the harmonic colors of Ab – A – D – Eb that I identify in section E of the composition. In the next example the chord symbols mark the tonal content of the melodic lines. All four lines contain four triads or chords built on the root notes a♭–a–d–e♭. They can be considered as non-tonal superimpositions on the C pedal point, creating tension before "landing" either on a C tonality in bars 97, 98, and 105, or on its chromatic sideslip C# (bar 101).




[ex 4.4.3.12 "Petulant Snoot" – alto saxophone solo fragment]

To summarize his operations in the improvised part of "Petulant Snoot", O'Gallagher shows coherence with the emphasis of the predominant trichord 1+5 in the composed part. This appears both in tonal and in non-tonal contexts. In his improvisation he also demonstrates a tonal application of this trichord 1+5, by means of designing the order of the root notes of the chords implied in his solo lines.

**Evaluation**

Twelve-tone elements and operations can be identified throughout all composed and improvised examples discussed. But rather than following "rigid" serial rules dictating strictly defined operations with twelve-tone sets, derived rows, and segments from the row, the actual examples display combinations of selective operations with a pre-given or implied tonal context. Although it is impossible to "prove", I consider these practices as examples of how Schat imagined his Tone Clock as a way to bridge the twelve-tone techniques of atonal music with the more intuitive and context-driven practice of tonal music. Likewise, the examples seem to illustrate how the trichords from the Tone Clock hours seem to support Wuorinen's ideas of small segments serving as quickly perceptible content groups rather than as rigidly ordered interval successions (see subchapter 4.1).

In all examples both composers and improvisers apply the twelve-tone techniques transposition, inversion and retro-gradation of pitches, trichords, and combinations of trichords, with the emphasis on those from the Tone Clock hour at stake. Trichord analysis identified the dominating presence of trichords 2+3 (Hoogstins), 1+2 (Carlberg), and 1+5 (O'Gallagher). Of these trichords, those containing a minor second interval worked better to create non-tonal sounds than trichords 2+2, 2+3, 2+4, 3+3, and 3+4 marking passages with a more diatonic character.

In the context of the above-mentioned blending of twelve-tone with tonal techniques, all soloists were obviously challenged to connect the assigned trichord operations to their informed intuitive habits of embellishing pentatonic scales (Hoogstins), applying non-tonal superimpositions (de Graaf, O'Gallagher), or creating high-density chromatic textures (O'Gallagher). No matter what inconvenience this challenge may have created for the performing musicians, it seems to have helped them all to create meaningful solos.

Expectedly, most applications of twelve-tone techniques were found in the composed parts. In the solos, the fragments where twelve-tone techniques are intentionally played are relatively short. As to O'Gallagher's soloing, I find this disappointing and in contrast to his well-structured method on twelve-tone improvisation discussed in subchapter 3.7. In his method, he favors a comprehensive approach of trichords and trichord combinations to both non-tonal and tonal musical, but in his otherwise impressive solos, this approach is not as obviously present as I had expected. On the other hand, the trichord successions in his improvisations are often related to implied tonalities. Therewith he demonstrates their qualities as non-tonal superimpositions on tonal harmonies.

To find out if separate applications of all distinct hours of the Tone Clock would lead to a better understanding of their potential musical space, I undertook the composing and playing of *Carillon*, which will be discussed in the next subchapter. My aims were to concentrate on operations with all basic tone rows by creating both horizontal and vertical successions of their trichords and trichord combinations. I also wrote suggestions for improvisations, to help performers making meaningful connections with the composed material. In the next subchapter I will discuss three movements of *Carillon*. Chapter 6 contains the complete recording of this composition for saxophone quartet.

### 4.5 My applications of the Tone Clock

I have called my saxophone quartet *Carillon* in response to Schat's idea to construct a carillon that every hour plays the appropriate Tone Clock row (Schat 1993:73). During initial finger exercises in order to become acquainted with the distinct sounds of a number of Tone Clock hours, I became fascinated by the surprising sounds that occurred from applying these trichords. Therefore, I decided to broaden my individual experience with the Tone Clock by completing all twelve movements.

The choice for the line-up of a saxophone quartet was made for three reasons. First, it follows from my personal experiences as a saxophonist and composer, being familiar with the instrument and with this particular combination of instruments. Second, after I had rehearsed and recorded the first exercises with my students at Codarts University of the Arts, the professional saxophone quartet Koh-i-Noor showed an interest in rehearsing and performing the first five movements I had written (using the first, third, ninth, eleventh and twelfth hours) with myself as the soloist. Their comments stimulated me to finish the rest of the twelve movements. In 2013, I recorded *Carillon* with my fellow saxophonists of the Clazz Ensemble at that time. Third, I considered that working with this small line-up and without a rhythm section, would help us to leave our comfort zones and to fully concentrate on the "new stuff", without the opportunity to "lean back" on the rhythm section, and just rely on their common jazz idioms.

My aim was to compose twelve compact pieces, one to every hour of the Tone Clock, which could be performed within a time period of forty-five minutes, so that listeners could experience the distinct sound qualities of the hours of the Tone Clock in a coherent way. To highlight these sonic qualities, I wrote the twelve movements in the form of "riffs", short and repetitive fragments. From the early days of jazz music, riffs have been played as compact melodic phrases to create continuous movement and as backgrounds in solo sections to support the efforts of the soloists. A number of these riffs have found their way into the codex of jazz originals, such as for instance "C-jam Blues" (Duke

Ellington) and "Bemsha Swing" (Thelonious Monk). Thus, I agree with composer Gordon Delamont's ideas expressed in a publication about twelve-tone techniques: "In formal jazz composition, using serial techniques, it is desirable that the characteristic rhythms of jazz be retained. Also, repetition of melodic elements is likely to occur more frequently in jazz composition" (Delamont 1973: 24).

I realized that, besides the challenge to get acquainted with the Tone Clock hours, this carillon would contain rhythmic challenges for the performers. But thanks to their long time professional experiences in various musical styles, they responded quite naturally to the rhythmic requirements such as distinguishing between swing timing and straight timing in all tempos, and mastering Latin American rhythms, odd meters, and flexible (accelerating and retarding) tempo's.

Schat's metaphors of his Tone Clock hours, such as "Pale sun through grey cloud-cover. Or also: a sharp, icecold moon" (Schat 1993: 59), associated with the seventh hour, and "Much dust in the atmosphere. Rush hour" (ibidem: 63) with the fifth, are not taken into consideration. The same goes for his suggestions to combine different Tone Clock hours to complete twelve-tone rows. As I discussed before, my aim with the construction of "Carillon" was to experiment with each individual hour and I was afraid that intentionally blending distinct hours would obscure this idea.

As to the arrangement of the Tone Clock's trichords, I mainly took their prime forms as points of departure. This seemed the best way to optimize the expression of their distinct colors. In my opinion, deliberately obscuring the rows by complex permutations and (retrograde) inversions would reduce the listeners' ability to distinguish the differences between the hours.

To help find patterns for solos, I devised a sort of guided improvisation by attaching a number of subjective and rather random suggestions to the distinct hours. These suggestions contain a selection of melodic patterns that are constructed with the trichords from the rows. Initially they were meant for my saxophone students to show them possible applications of the Tone Clock hours and trichords, as introductions to the distinct sounds of the rows and trichords, and as examples of how to connect these twelve-tone techniques to their existing improvisational practices.

In the following sections my individual interpretations of the Tone Clock are discussed in three movements of *Carillon*. First is "Onsa", based on the first hour, the symmetric row with the highest dissonance and the most obvious twelve-tone structure: the chromatic scale. Next is "Pontiac", based on the fifth hour, the 1+5 trichord. The attractive dissonance of this trichord was already obvious in the previous examples of O'Gallagher's music. And finally, "Dicke Pitter", based on the 2+5 trichord from the ninth hour. By its

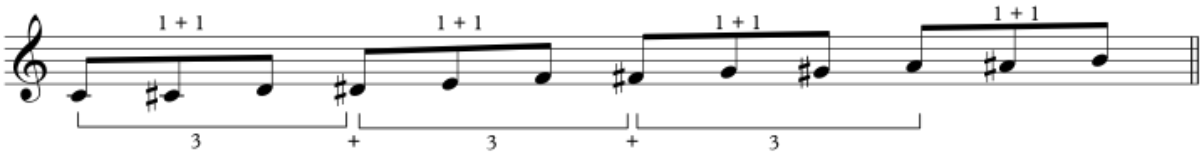
intervals of a major second and a perfect fourth it sounds less dissonant than "Onsa" and "Pontiac".

As to each movement, I will discuss the applications of the Tone Clock in the composed sections, the suggestions for improvisation, and how the improvisations relate to the compositions. As to the analysis of both the composed parts and the solo transcriptions, trichord analysis will be applied. For the sake of reading ease, I have removed all indications concerning tempos, dynamics, phrases and directions from the examples.

Trichords are displayed both in horizontal and in vertical orderings. Similar to the sections above, trichords in horizontal orderings are marked by legato lines above or below the staff, and notated with spaces between the numerals and the plus signs. Trichords in vertical orderings are marked above the notes that sound as similarities, and notated without these spaces between the numerals and the plus signs. The figures mark the trichords in their prime forms, the smallest possible form of the trichord. For the ease of reading, the octave disposition of the pitches is not indicated. Trichords in which one pitch is repeated are considered incomplete trichords or "dyads".

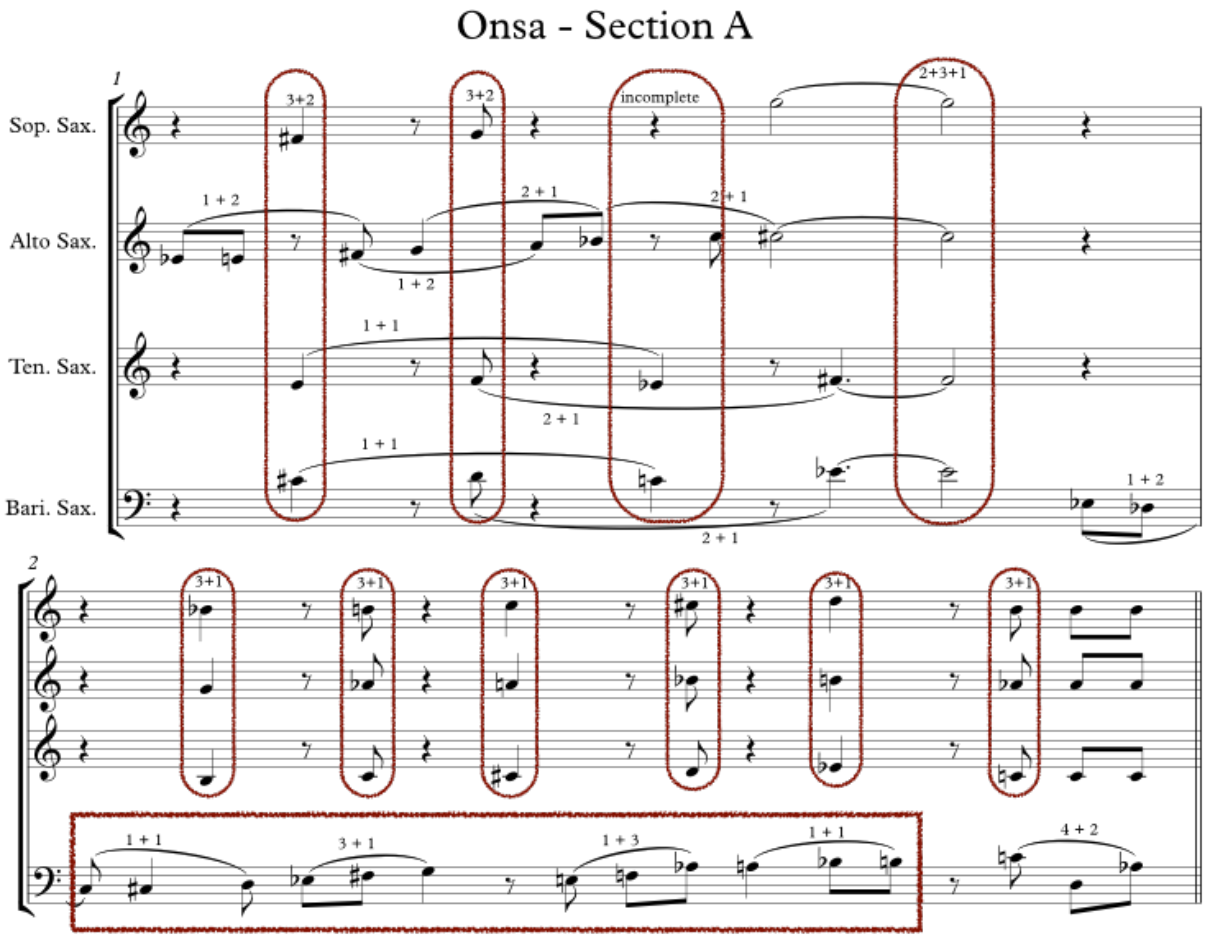
### 4.5.1 "Onsa"

In the basic row of "Onsa" the 1+1 trichords of the first hour of the Tone Clock are steered by the 3+3 trichord of the tenth hour.



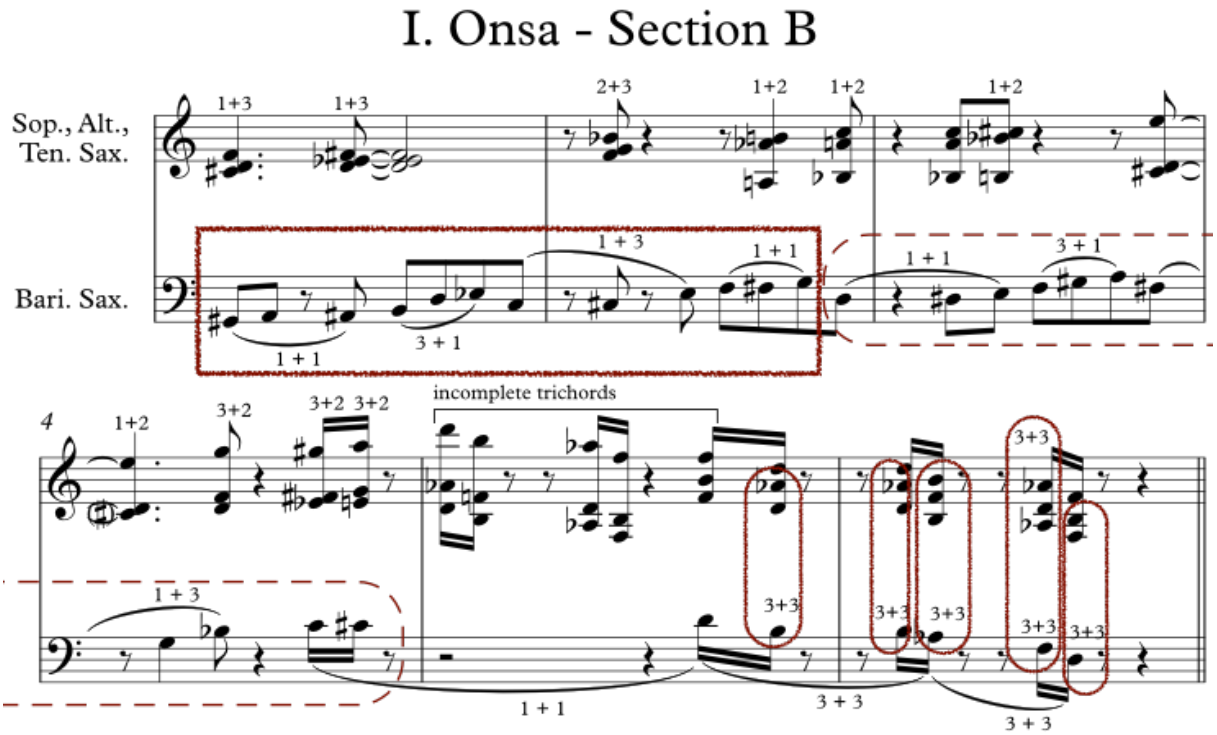

[ex 4.5.1.1]

In section A, the alto saxophone plays an $e^{\flat}$ octatonic scale. Trichord analysis shows it construction with 1+2 and 2+1 trichords. The vertical orderings in bar 1 display 3+2 trichords $c^{\sharp}$–e– $f^{\sharp}$, and d–f–g; and tetrachord $e^{\flat}$–$f^{\sharp}$–$c^{\sharp}$–g marked as 2+3+1 (prime form). Then, after his two pick-up notes at the end of bar 1, the baritone saxophone plays a twelve-tone row marked by the rectangle in bar 2 combining the trichords 1+1, 3+1, and 1+3. The remaining saxophones play stacked 3+1 trichords.



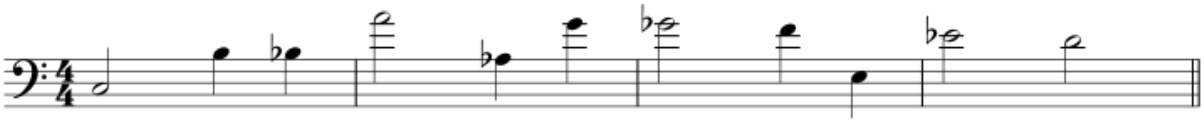

[ex 4.5.1.2 "Onsa" – section A theme]

At the beginning of section B the baritone saxophone repeats the twelve-tone row, transposed from C to G# (T8, in the rectangle). Then, another transposition of this line to D (T6) seems to appear, marked by dotted line, but, with the note b left out, this is not a complete twelve-tone row. Trichord analysis of the clusters played by the remaining saxophones displays a collection of 1+3, 2+3 and 1+2 trichords. Bars 5–6 are dominated by incomplete, complete and stacked 3+3 trichords.



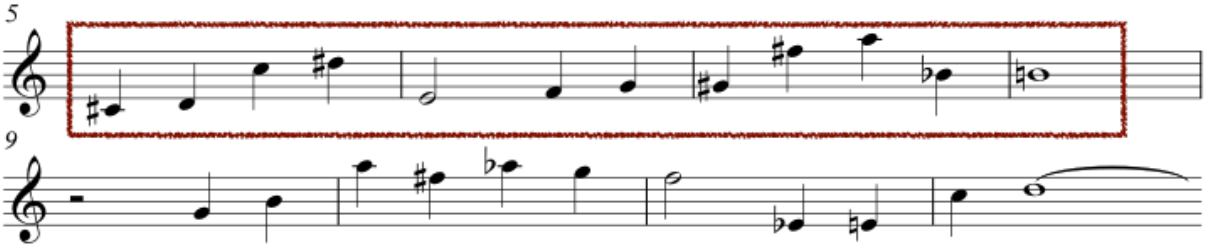

[ex 4.5.1.3 "Onsa" – section B theme]

In the first four bars, and in the first note of the fifth bar of section C, the third twelve-tone melody is introduced, a descending C chromatic scale that is obscured by octave displacements and by its distribution over the four voices, in such a way that the last note of a melodic fragment overlaps the first note of the next.



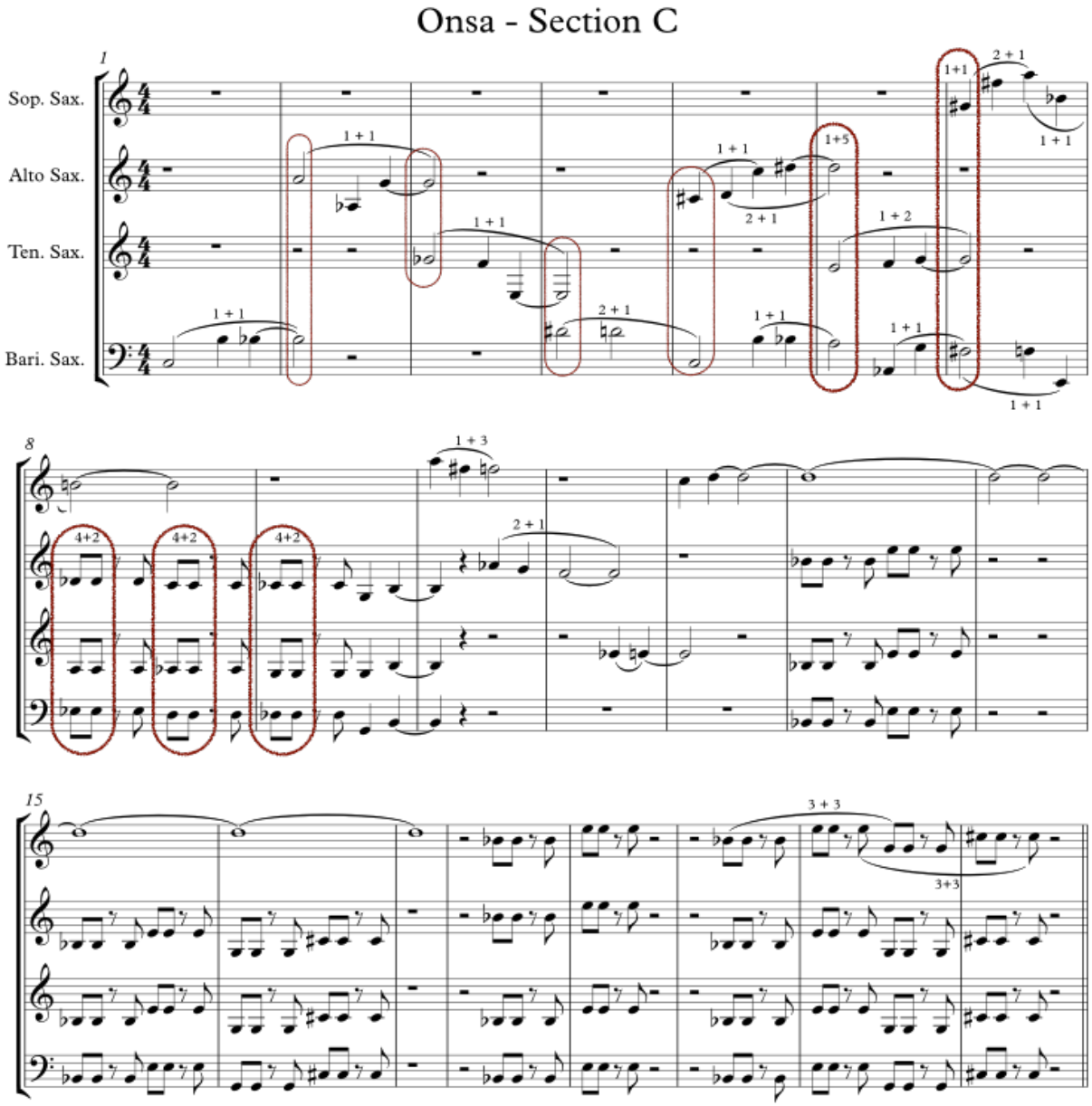
[ex 4.5.1.4]

From bar 5 the following melody is distributed over the four voices. The first four bars display a twelve-tone row, the second half a ten-tone row with one note repeated.



[ex 4.5.1.5]

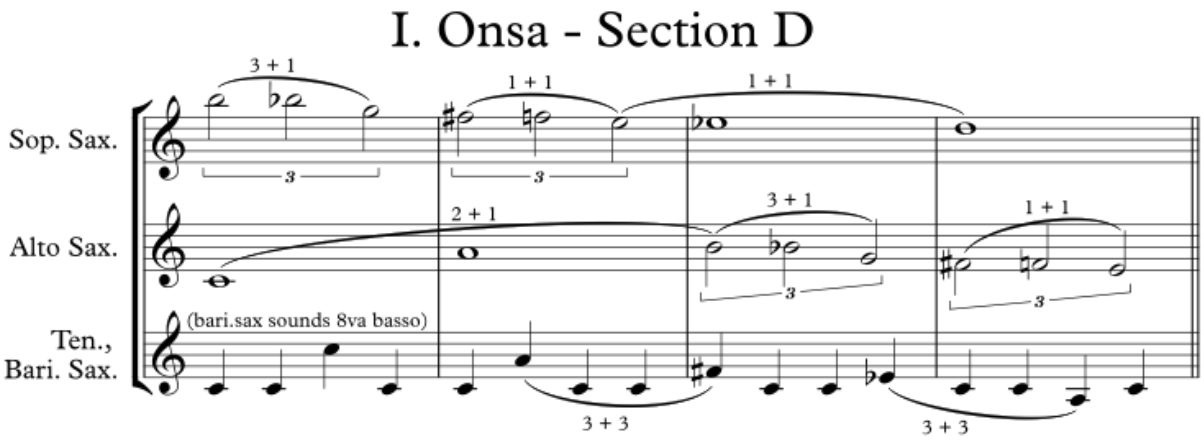
The following example shows section C. The encircled dyads and triads in bars 2–7 all contain minor second intervals that emphasize the dissonance of the first hour of the Tone Clock. The unison parts in the last four bars are constructed with trichords 3+3, the steering trichord of the first hour.




[ex 4.5.1.6 "Onsa" – section C theme]

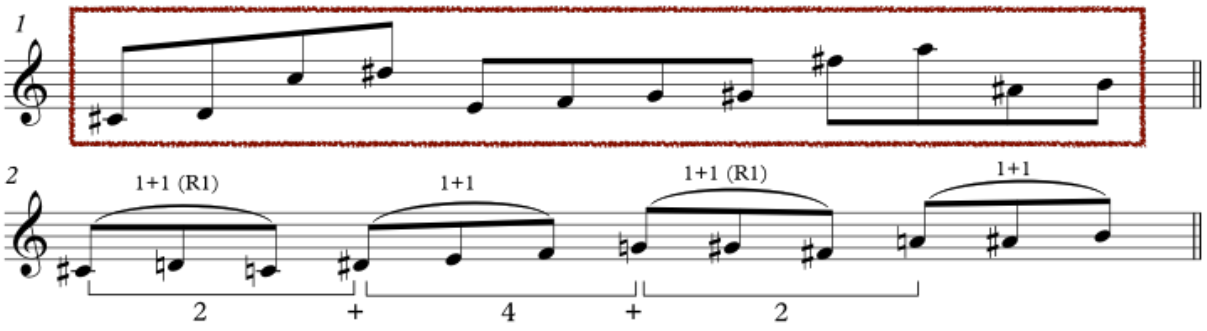
Section D, the solo section of this tune, serves as a continuously repeated background line behind the solos of the baritone, alto and soprano saxophonists. Only after the last soloist has finished his part, it is played by all four horns. The soprano and alto saxophones play crossing lines that together display a ten-note row, while the tenor and the baritone saxophones combine the root note c with the notes a, $f^{\sharp}$, and $e^{\flat}$. Together

they create a C-diminished chord by stacking two rotations of the 3+3 steering chord: c–e♭–f♯, and e♭–f♯–c.




[ex 4.5.1.7 "Onsa" – section D theme]

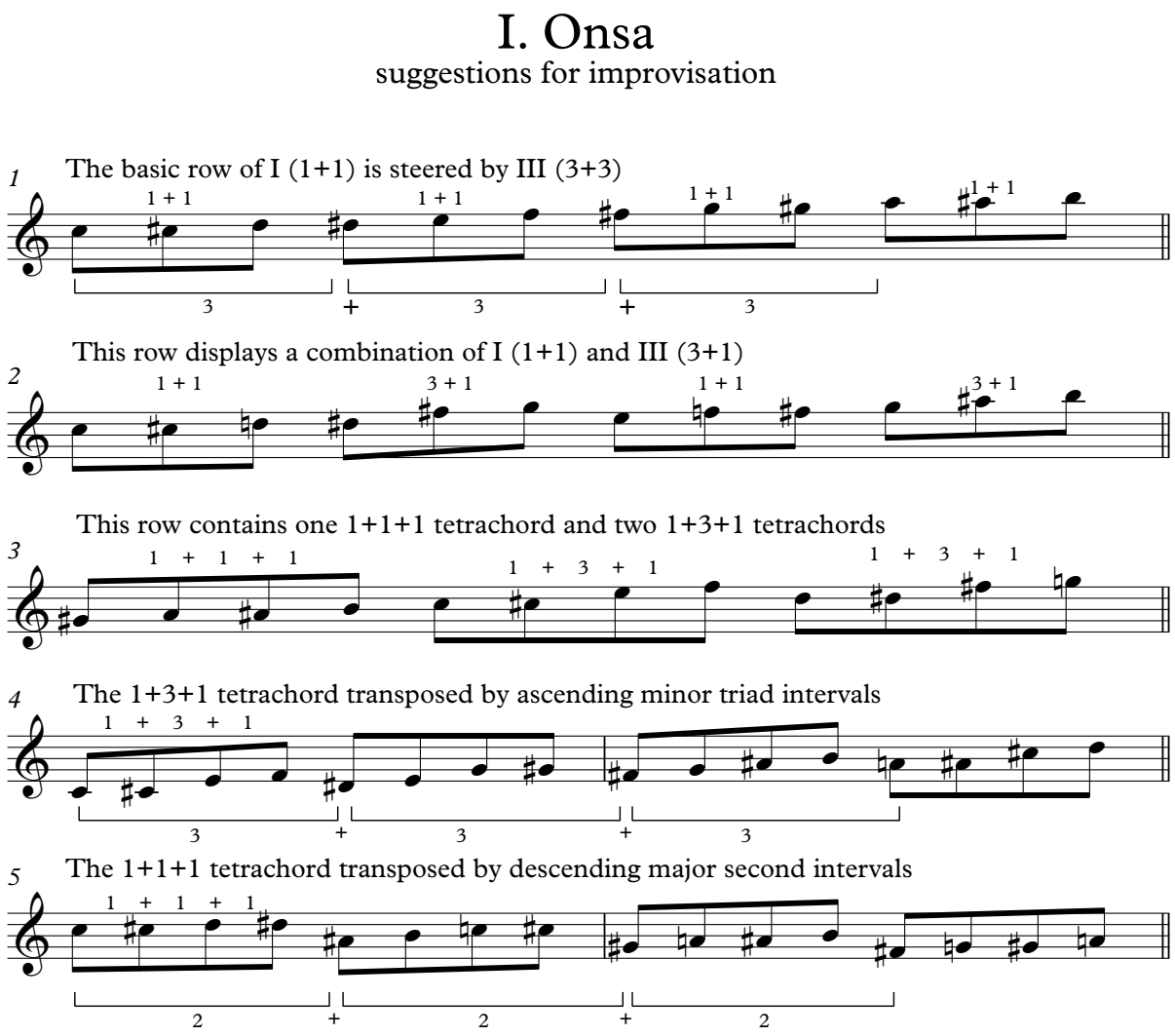
Section E repeats the twelve-tone row from section C. After being played in a number of variations, it ends in the form of a canon. The first line in the next example shows the melody in its simplest form. The second line displays its basic twelve-tone row.




[ex 4.5.1.8 "Onsa" – section E theme]

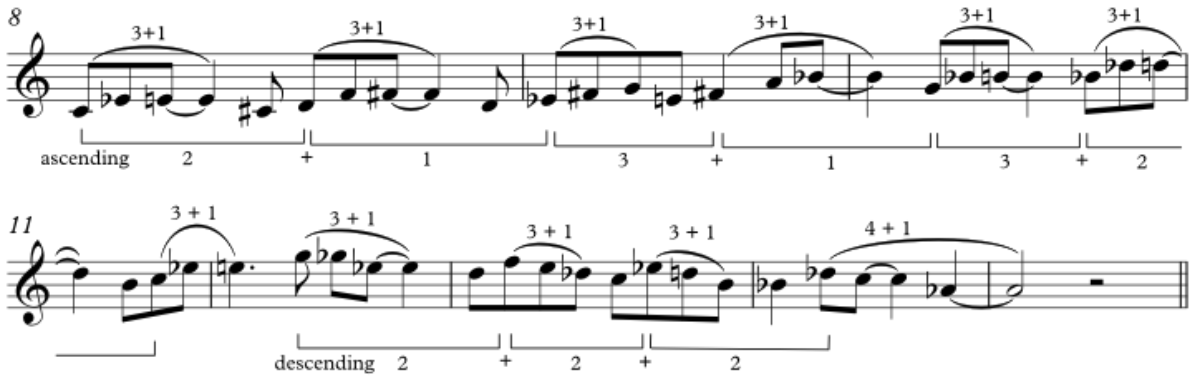
The example below shows my suggestions for improvisation with the first hour. The first three bars display complete twelve-tone rows. To prevent from an abundant use of the chromatic scale, I suggest the (combination of) trichords 1+1 and 1+3 in bar 2 as a possible point of departure. To help getting acquainted with the sound of this row I point at the tonal reference of the combination of trichords 1+1 and 3+1 to what is called the

harmonic minor of the fifth degree, the second tetrachord of a minor (or major) harmonic scale. To highlight this characteristic sound of the first hour my advice is to create sequences by transposing this trichord combination up and down by intervals of (combinations of) minor seconds, minor thirds and major seconds. Extended forms of these trichords in bar 3 result in three tetrachords completing a twelve bar row. Bars 4 and 5 contain simple manipulations of the form and the order of similar trichords. Bar 4 shows a succession of the extended 1+3 trichords steered by trichord 3+3. The presence of this steering trichord refers to the tonal color of the diminished chord. In bar 5 trichord 2+2 is used as steering trichord to order the extended trichords of the basic row in bar 1. Here the steering trichord refers to the tonal color of the whole-tone scale.



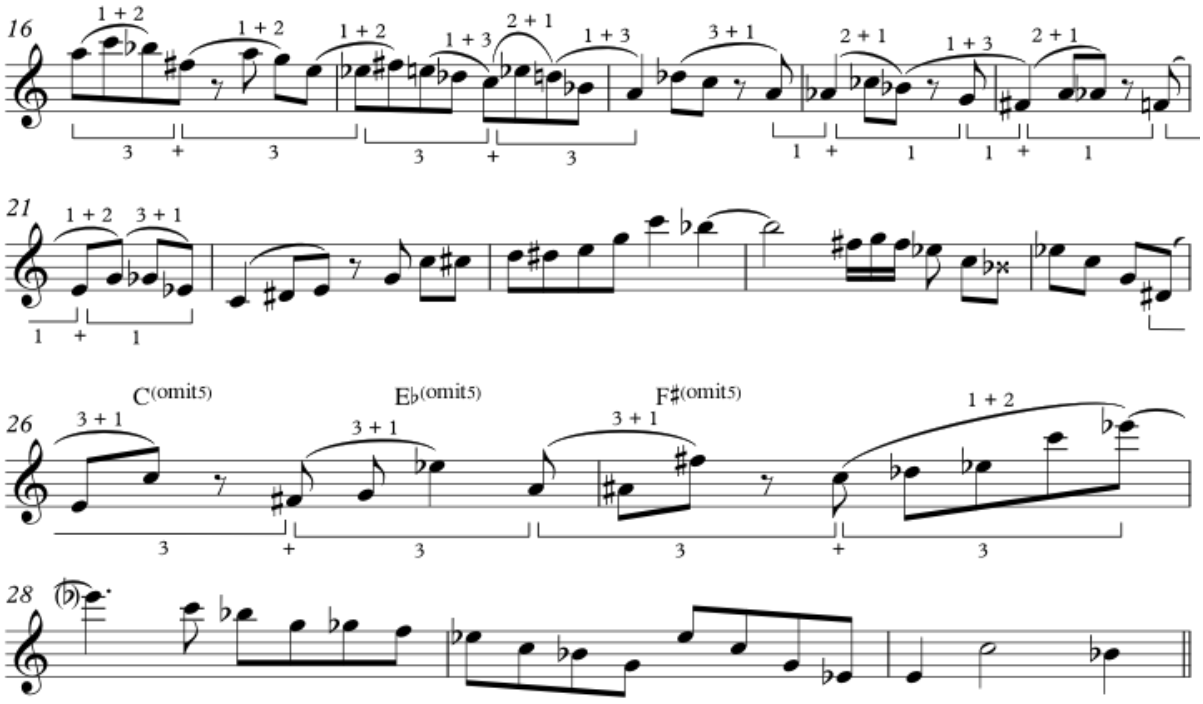

[ex 4.5.1.9]

The following fragment of my own tenor saxophone solo shows examples of trichord operations as suggested above. In bars 8–11, I play an ascending sequence of 3+1 trichords. The steering hours of these trichord combinations are quite random: 2+1, 3+1, and 3+2. In the following bars, I play a descending succession of 3+1 trichords in retrograde. This sequence is steered by the symmetry of the extended trichord 2+2+2. This fragment refers both to my ideas of both repeating trichords by freely transposing them up an down, and to create orderings by applying symmetric steering trichords, as demonstrated in bar 5 of my suggestions for improvisations. Both operations are meant to illustrate and emphasize the sound possibilities of the trichords and trichord combinations at stake rather than to manipulate the complete Tone Clock hours.




[ex 4.5.1.10 "Onsa" – tenor saxophone solo fragment]

In the next fragment of my solo the symmetry of the first hour's row is illustrated by the 3+3 steering trichords in bars 16–17 and 26–27. These bars point back to the idea of ordering segments at minor third distances as expressed in bar 4 of my suggestions for improvisation. In bars 18–21, the basic 1+1 trichord of the first Tone Clock hour itself serves as a steering hour of a sequence of 1+2 and 1+3 trichords.




[ex 4.5.1.11 "Onsa" – tenor saxophone solo fragment]

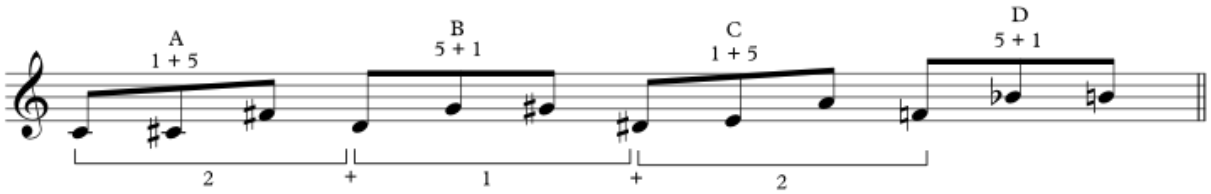
**Evaluation**

The composed parts in "Onsa" display conscious applications of various twelve-tone operations. Operations with three distinct twelve-tone rows are applied to construct the melodic lines. They are manipulated by octave displacements, by re-ordering trichords and trichord combinations from the row, and by transpositions of these elements. Vertical orderings are created by stacking the trichords and trichord combinations from the first Tone Clock hour and from other hours. The trichord terminology appears to be an insightful tool to identify these vertical orderings that are difficult to express in conventional chord symbols.

The transcription of my tenor saxophone solo demonstrates a deliberate use of successions of trichords from the basic row and from related rows. It provides clear illustrations of ordering these trichord successions by the steering chord of the row or by other symmetric steering trichords. These operations illustrate the possible applications of my suggestions for improvisation.

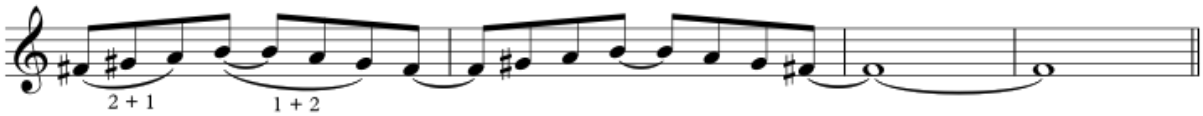
### 4.5.2 "Pontiac"

In the basic row of "Pontiac" the 1+5 and 5+1 trichords of the fifth hour are steered by trichord 2+1 from the second hour.



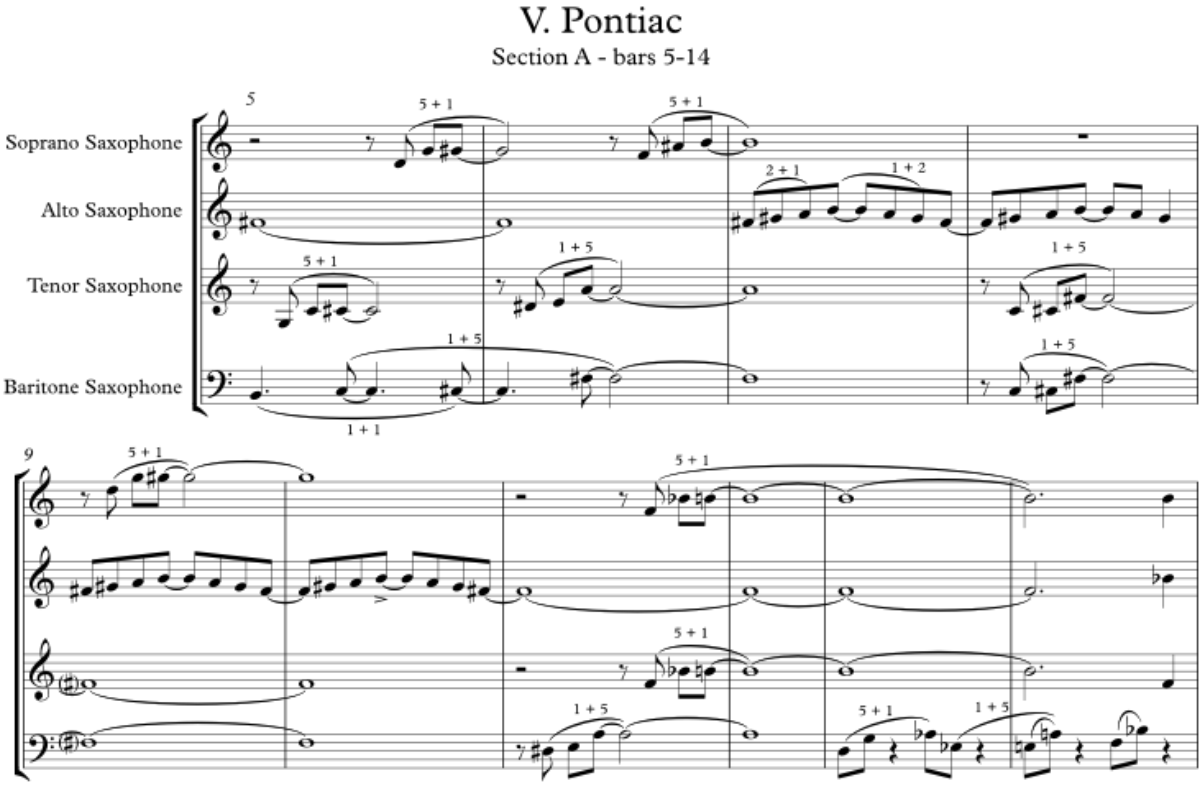

[ex 4.5.2.1]

The alto saxophone opens section A with the following fragment, created with the steering trichord of the second hour, that will serve as a basic line all through this movement.




[ex 4.5.2.2 "Pontiac" alto saxophone melody]

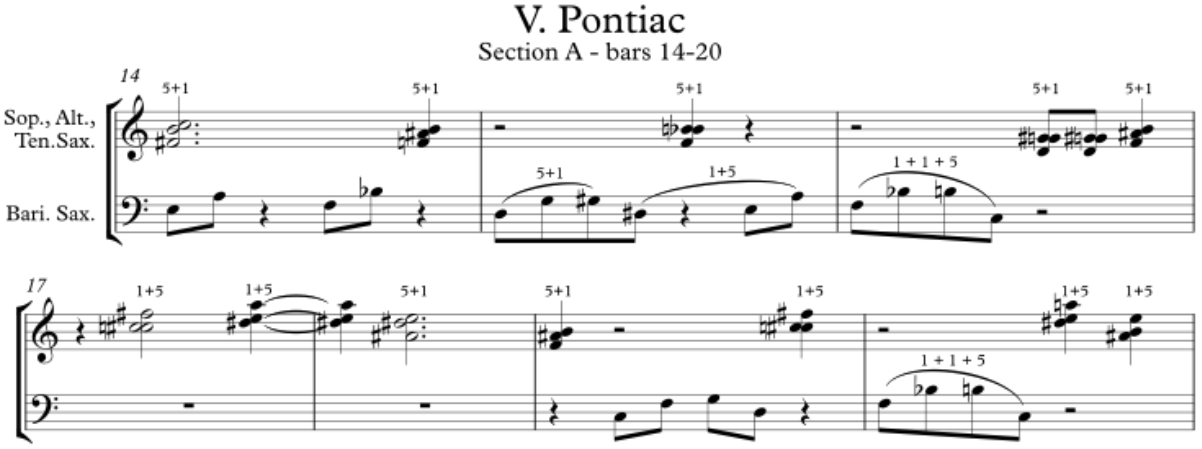
From bar 5 in section A, the alto saxophone continues this basic line, while the soprano and tenor saxophones play 5+1 and 1+5 trichords. So does the baritone saxophone, but he adds a chromatic pick-up note. This combination of trichords 1+1 and 1+5 results in fact into a 1+1+5 tetrachord.




[ex 4.5.2.3 "Pontiac" – section A fragment]

Then, the baritone saxophone continues playing perfect fourth intervals, largely at distances of minor seconds, again resulting in 1+5 and 5+1 trichords. In bars 16 and 20 the 1+1+2 tetrachord is played again, with the note c in octave displacement.

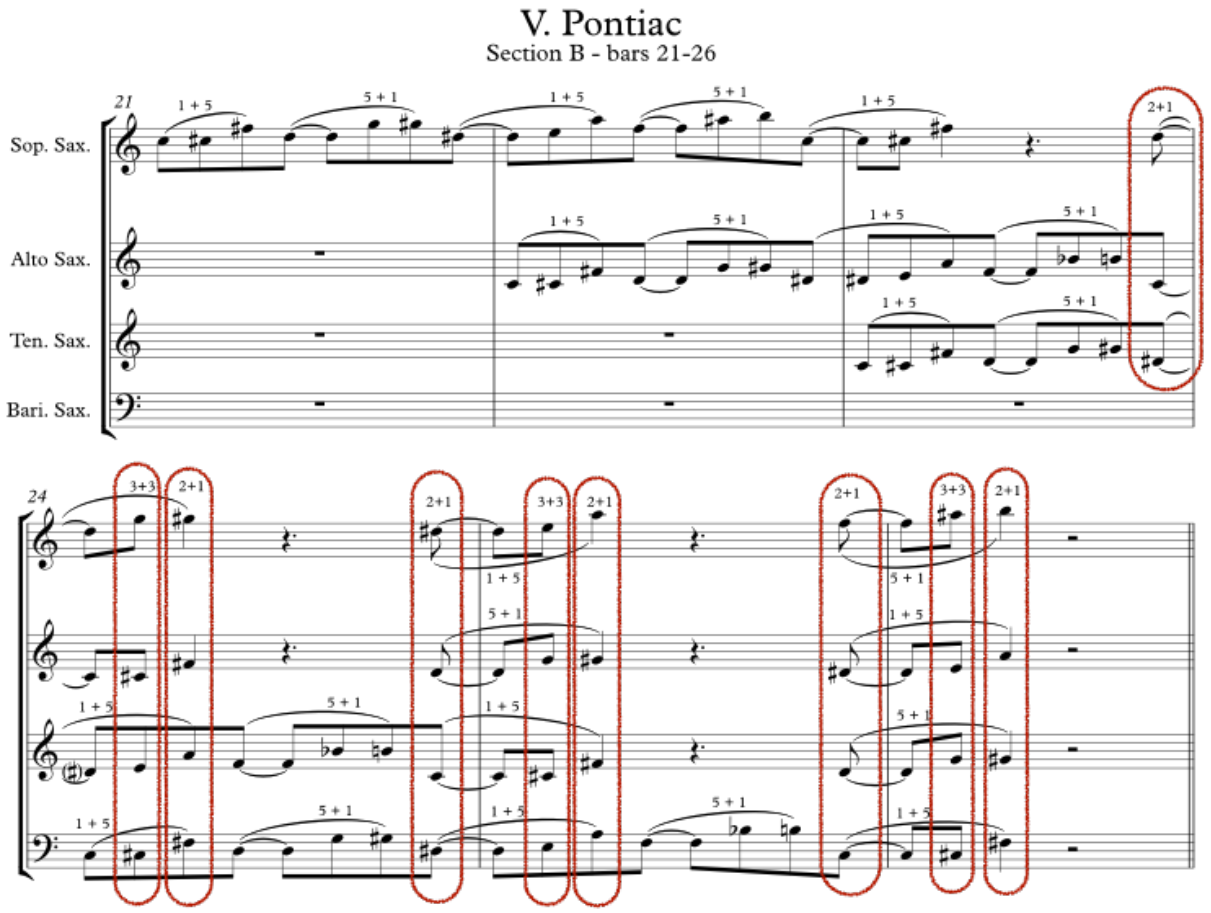
Tenor, alto, and soprano saxophones play vertical orderings of trichords 1+5 and 5+1.




[ex 4.5.2.4 "Pontiac" – section A fragment]

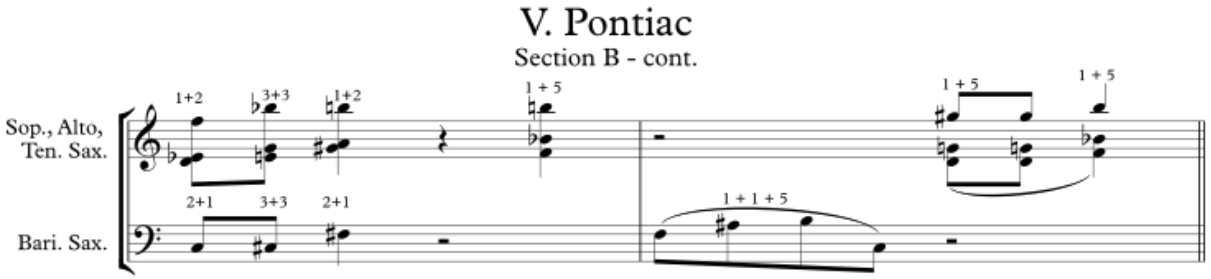
In section B the centrifugal sound of the fifth hour is emphasized by repeating the complete basic twelve-tone row as a canon over all four voices. As a result of this

arrangement of the rows, vertical orderings of steering trichord 2+1 and trichord 3+3 could be created.



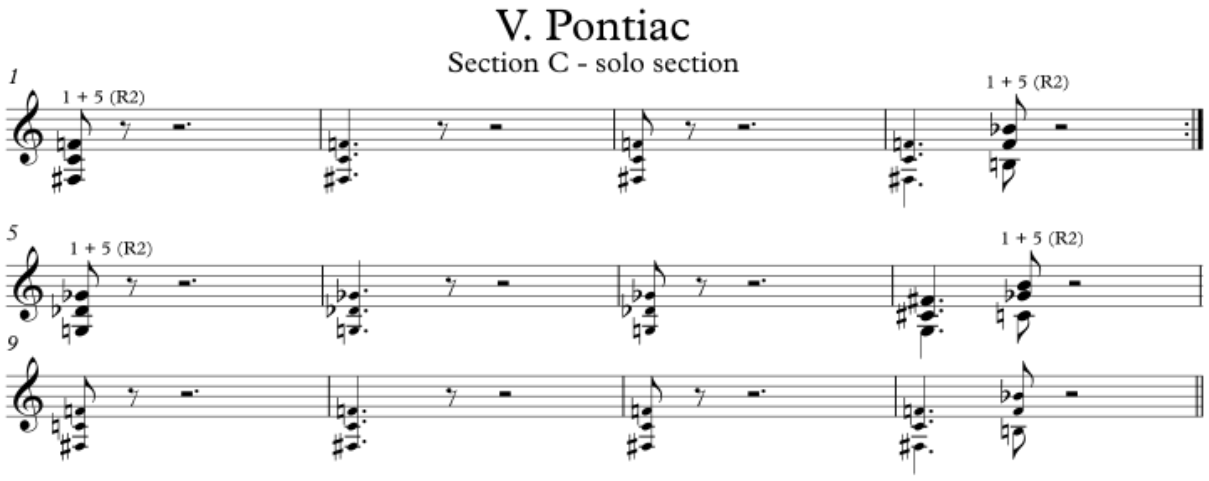

[ex 4.5.2.5 "Pontiac" – section B fragment]

In the continuation of section B the stacked 1+2 and 1+5 trichords, with the soprano part in octave displacement, keep emphasizing the dissonant sound of the fifth hour.




[ex 4.5.2.6 "Pontiac" – section B fragment]

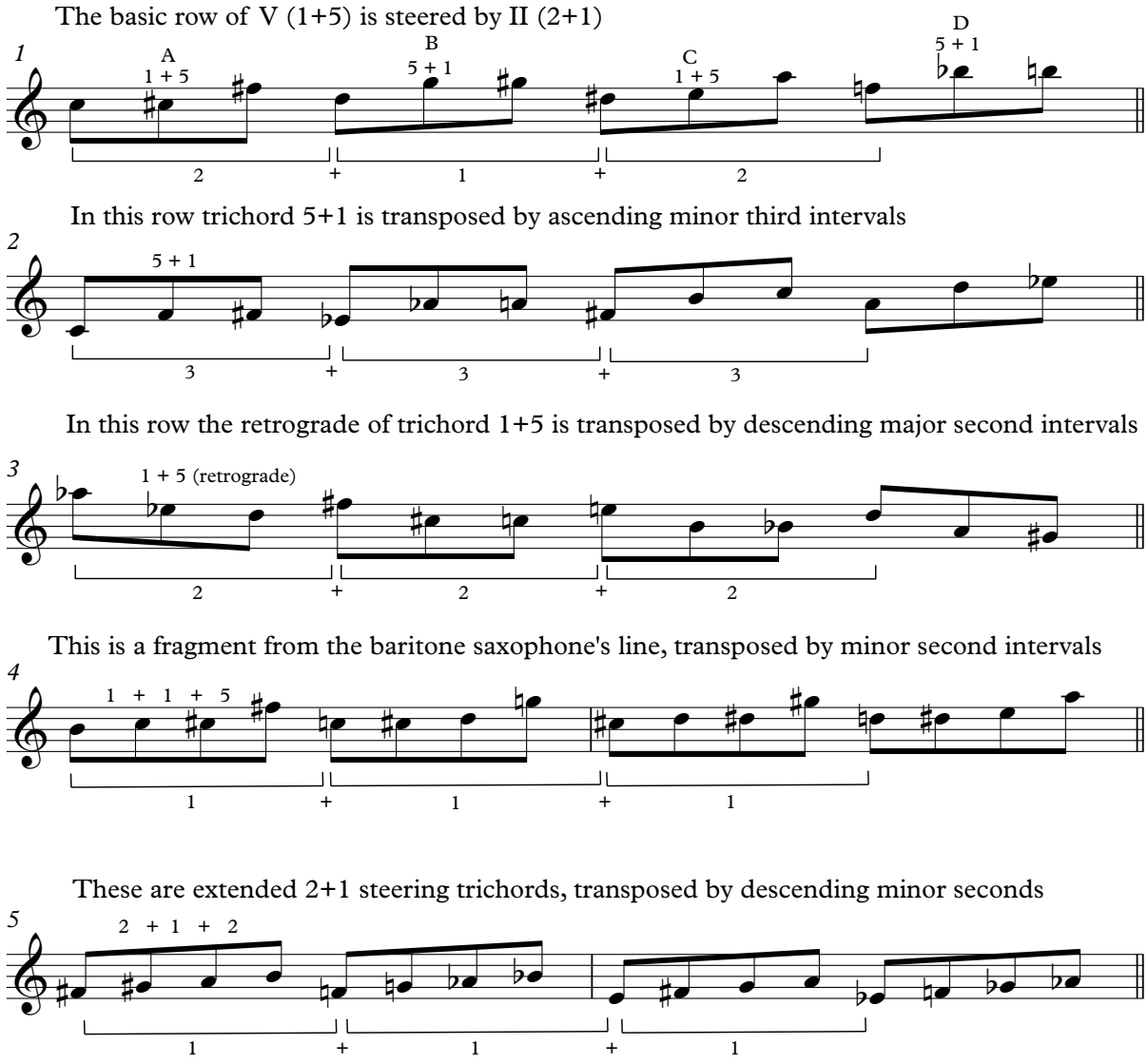
The solo form in section C is a traditional A1 (bars 1–4) - A2 (bars 1–4 repeated) - B (bars 5–8) – A3 (bars 9-12) form that is – although usually arranged in lengths of eight bars per section – quite common in jazz. The accompanying part is made of stacked 1+5 trichords in second rotations, resulting in intervals of augmented and perfect fourths.




[ex 4.5.2.7]

In my suggestions for improvisations in the example below, I intend to present ideas of meaningful melodic lines. I mention for instance in bar 2 that a transposition of trichord 5+1 by minor third intervals will create a stronger melodic line than applying the same operations to trichord 1+5. The latter will result in a pattern evoking a "cliché embellishment" of a diminished seventh chord, a pattern that in my opinion should be avoided in order to keep distance from obvious tonal references. In bar 3, I suggest the retrograde of trichord 5+1 played in descending direction, transposed by major second intervals. I find this line attractive because in this ordering the major second interval is added to the minor second and perfect fourth of the trichord, to result in a higher harmonic vagueness and at the same time in a larger emphasis on the basic trichord. The suggestions in bars 4 and 5 are related to elements in the theme of "Pontiac". In bar 4, I suggest to pick the tetrachord played by the baritone saxophone in bar 5–6 of section A, a characteristic pattern in the composed part, and to transpose this by minor second intervals. In bar 5 the extended 2+1 steering trichord of the row, which plays an important role in the vertical structures of the composition, is transposed by descending minor second intervals.

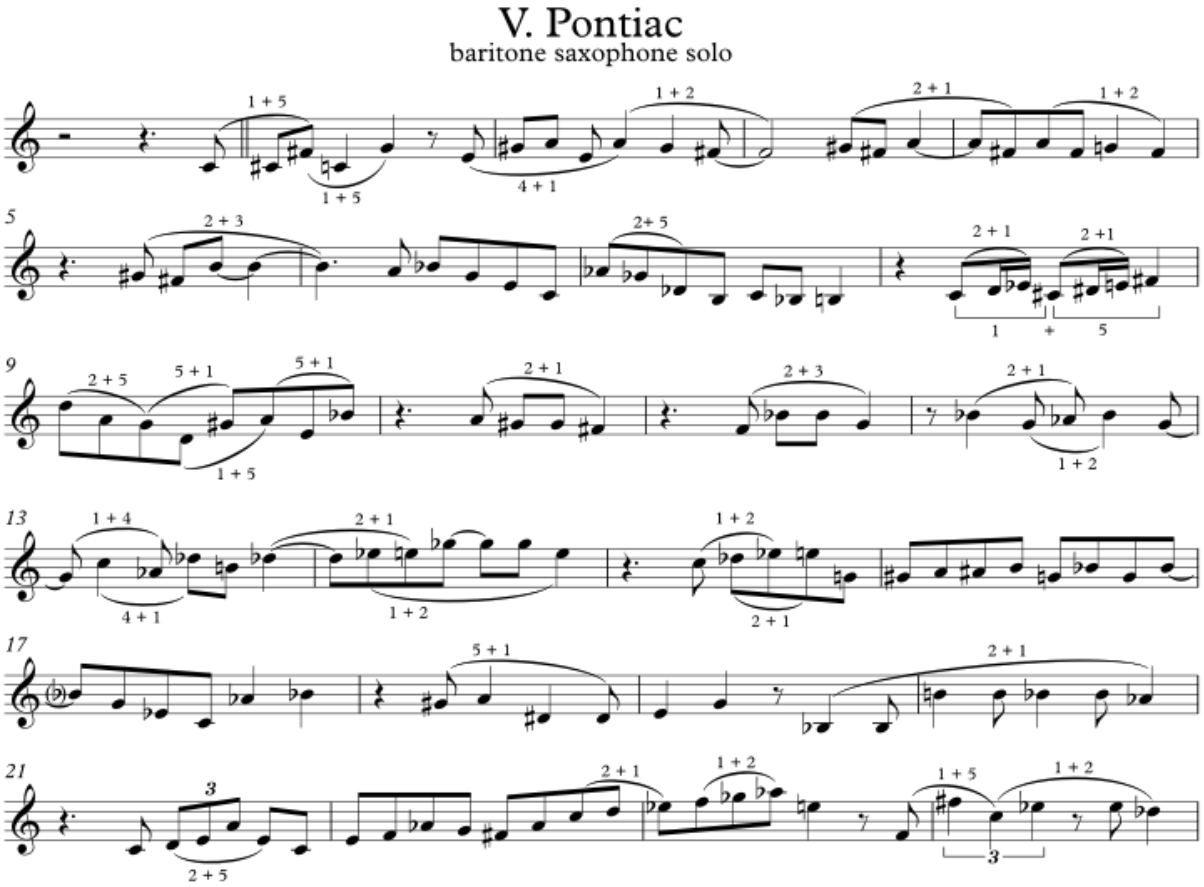
# V. Pontiac
suggestions for improvisation




[ex 4.5.2.8]

The transcription of the first twenty-four bars of Nils van Haften's baritone saxophone solo doesn't show any concrete links to my suggestions for improvisation above. However, thanks to his well-informed intuition and his substantial experience as a jazz improviser he manages to play a solo that displays evident connections with the structure of the fifth hour's row and its application in "Pontiac". In bars 1, 9, 18, and 24 he relates explicitly to the 1+5 row of the fifth hour, but also to trichords 1+2 from the steering trichord that is important in the melody of this tune. This is evident in bar 14 that sounds like an echo of the alto sax melody in section A. It is also illustrated in bar 8, were the 1+2 trichord is played in the melody, while the basic 1+5 trichord is the steering interval.

An important ingredient of the 1+5 trichord, the perfect fourth interval is emphasized several times in Van Haften's solo. Beside in the 1+5 trichords from the row, this interval is also implied in the 2+5 trichords in bars 7, 9, and 21. Likewise, in the interval successions that are marked by trichords 1+4, 4+1 (bar 2, 13) and 2+3 (bar 5, and 11) the perfect fourths might lead him to use them as a references to the fifth hour of the Tone Clock. Although this striking element in his solo does not comply strictly with the appointed 1+5 trichords of the fifth hour, it is tenable in musical terms. In the next section I will come back to the relations between trichords 1+5, 2+5, and 2+3.




[ex 4.5.2.9 "Pontiac" – baritone saxophone solo fragment]

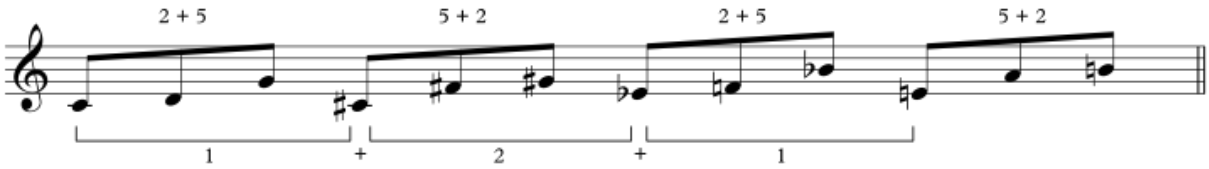
**Evaluation**

Compared to "Onsa", the focus in "Pontiac" has been changed from manipulations of complete twelve-tone rows to operations with the trichord segments of the row. As a result, the horizontal relationship in the melodic lines between the 1+5 basic trichord of the row and the 2+1 steering trichord, ordered in alternating positions, is more intense. In their vertical orderings both trichords effectively support the characteristic dissonant sound of the fifth hour.

In his solo, Van Haften's reference to the Tone Clock hour is more distant than mine in my solo in "Onsa". Instead of deliberate operations with a single predominant trichord, he intuitively refers to the appointed intervals of a minor second and a perfect fourth. This is the direct result of my additional advice to the soloists, to refer intuitively to the written parts while following my written suggestions for improvisation.

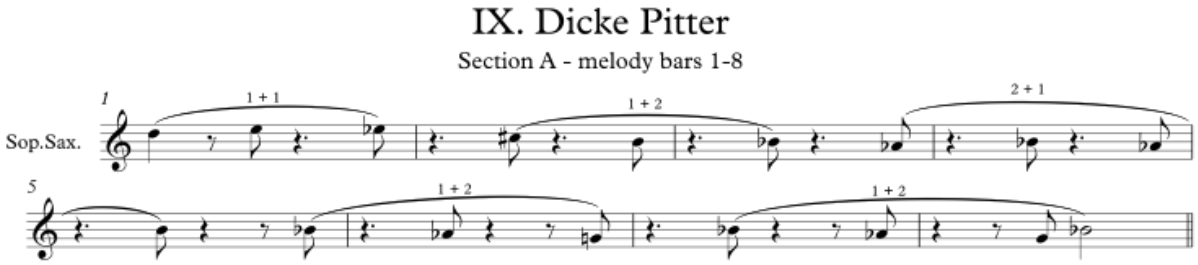
### 4.5.3 "Dicke Pitter"

In the basic row of "Dicke Pitter" the 2+5 and 5+2 trichords of the ninth hour are steered by trichord 1+2 from the second hour.




[ex 4.5.3.1]

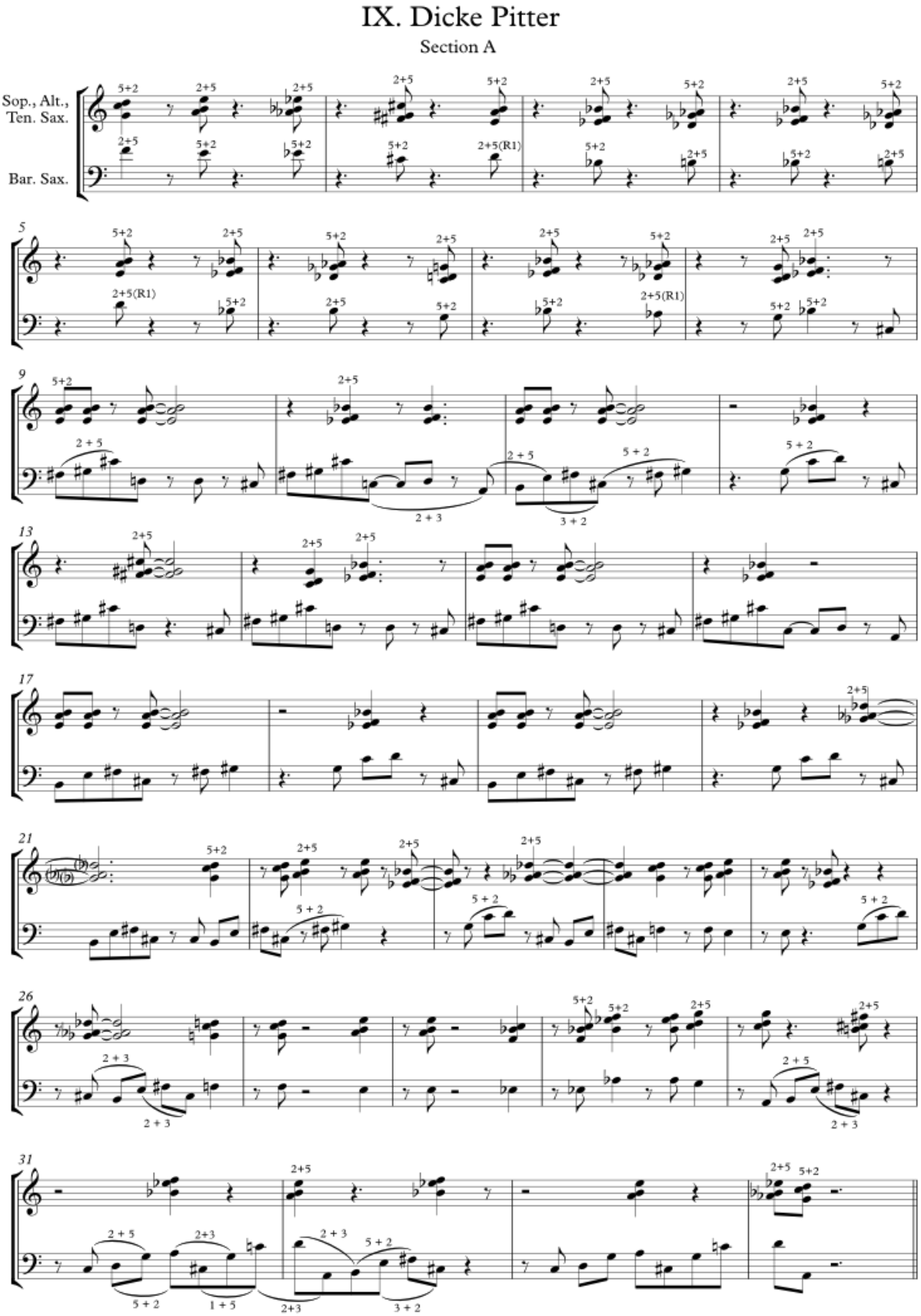
In section A of "Dicke Pitter" the bells of the cathedral in Cologne are sounding. This fragment mocks the rhythmic effects of bells in a clock tower ringing at the same time. In the first eight bars the soprano saxophone plays a series of accentuated notes constructed with 1+1 and 1+2 trichords.




[ex 4.5.3.2 "Dicke Pitter" – section A fragment]

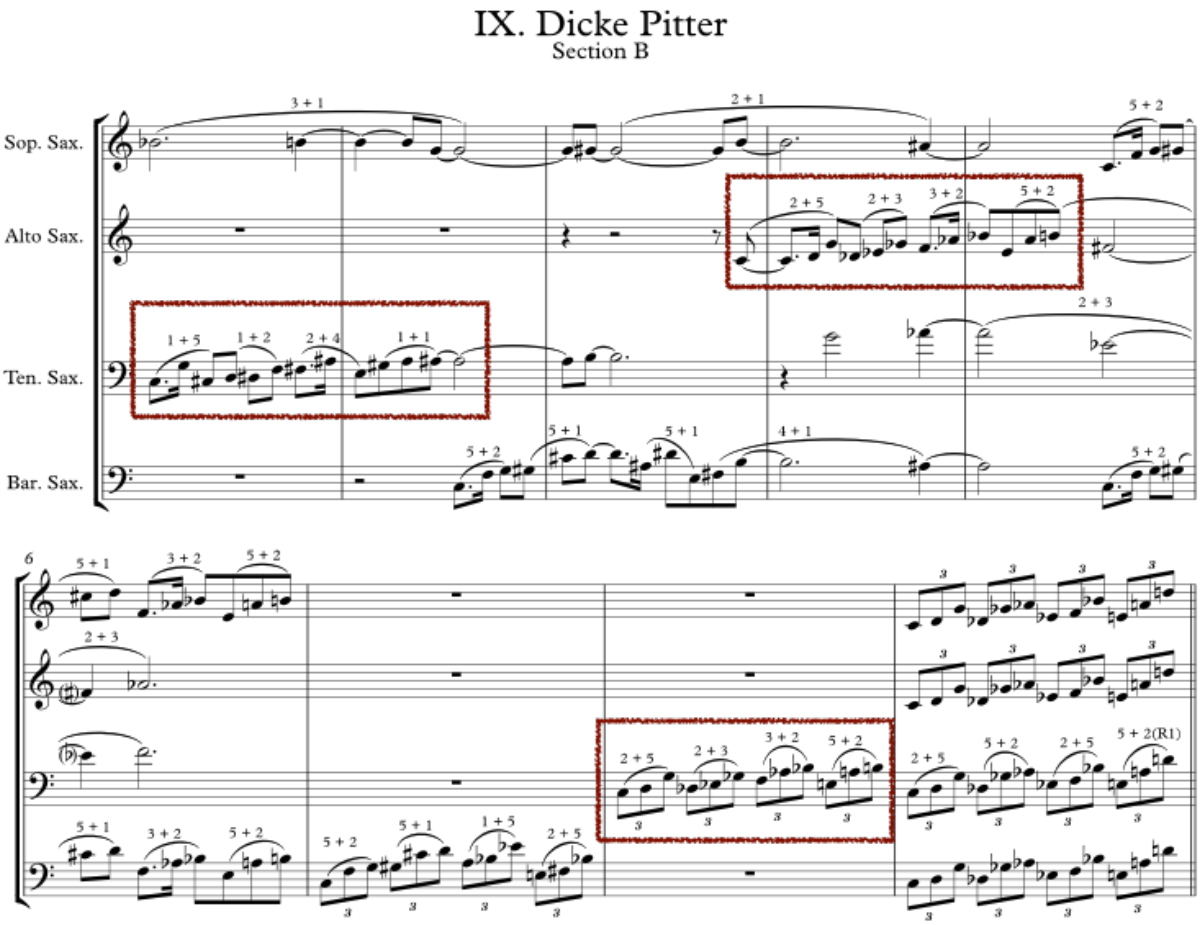
This melody is harmonized with vertical orderings of 2+5 and 5+2 trichords. Trichords 5+2 are stacked on 2+5 trichords and 2+5 trichords stacked on 5+2 trichords, resulting in tetrachords of 2+5+2 and 5+2+5.

From bar 9 until the end of section A, the baritone saxophone plays a melodic line that is mainly constructed with 2+5 trichords. The fragments in bars 10–11 and in bars 30–34 display combinations of trichord 2+5 with trichords 2+3 and 1+5. These bars can serve as demonstrations of Schat's statement that trichord 2+5 "easily makes contact with other tonalities […] such as that of the Seventh Hour […] or more distantly, that of the Fifth Hour" (Schat 1993: 67).



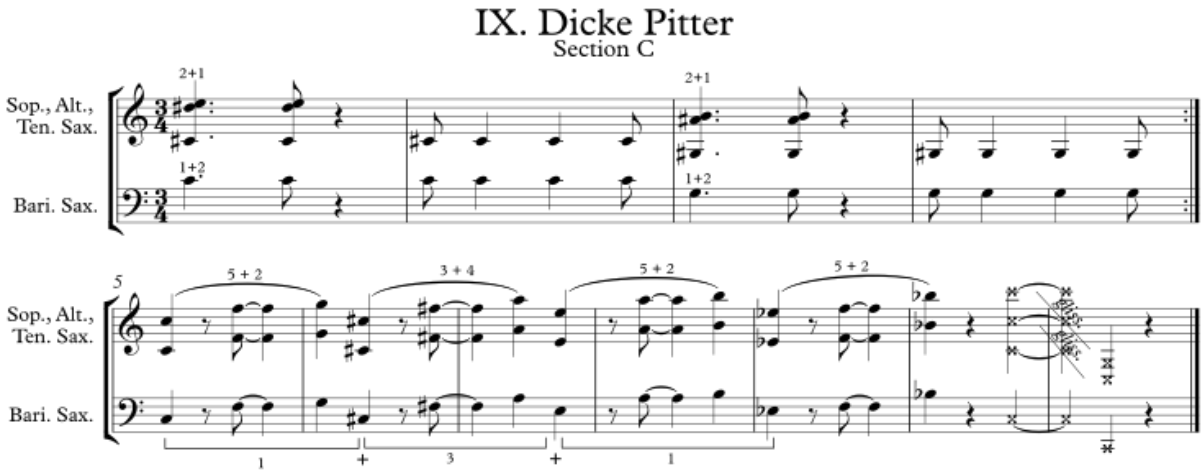

[ex 4.5.3.3 "Dicke Pitter" – section A fragment]

In section B the tenor saxophone sets up a melodic line that in bars 1–2 displays a twelve-tone row ordered with a succession of trichords 1+5, 1+2, 2+4 and 1+1. The other saxophones successively answer this line with rows of different lengths and different trichords. The soprano and baritone saxophones together in bars 5–6 play a combination of 5+2, 5+1, 3+2, and 5+2 that results in a ten-tone row. The alto sax in bars 4–5 plays a twelve-tone row that combines trichords 2+5 and 5+2 with trichords 2+3 and 3+2, and is repeated by the tenor saxophone in bar 8. These lines again provide evidence for Schat's statement about the easy contact between these trichords. The baritone saxophone plays a ten-tone row in bars 2–3 and repeats this in bar 7. The line in bar 9, played in unison and octaves, almost displays the complete twelve-tone row of the ninth hour. The last note b is changed into the note d, to end this short theme with a trichord of two perfect fourth intervals, the first rotation of 2+5 trichord d–e–a.



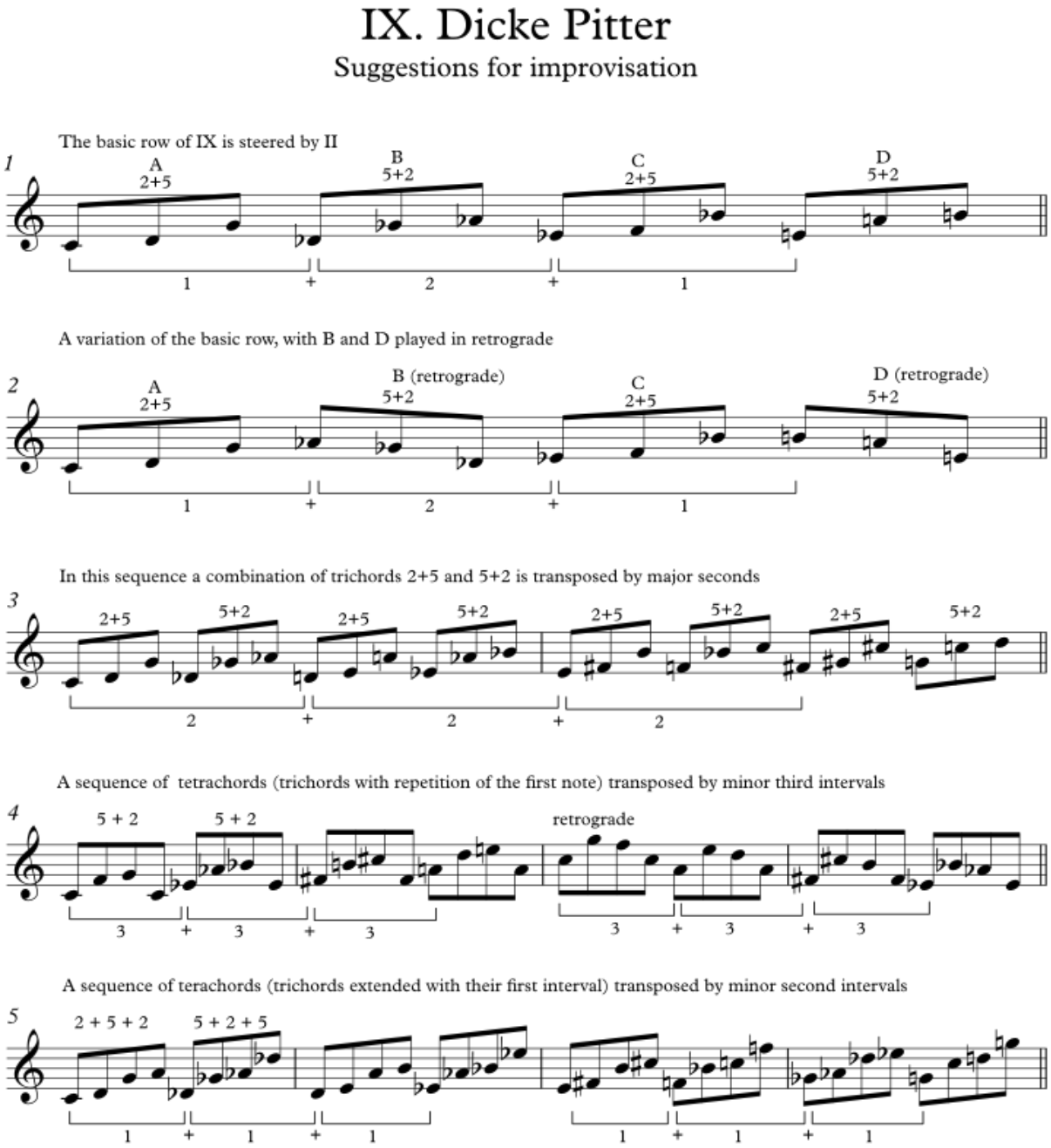

[ex 4.5.3.4 "Dicke Pitter" – section B fragment]

Section C is open for a tenor saxophone solo. The accompaniment is a succession of vertically ordered steering trichords 1+2 and 2+1. This results in a harmonic reference of a C pedal point and a G pedal point. The tutti part starting at bar 5 is finished abruptly by a long "fall" played by all four saxophones.




[ex 4.5.3.5 "Dicke Pitter" – section C bars 5-11]

As a first suggestion for improvisation in bar 2, I stay close to the basic row of the ninth hour, by putting the second (B) and fourth trichord (D) of the row in retrograde. In bar 3 I suggest a sequence of a trichord combination A+B, transposed by major second intervals. Then, in order to escape to the "three-ness", the continuous presence of 12/8 triplets in the twelve-tone rows, I play the 5+2 and 2+5 trichords in bars 4 and 5 in extended forms. The sequence in bar 4 is created by repeating the root notes of all 5+2 trichords and by transposing the resulting tetrachords by minor third intervals. In bar 5 I extend the trichords by repeating their first intervals: trichord 2+5 becomes tetrachord 2+5+2, and trichord 5+2 becomes tetrachord 5+2+5. The resulting tetrachords are steered by minor thirds and by minor second intervals. Here I again show my preference to create differences between the intervals in the trichords and the steering intervals.

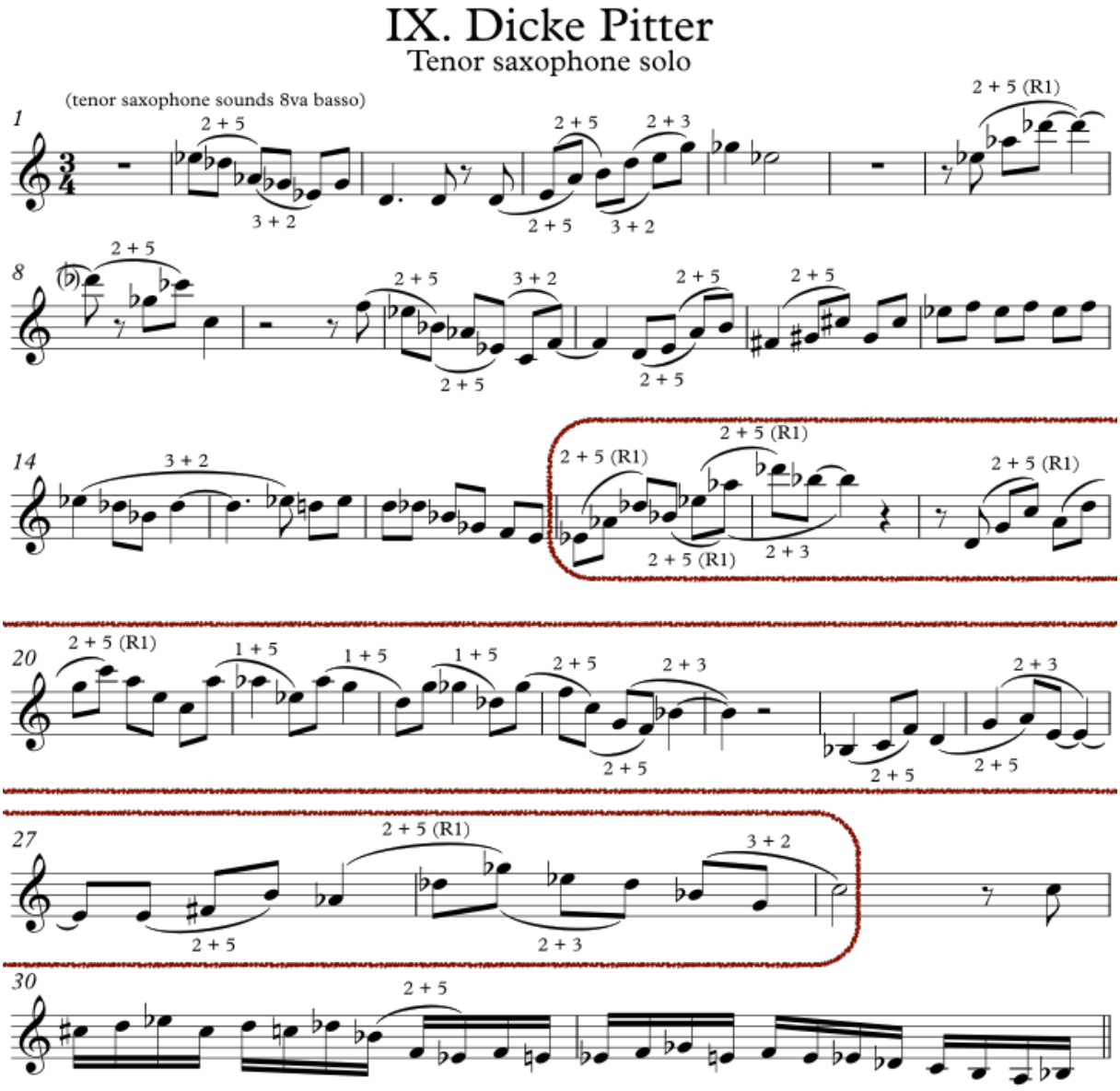



[ex 4.5.3.6]

Trichord analysis of my tenor saxophone solo reveals a large number of deliberate applications and variations of the 2+5 trichord; there are no clear references to the suggestions for improvisation above. The encircled fragment of bars 17–29 summarizes a number of characteristic applications. First, in bars 17–20 the first rotations (R1) of trichord 2+5 draw the attention by the symmetric combinations of two perfect fourth intervals. These are followed by several 2+5 trichords in prime forms in bars 23–27.

Bars 21–28 also show combinations of trichord 2+5 and trichords 2+3, and 2+5. This again recalls Schat's statement that the ninth hour easily makes contact with the seventh

and the fifth. The trichord analysis indeed shows a connection between trichord 2+5 and the 2+3 and 1+5 trichords of these hours. I admit that at the moment I played this solo I was not aware of this connection. Just as in Van Haften's baritone saxophone solo in "Pontiac", the connection seems to result of my emphasis on the interval of a perfect fourth which is also a component of trichord 1+5, and the "sum" of the trichord 2+3.




[ex 4.5.3.7 "Dicke Pitter" – tenor saxophone solo]

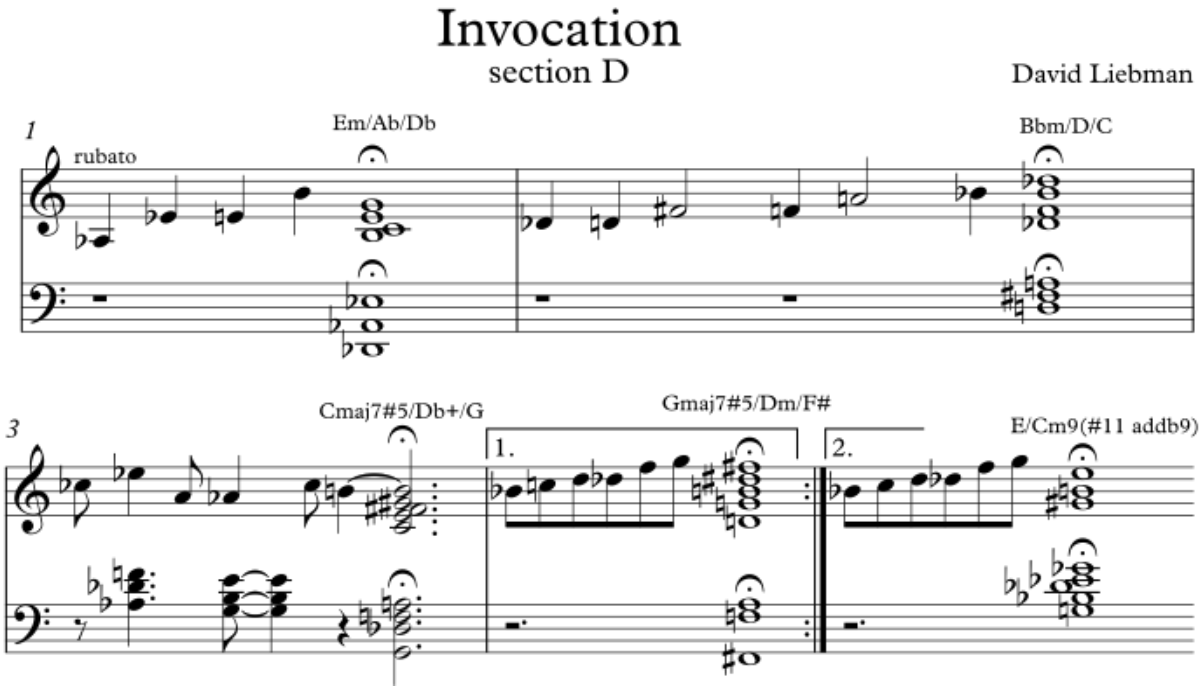
**Evaluation**

Two different twelve-tone rows, two different ten-tone rows, and one eleven-tone row can be identified in "Dicke Pitter". Both twelve-tone rows are constructed with trichords from various Tone Clock hours. Only the eleventh-tone row is constructed with ninth hour trichords exclusively. Despite the sparse references to the ninth hour in the melodic lines, the vertical ordered fragments contain separate stacking of both its rather consonant basic 2+5 trichord and the more dissonant 1+2 steering trichord. Schat's assumption of an "easy contact" between trichord 2+5, 2+3, and 1+5 is confirmed both in the composed part and in the tenor saxophone solo. Although not mentioned in the suggestions for improvisation, the second rotation of trichord 2+5 resulting in a stacking of two perfect fourth intervals, proved to be an interesting tool to create combinations of 2+5 trichords.

The combination of trichord 2+5 (rather consonant) with its steering trichord 1+2 (rather dissonant) on the one hand, with friendly trichords 2+3 (rather consonant) and 1+5 (rather dissonant) on the other, make this ninth hour of the Tone Clock an attractive tool in the border area between twelve-tone technique and tonality.

### 4.6 Trichord operations instead of "composite scales"

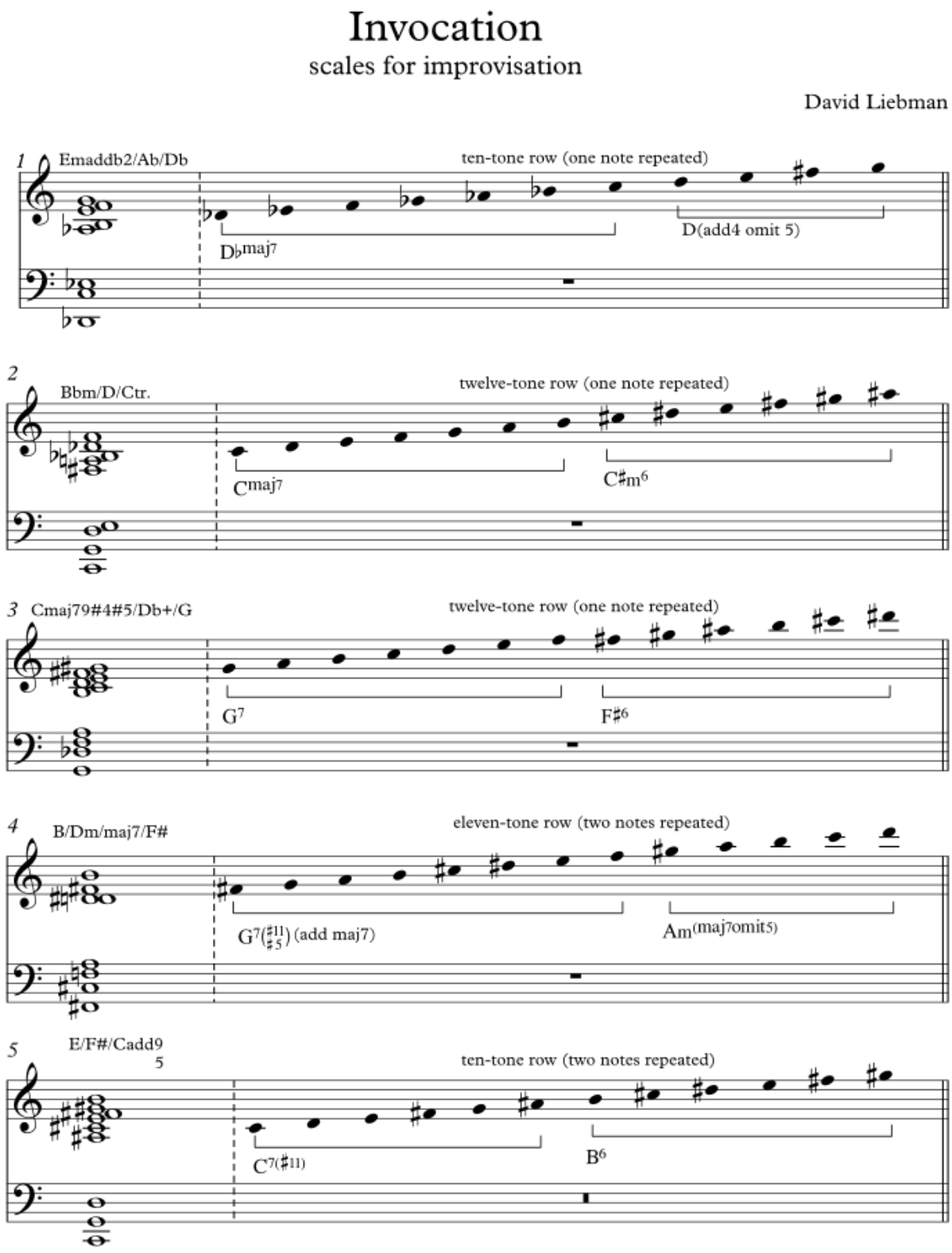
In section 3.2.3 I discussed the first three sections of Liebman's composition "Invocation" (Liebman 2013: 170). The example below displays a fragment of the slow ballad in section D of this composition. I will take this as an example to discuss trichord operations as a simple alternative to Liebman's complex improvisational approach.




[ex 4.6.1 "Invocation" – fragment section D]

Regarding the improvisations Liebman suggests to connect his "triple polychords" to a number of "composite scales" (Liebman 1993: 174), I have concerns with the complexity of these suggestions for improvisation. In my opinion, Liebman's scales as such sound like twelve-tone rows, without a clear link to the structure of the accompanying chords. This, combined with the fact that the separate "tonalities" of the last four bars each, tend to evoke an "anything goes" approach to improvisation that I dislike. As an alternative to his approach, I will demonstrate how twelve-tone techniques with the Tone Clock's trichords can be applied as a useful alternative to Liebman's random mixture of twelve-tone and tonal approaches.

The example below displays the rows, ranging between ten-tone and twelve-tone rows, as well as the implied fragments of diatonic scales in each row. The polychords (slightly different from those in the fragment above) are notated as root note with, stacked upon them, a combination of either two triads or a triad with a seventh chord.

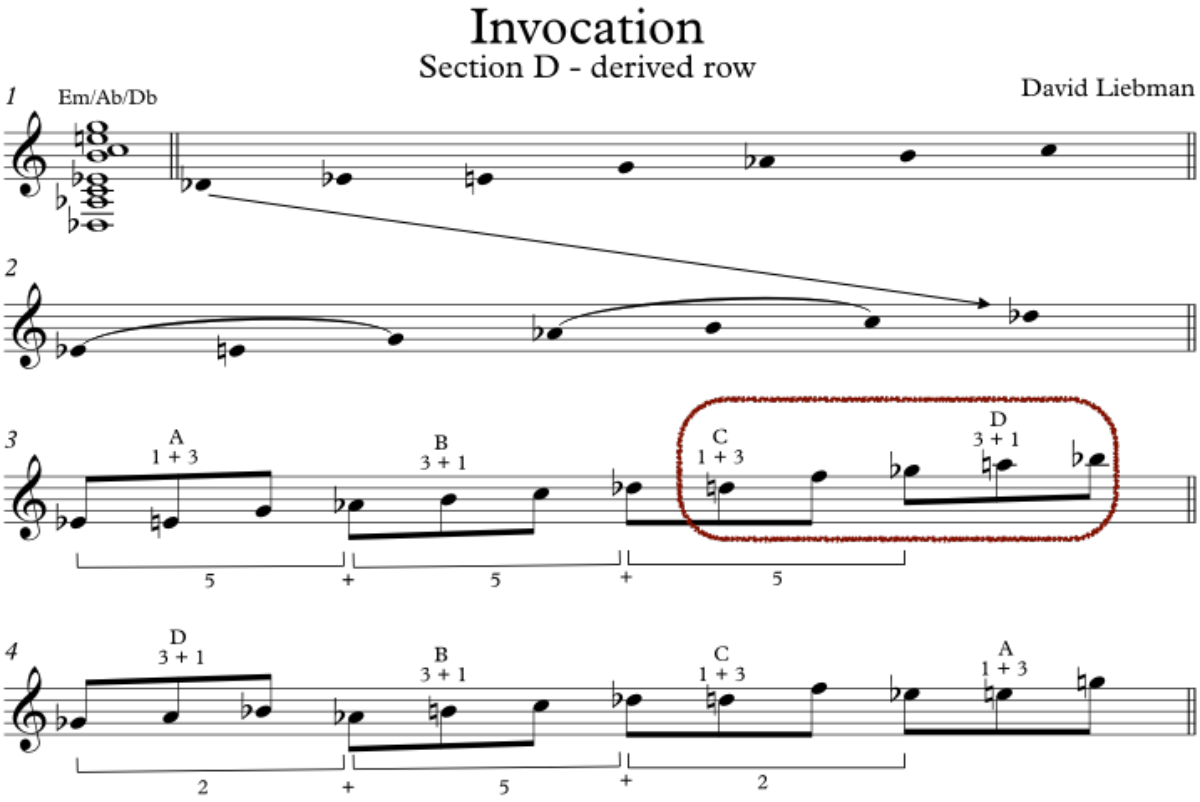



[ex 4.6.2]

The following examples show my trichord operations to the first, the second and the last accompanying chords in the fragment of section D shown above. In order to maximize

the connection between composition and improvisation, I chose the complex chords from that section, instead of Liebman's slightly modified solo chords.

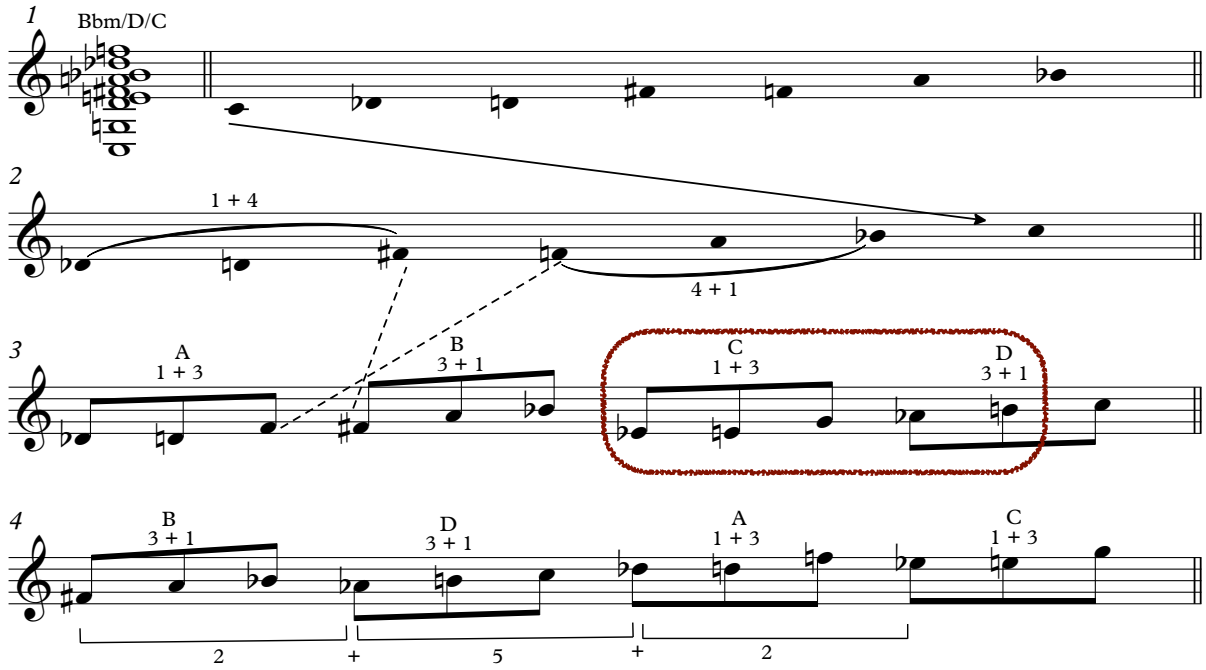
The first line contains all pitches from the melody and the chord in the first bar, in displayed order. By moving the note d♭ to the end of the row, this line starts with a combination of trichords 1+3 and 3+1. By transposing this combination up a minor seventh (T10), so that it starts with the note d♭, the twelve-tone row in bar 3 is created, containing a succession of 1+3 and 3+1 trichords from the third hour of the Tone Clock. This row is steered by tetrachord 5+5+5, a combination of two 5+5 trichords. The notes that are added to complete the row are encircled. As seen in "Dicke Pitter" in section 4.5.3, trichord 5+5 is the first inversion of trichord 2+5. With this in mind, the correct row that is displayed in the fourth line can be derived. It is steered by tetrachord 2+5+2, a combination of trichords 2+5 and 5+2. Thus, improvisers who are familiar with the Tone Clock can use this row as the basis for their improvisations on the stated complex chord.




[ex 4.6.3]

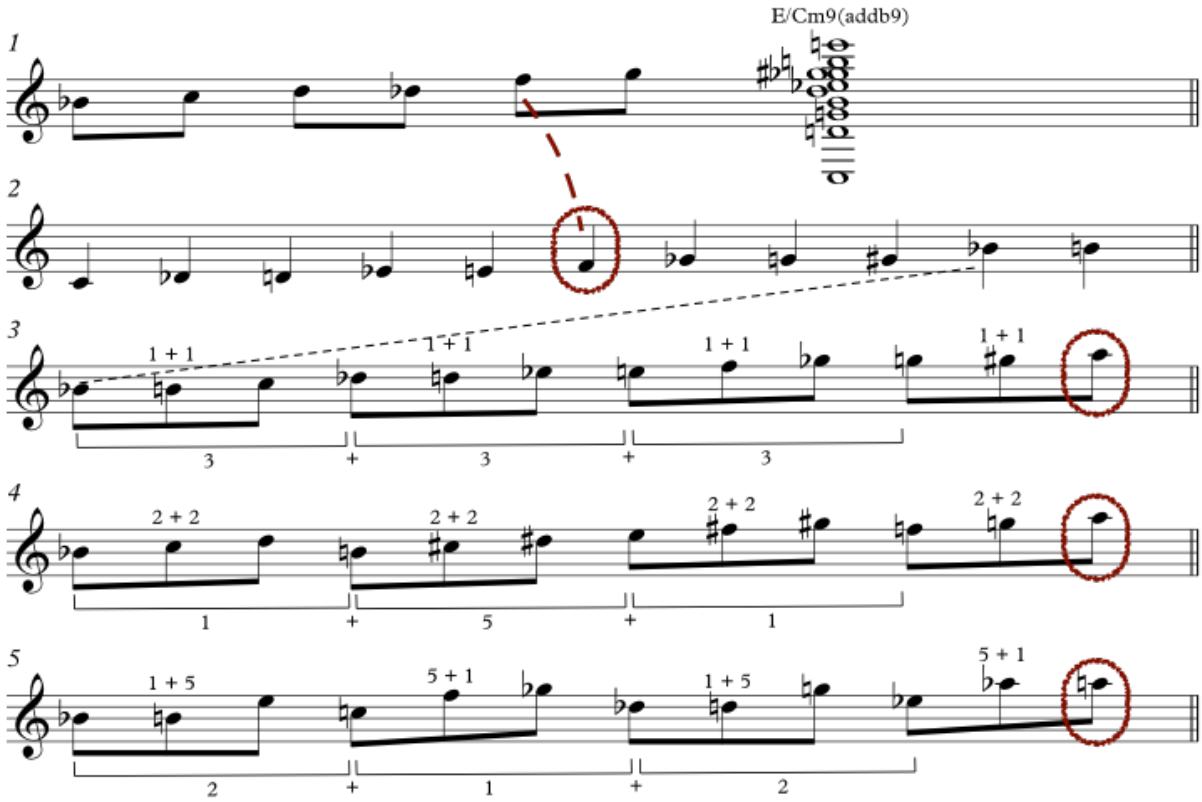
In the next example, all seven pitches present in the second bar of "Invocation" are ordered in a succession of trichords 1+4 and 4+1 plus the note c, the root note of the chord, which is displaced to the last position of the row. By changing the positions of the

notes f$^{\#}$ and f, a combination of trichords 1+3 and 3+1 is created. By transposing this trichord combination up a major second, a twelve-tone row is created with the note c at the last position. The added notes are encircled. The fourth bar shows how I re-ordered these trichords with steering hour 2+5. This row sounds the same as the fourth one in the previous example. Thus, improvisers could create continuity between the chords in bar 1 and 2 by taking this row as their reference.




[ex 4.6.4]

From the chord in the last bar of the fragment of section D (see example 4.6.1) an eleven-tone scale can be extracted as is shown in bar 2. To complete a twelve-tone row, the note a has been added in bar 3. This chromatic scale allows improvisers to superimpose the trichords 1+3 again, adding continuity to the previous rows. But they could also derive various (different) rows at pleasure, as shown in bars 3–5. Bar 3 shows the derivation of a twelve-tone row constructed with 1+1 trichords from the first hour, steered by the 3+3 trichord from the tenth hour. Bar 4 displays an alternative derived tone row with trichords 2+2 from the sixth hour, steered by trichord 1+5 from the fifth hour. The derived row in bar 5 is constructed with the same trichord, steered by trichord 2+1 from the second hour.




[ex 4.6.5]

**Evaluation**

For sure, Liebman's complex scales justify the hybrid tonal colors that can be distinguished in his chords. But, as an addition to this, the trichord applications demonstrated above could help the improviser to create consistent melodic lines in complex harmonic contexts. Experienced improvisers will manage to superimpose these twelve-tone techniques to express their individual harmonic colors as an alternative to, or alongside the advanced chord-scale approach that Liebman is pointing at. They can create continuity between complex chords even when they are not intentionally composed with these twelve-tone techniques. The continuation of the 1+3 trichord between the first and second chord is a clear example of this. The actual application of manipulating the Tone Clock's trichords proves the value of this system as a self-employing tool for improvisation in a complex harmonic context.

### 4.7 Generative compendium of melodic patterns

The improvisations by the saxophonists in "Carillon" display a combination of guided and informed intuitive improvisation. The guided part results from my written suggestions, my verbal explanations, and my sonic demonstrations of how to operate with the basic trichords, trichord combinations and row variations. The intuitive part results from how the saxophonists launch their individual musical experiences to connect this new information to their existing improvisational practices.

Saxophone quartet "Carillon" was composed and recorded before the publication of O'Gallagher's method on twelve-tone improvisation, discussed earlier in subchapter 3.7. There I expressed my concerns with his rather encyclopedic approach, resulting in a large quantity of barely meaningful patterns by which his method shows rather a theoretical than a practical quality. As another drawback, I mentioned that O'Gallagher didn't offer clear solutions for a major rhythmic problem with the trichordal approach: the predominant presence of three-note groupings.

I consider my suggestions in the following sections as an addition to O'Gallagher's method. I share the same goal as O'Gallagher, "to acclimate and train the ear to a new way of hearing harmonic and intervallic space" (O'Gallagher 3013: 8), but considered from a different perspective. I intend to show how I derived this selection of patterns from particular trichords and trichord combinations.

In this section I present a selection of melodic lines that are created with the trichords in the twelve hours of the Tone Clock. I constructed these lines as row patterns, to express the characteristic sound of each trichord family. The trichord patterns are followed by patterns of tetrachords, brought up by Babbitt and De Marez Oyens as discussed in section 4.3.2.

I realize that my presentation of these lines as patterns consisting of symmetrical sequences of intervals can raise problems. In chapter 2, I mentioned Liebman's difficulty with the excessive use of patterns or "licks" in improvisations. Although, by their specific contours, "these shapes can act as a kind of *filler* material as a connecting phrase between main musical ideas […] there is always the danger of overuse leading to a mechanized and predictable musical statement" (Liebman 2013: 69). I emphasize that, just as the basic bebop patterns a beginning improviser repeatedly plays to internalize the harmonic, rhythmic and melodic aspects of the traditional jazz idioms, my suggested trichordal patterns are not meant as "ready-mades" to be quoted literally on stage, but rather serve as basic structures and a point of departure for personal embellishments

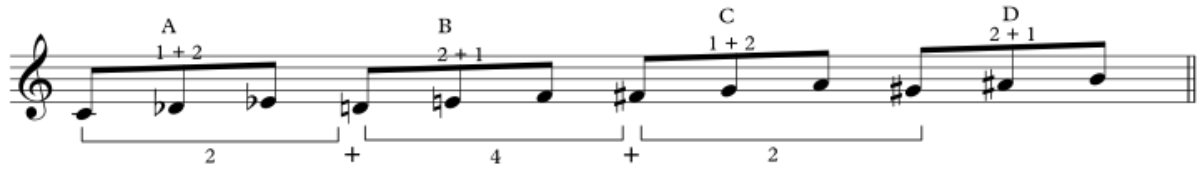
and variational techniques. Jazz students are used to working like this in order to permanently understand, organize, and embody new musical knowledge. This manipulation of sequential patterns is omnipresent during this learning process, from the two quadrants in a conventional major scale, to the multiple divisions of the chromatic scale in composer Nicholas Slonimsky's *Thesaurus of Scales and Melodic Patterns* (1975). And therewith practically: repeating and transposing scales and scale patterns is a sequential effort that helps to memorize new musical information. In section 3.3.2, I discussed this in the context of memorizing interval combinations in Bergonzi's *Thesaurus of Intervallic Melodies* (2000).

From here on, the trichords are named by their interval combinations, no longer by the numbers of the Tone Clock hours. The series of examples starts with the non-symmetric trichords 1+2, 1+3, 1+4, 1+5, 2+3, 2+4, 3+4, and 2+5. It is followed by the tetrachords 1+5+1, 2+1+2, 2+3+2, 5+1+1, and 1+2+3. To facilitate the reader's practice, every section starts with the display of the basic twelve-tone row in one or more steerings. Next, its trichords, trichord combinations, and tetrachords are presented in different positions and transpositions. In a number of cases their potential tonal colors are discussed. Patterns constructed with symmetric trichords and tetrachords have been left out because they refer predominantly to diminished and augmented tonal colors. By applying them as steering trichords, these harmonic references are less obvious because then the emphasis is on the trichords they connect. Moreover, the symmetric steering hours serve well to order the trichords and tetrachords along the five possible equal divisions of one octave. Trichord 1+1 refers to the chromatic scale itself and points at transpositions at distances of a minor second interval. Trichord 2+2 refers to the division of the octave in six equal parts, trichord 3+3 to the division in four equal parts, and trichord 4+4 to three equal parts. The division into equal parts results from tetrachord 2+2+2.

My operations to avoid obvious tonal references go hand in hand with my intentions to evoke a certain amount of harmonic vagueness. Thus, it appeared to work best by creating contrasts between intervals in the basic trichords and tetrachords of the row on the one hand, and those in the symmetric steering hours on the other. As expected, even this maximum emphasis on interval variation would not rule out any tonal references, but it appeared to be an effective strategy to avoid too obvious chord-scale applications. In his identification of the content of his Tone Clock hours and their fragments, Schat loosely alternates between notions of (meteorological) atmospheres and unfavorable associations to examples in classical music. For the time being, I prefer to remain connected to Liebman's notions of implied tonalities, temporary tonal centers, tonal anchor, linear tonality and diatonic lyricism discussed in subchapter 3.1.

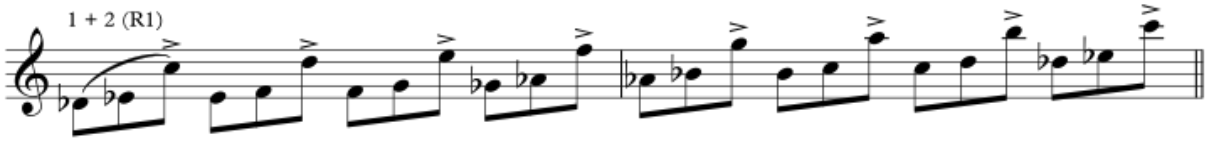
### 4.7.1 Trichord 1+2

In its basic row, trichord 1+2 is steered by trichord 2+4.



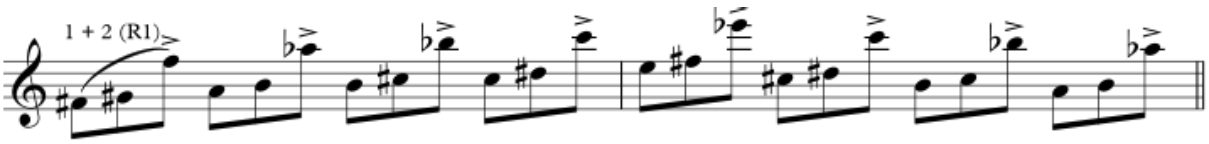

[ex 4.7.1.1]

In the first rotation (R1) of trichord 1+2, the interval between the two outer notes is a major seventh. Because of the "contemporary" sound of this wide and dissonant interval, I use this to embellish single notes or scales, such as the C major scale (shown by the accentuated notes) in the following example. As a result of this operation the resulting line sounds as an upper structure of the scale of d♭ major, with two notes adapted. To comply with the demand of merely playing 1+2 trichords in first rotation, I play g instead of g♭ in the third grouping, and d instead of d♭ in the penultimate grouping.




[ex 4.7.1.2]

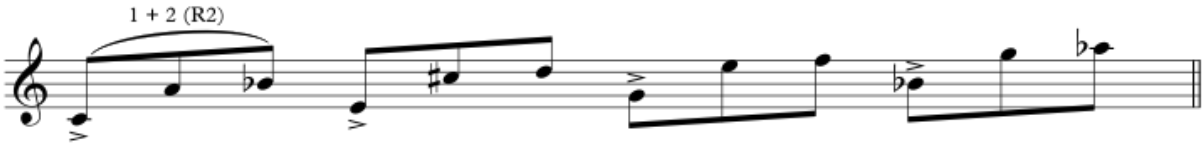
In the next example an f minor pentatonic scale (shown by the accentuated notes) is embellished with this first rotation of trichord 1+2. Just as the example above, the interval between the first and the last note of every trichord is a major seventh, and the f minor pentatonic scale sounds as an upper structure of the f♯ minor pentatonic scale.




[ex 4.7.1.3]

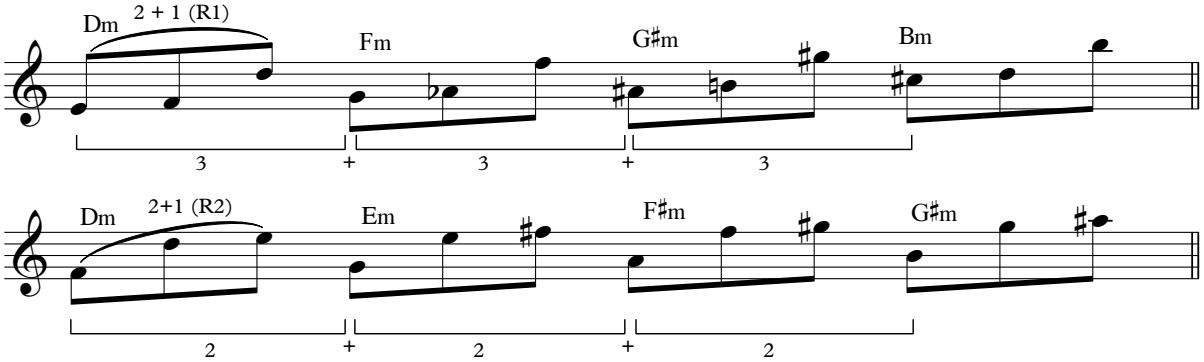
The following example shows a pattern with the second rotation (R2) of trichord 1+2 put on the (accentuated) chord notes of C7. This operation results in a melodic line that also

implies the chord tones of A7 and Bb7, while each separate trichord evokes the harmonic color of a major7/sus2/omit5 chord.




[ex 4.7.1.4]

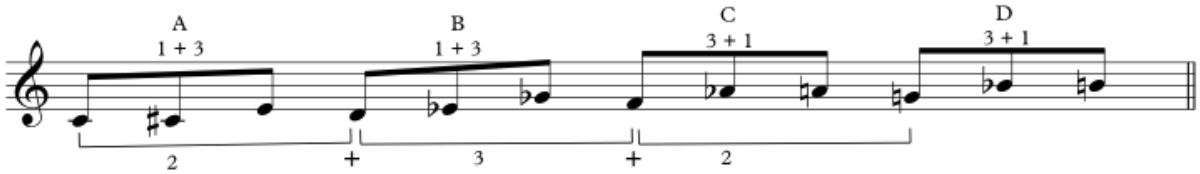
Next, both rotations of trichord 2+1 are shown. Both can be used to embellish the first three notes of a minor triad. In the first sequence minor triads are transposed in distances of minor thirds. In the second sequence they are arranged at distances of a major second.




[ex 4.7.1.5]

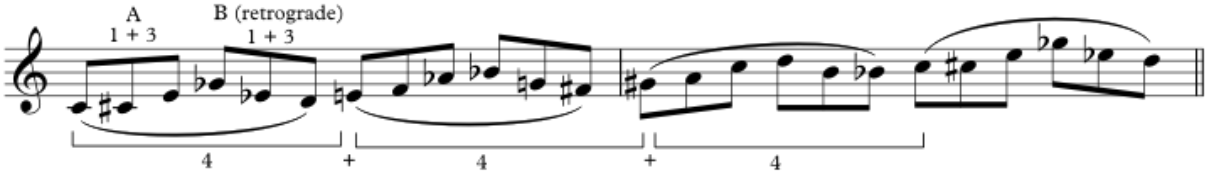
### 4.7.2 Trichord 1+3

In the following example the basic row of trichord 1+3 is steered by trichord 2+3.



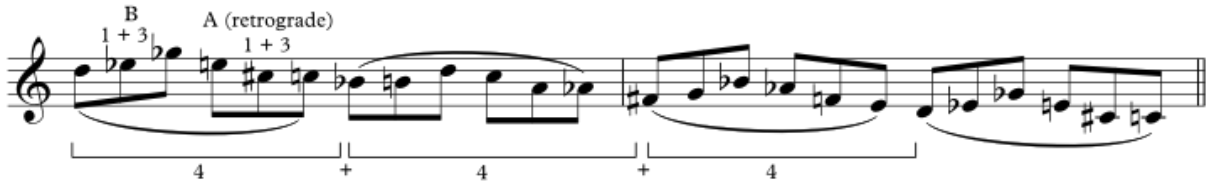

[ex 4.7.2.1]

In the example below, trichord combination A+B from the row above, with trichord B put in retrograde, results in hexachords transposed in ascending steps of major thirds.



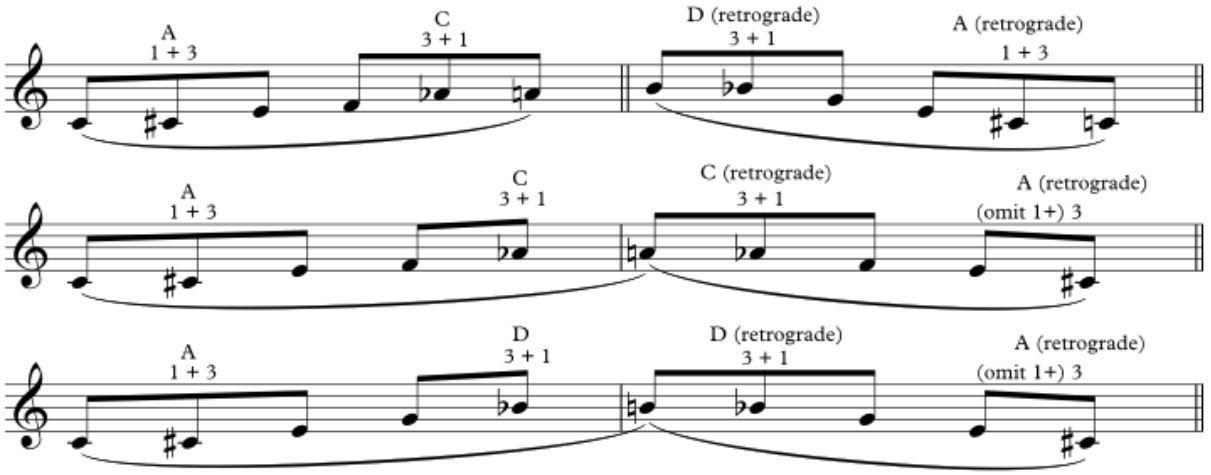

[ex 4.7.2.2]

The descending variation of this sequence shows hexachords of trichord combination B+A, now with A in retrograde. It is interesting to hear how in this arrangement, the genuine minor/major7 harmonic color of the 1+3 trichord is overlaid by the whole-tone/augmented color that results from the steering trichord 4+4 and the major second intervals between the last and first notes of the hexachords.



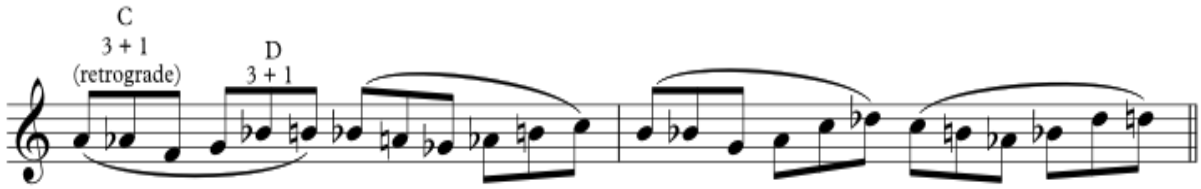

[ex 4.7.2.3]

Other interesting trichord combinations with the trichord 1+3 family are A+C that sounds as a composite triad of $c^{\sharp}$ augmented over c augmented, and D (retrograde)+A (retrograde) that evokes the sound of a C7b9 chord. Both trichord combinations sound particularly well as an ascending-descending riff that is phrased in five-note groupings, as shown in the second and third line of the example below.



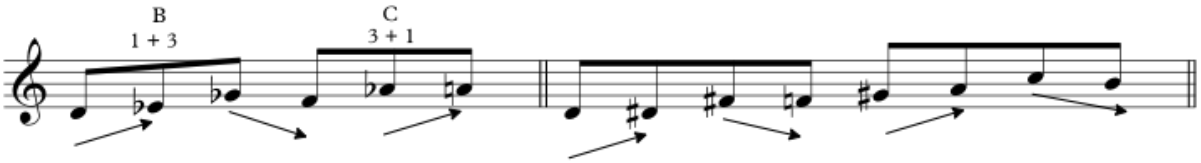

[ex 4.7.2.4]

Combining trichords C+D, with C played in retrograde, creates a chromatic sound with an interesting harmonic vagueness. In the next example this trichord combination is transposed with minor second intervals. The contrast between the ascending direction of the trichord combination and the descending minor second interval between its last note and the first note of the next combination creates an interesting effect in this line.



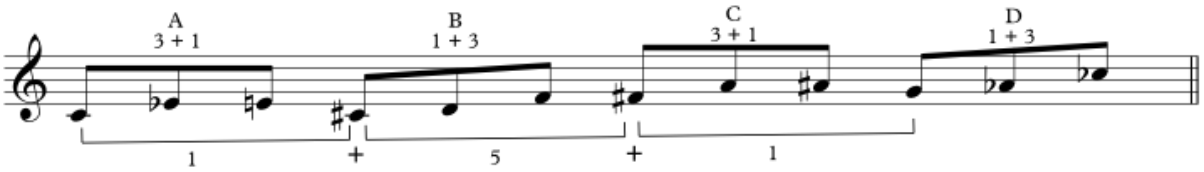

[ex 4.7.2.5]

Trichord combination B+C in the example below shows an embellishment of an incomplete octatonic scale. In the second bar this octatonic scale is completed and enharmonized. By adding the notes c and b, it evokes the sound of B7 (b9, b10, #11, 13).



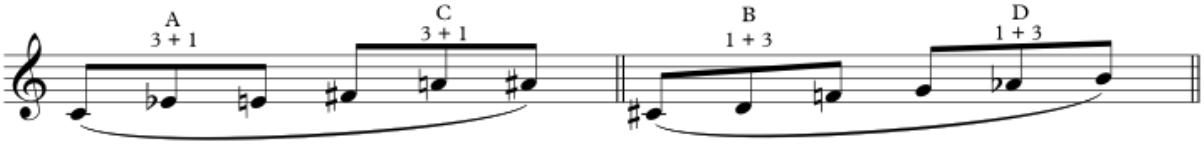

[ex 4.7.2.6]

The relationship of trichord family 1+3 with the octatonic scale is even more obvious when we take the next row, steered by trichord 1+5, as a point of departure.



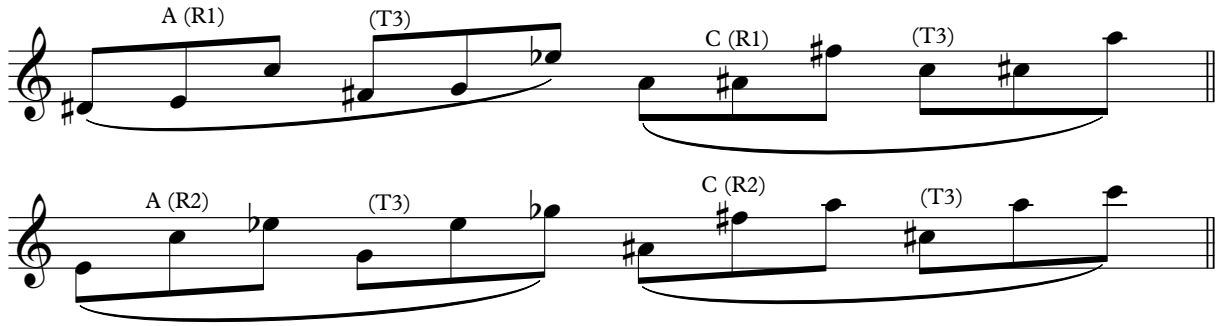

[ex 4.7.2.7]

Trichord combination A+C shows a fragment from the C octatonic scale, while trichord combination B+D shows a fragment from de C$^{\#}$ octatonic scale.



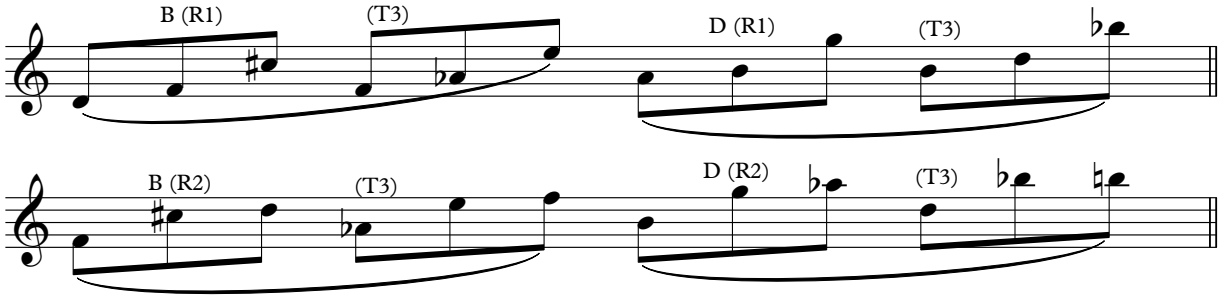

[ex 4.7.2.8]

Both rotations of trichord A and C, each transposed in steps of minor thirds (T3), result in quite common embellishments of the octatonic scale, as we see in the next example.




[ex 4.7.2.9]

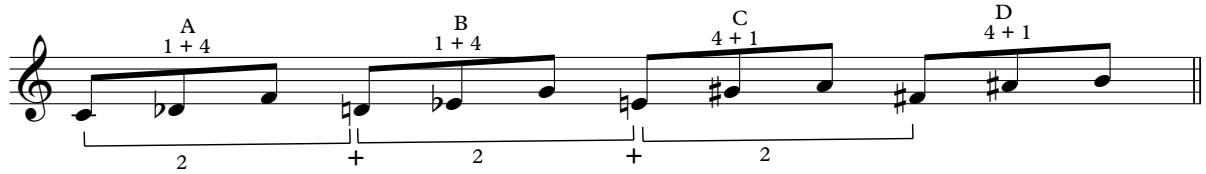
The same goes for both rotations of trichord combination B+D as is shown in the next example.



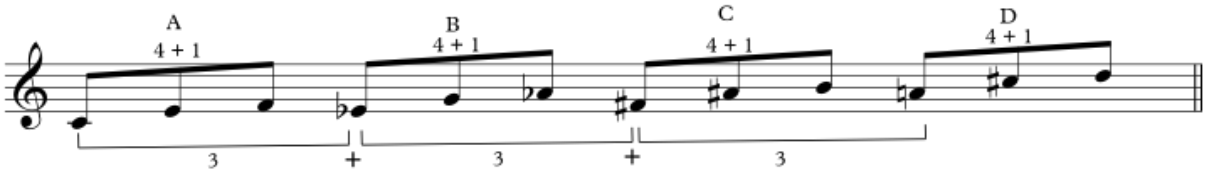

[ex 4.7.2.10]

### 4.7.3 Trichord 1+4

The basic row of trichord 1+4 is steered by trichord 2+2.

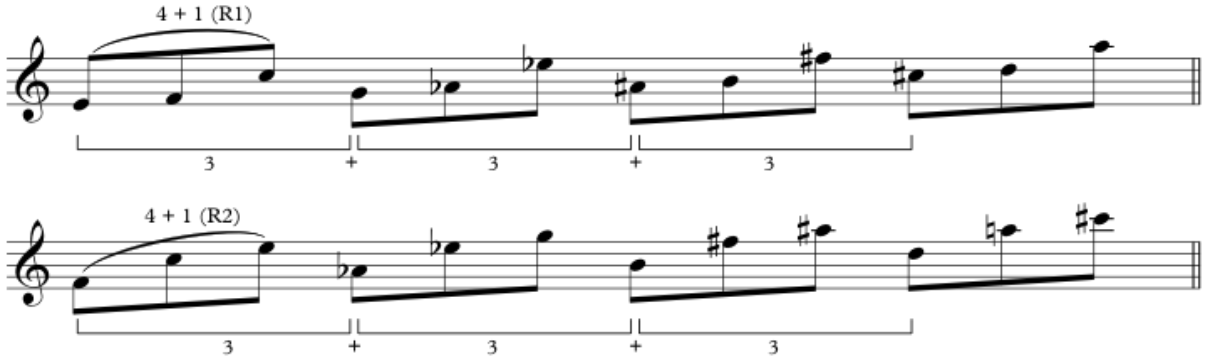



Due to the sound of the perfect fourth in the outer voices of these trichords in prime form, in particular the 4+1 trichord refers to conventional V–i cadences. This is for instance the case in the row with steering 3+3 in the example below, which contains 4+1 trichords exclusively.



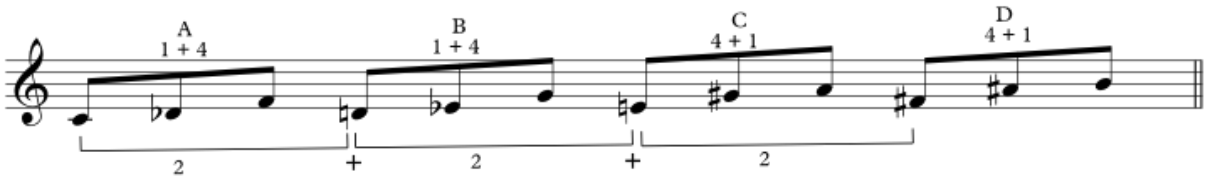

[ex 4.7.3.1]

Both in their prime forms in the row above and in their first and second rotations in the examples below, these trichords display the harmonic color of maj7/omit3 chords, transposed in ascending direction by minor third intervals.



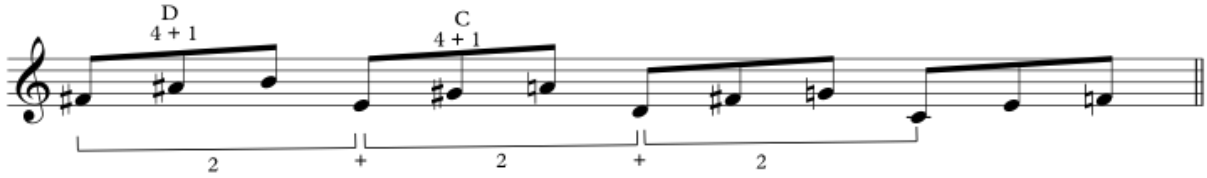

[ex 4.7.3.2]

More variations are found in the next row in which 1+4 is steered by trichord 2+2.



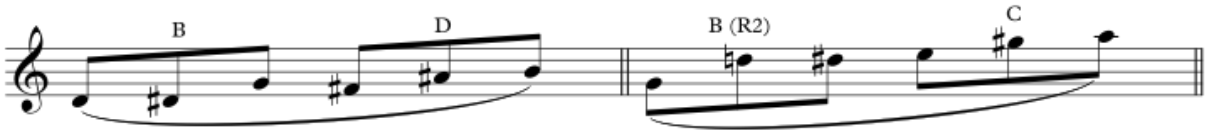

[ex 4.7.3.3]

By playing trichords D – C in reverse order and transposing C by major second intervals down, a cycle of fourths results: F# – B – E – A – D – G – A – F.



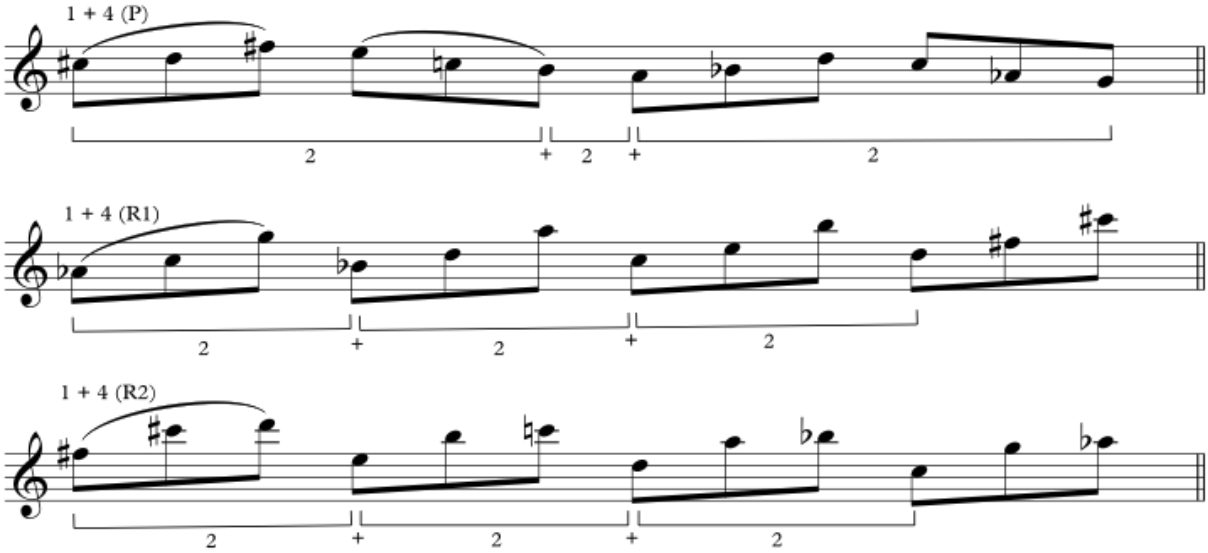

[ex 4.7.3.4]

The next example shows two chord embellishments that result from two different trichord combinations from the row above. Combining trichords B+D in their prime forms (with $e^{\flat}$ enharmonized to $d^{\sharp}$) results in an embellishment of Bmaj7$^{\#5}$. The combination of the second rotation of B, and the prime form of C evokes a harmonic color of Amaj7/omit3.




[ex 4.7.3.5]

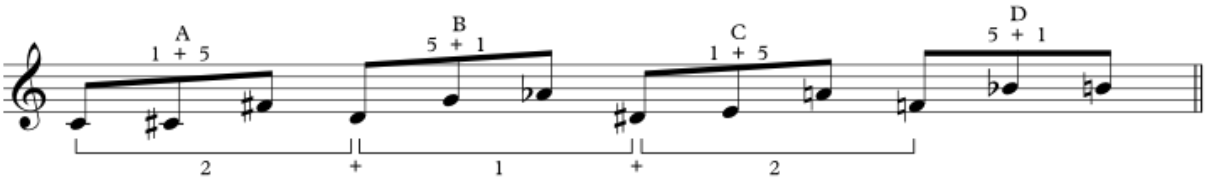
The next three sequences of 1+4 trichords evoke the harmonic color of maj7/omit5 chords. The first line shows 1+4 trichords in prime forms in a descending line transposed by a major second, with the trichords in alternating directions. The second line shows the trichords in first rotation, transposed in distances of a major second, in ascending direction. The same transposition is again used in the third line, in descending direction, with the trichords in second rotation.




[ex 4.7.3.6]

### 4.7.4 Trichord 1+5

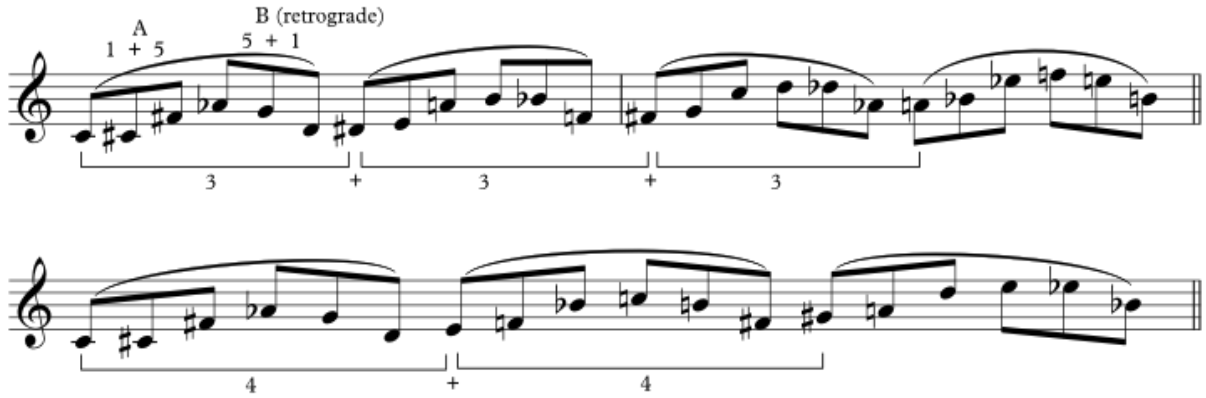
The next example shows trichord 1+5 steered by trichord 2+1.




[ex 4.7.4.1]

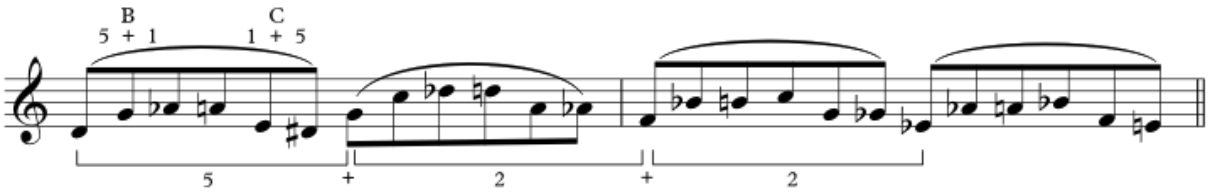
The centrifugal sound of the basic 1+5 trichord is illustrated in the following trichord combinations. The first example shows orderings of trichord combinations A (prime form) and B (retrograde). In the first line four hexachords are ordered at minor third distances. Because the last note connects back to the beginning of this sequence, the line evokes

the idea of a "turnaround" in a C tonality. The same could be said about the second line, but I consider the abundance of major second intervals making this line more predictable and therefore less interesting.



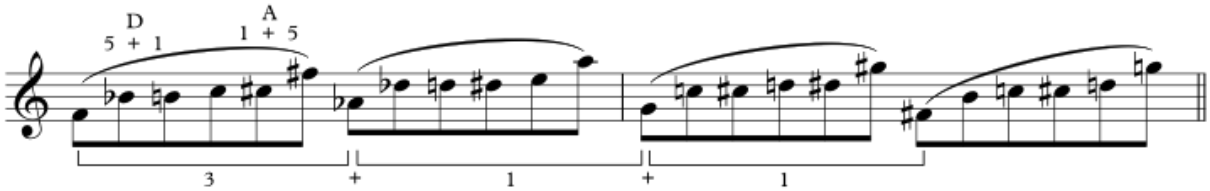

[ex 4.7.4.2]

Next is a pattern of hexachords of B (prime form) and C (retrograde). It is transposed a perfect fourth up, and then descends by major second intervals. I imagine that this pattern evokes a turnaround on, for instance, a Dsus chord.




[ex 4.7.4.3]

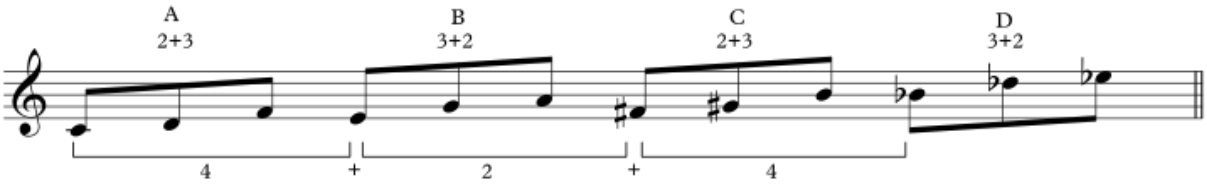
The final example shows a hexachord of trichords D and A. These are steered by 3+1+1 to evoke a turnaround of a Fsus chord.




[ex 4.7.4.4]

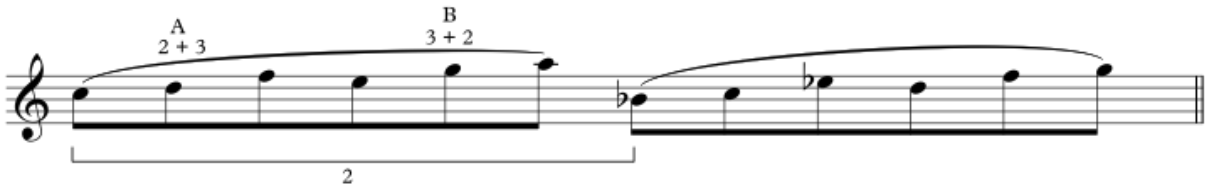
### 4.7.5 Trichord 2+3

The basic row of trichord 2+3 is steered by trichord 2+4.



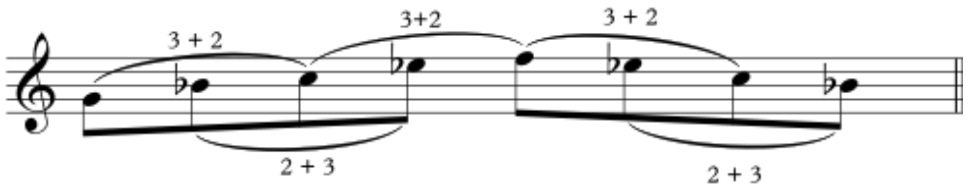

[ex 4.7.5.1]

A hexachord with the combination A+B evokes the harmonic color of Cmaj6, or (Gm7–) C7. In the following line this hexachord is transposed down by a major second interval, evoking the iii – vi – ii – V progression G7sus – C – F7sus – Bb.



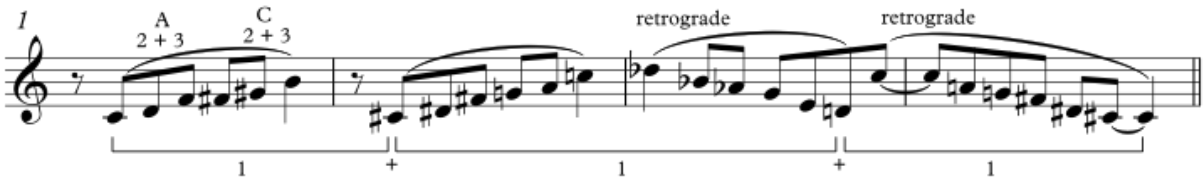

[ex 4.7.5.2]

As I already discussed in section 4.4.1, the trichords 2+3 and 3+2 are basic elements of the minor pentatonic scale.




[ex 4.7.5.3]

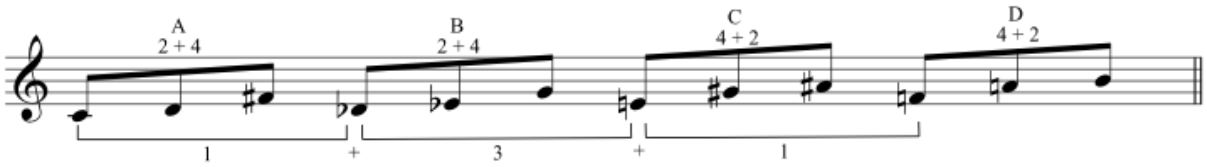
By ordering trichord pairs such as in the following line, the obvious pentatonic sound of this trichord can be slightly obscured. The hexachord with the trichord combination A+C is arranged in ascending order, at distances of two ascending and one descending minor second intervals. In bars 3 and 4 they are put in the retrograde form.




[Example 4.7.5.4]

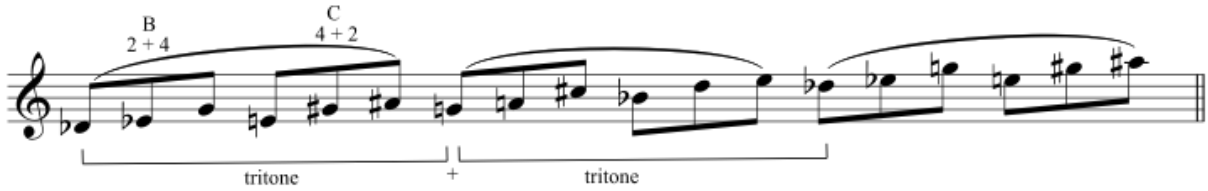
### 4.7.6 Trichord 2+4

In the following example the basic row of trichord 2+4 is steered by trichord 1+3.



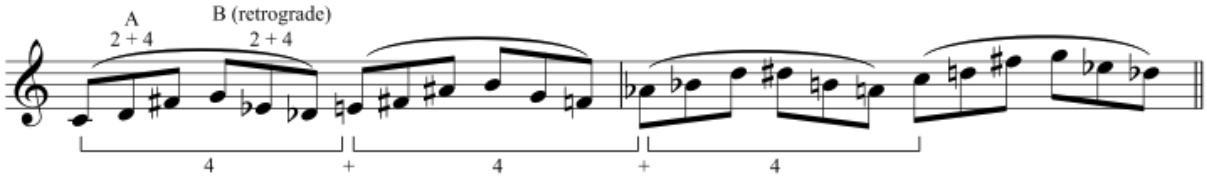

[ex 4.7.6.1]

Combinations of trichords from this row tend to evoke tonal colors of whole tone scales, and intervals of augmented fourths and fifths. The following hexachord with trichords B+C emphasizes this tonal reference. It is transposed twice, by tritone intervals, in ascending direction.



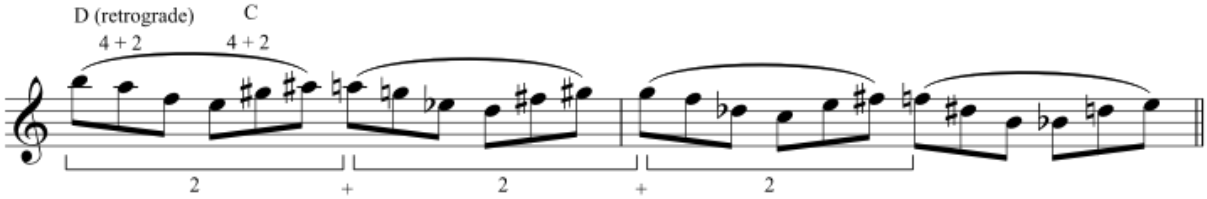

[ex 4.7.6.2]

In the next example a hexachord with trichords A+B is transposed a major third up twice. The steering tetrachord 4+4+4 emphasizes the augmented tonal color of this eighth hour of the Tone Clock. The combination of this augmented tonal color of the steering trichord, the minor second intervals between the trichords inside each hexachord, and the minor third intervals between the last and first notes of the adjacent hexachords, creates an interestingly vague harmonic color.



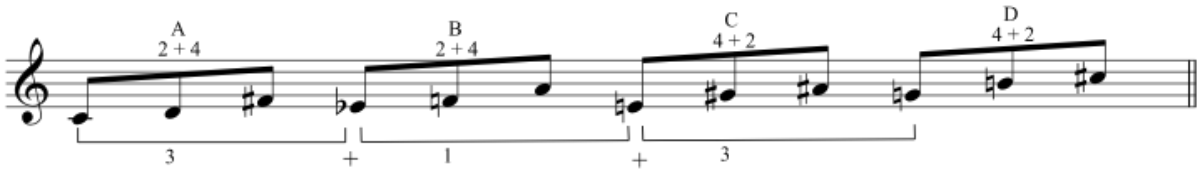

[ex 4.7.6.3]

The hexachord of trichords D (in retrograde) + C in the following example shows a variation in descending direction, transposed by distances of a major second.



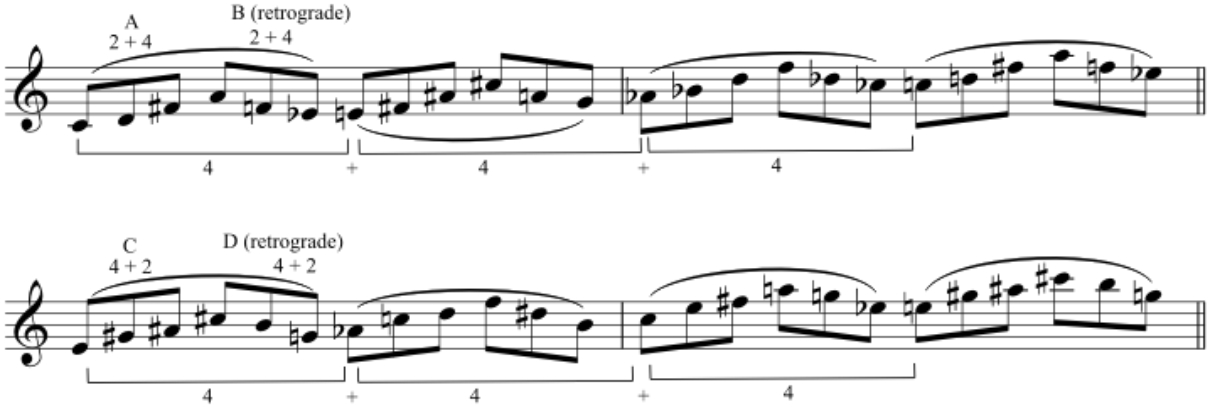

[ex 4.7.6.4]

The basic row of trichord 2+4 can also be steered by 3+1, as shown in the next row.



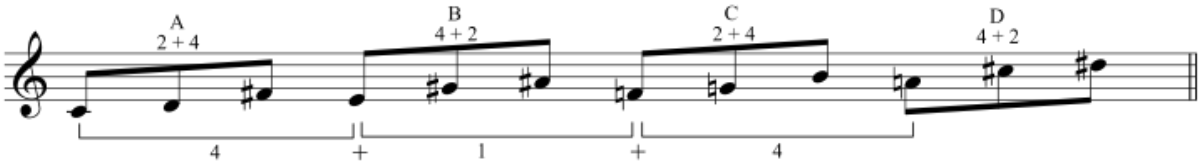

[ex 4.7.6.5]

The next example shows two lines evoking an intriguing sound. The first shows a hexachord of 2+4 trichords A+B, the second a combination of 4+2 trichords C+D. The steering trichord in both lines is 4+4, while the intervals between the trichords inside the hexachords are minor thirds and the intervals between the last note of each hexachord and the following is a minor second. As a result, both lines combine the diminished sound of their hexachords with the augmented sound of the steering trichords.



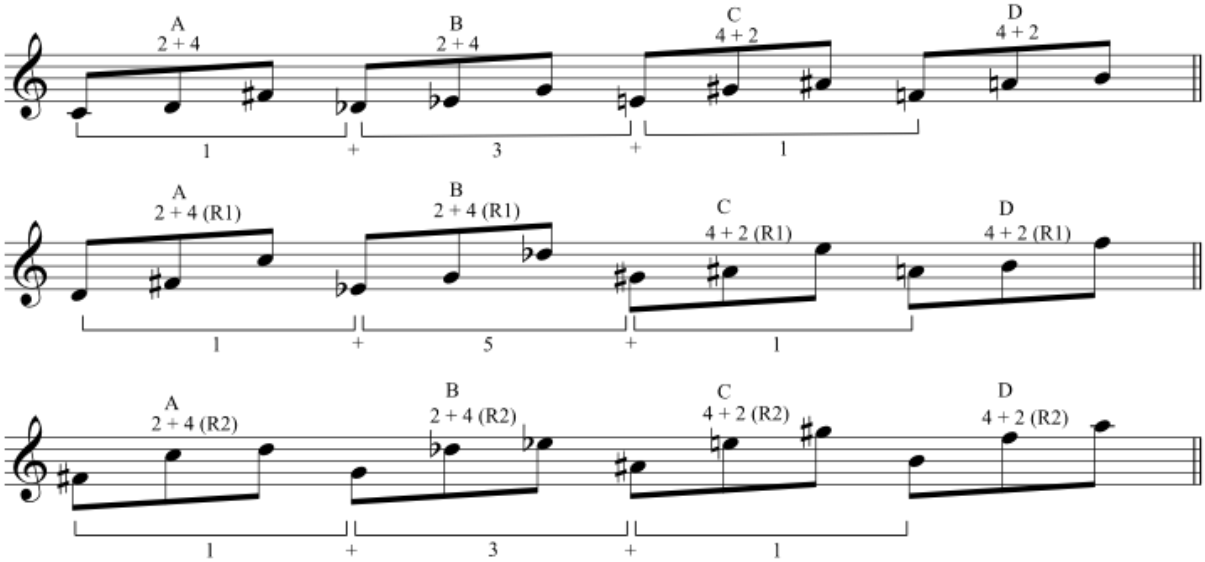

[ex 4.7.6.6]

The next row shows trichord 2+4 steered by 4+1. Trichord combination A+B shows an embellishment of the C whole tone scale and trichord combination C+D does the same with F whole tone scale.



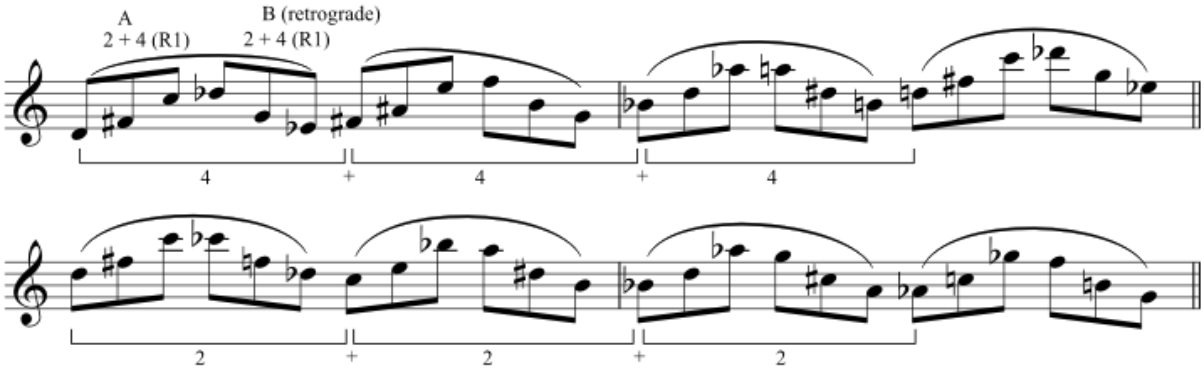

[ex 4.7.6.7]

The following paragraphs show patterns resulting from the inversions of the 2+4 trichord family. The example below shows the 2+4 row steered by 1+2. The second line shows the first rotations, and the third line shows the second rotations of the trichords in the row.



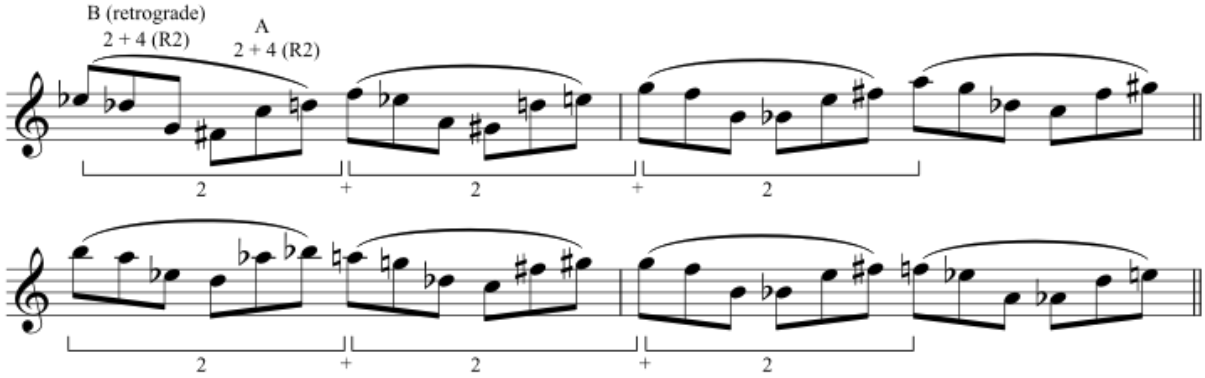

[ex 4.7.6.8]

The combination of trichords A+B in their first rotations evokes the tonal color of D7(omit5) – Eb7(omit5). In the first line the example below, the trichord combinations are transposed by a major third up. In the second line the retrograde of the trichords are transposed down by minor seconds. The result sounds as a hexachord that is transposed by major seconds in descending direction.



[ex 4.7.6.9]

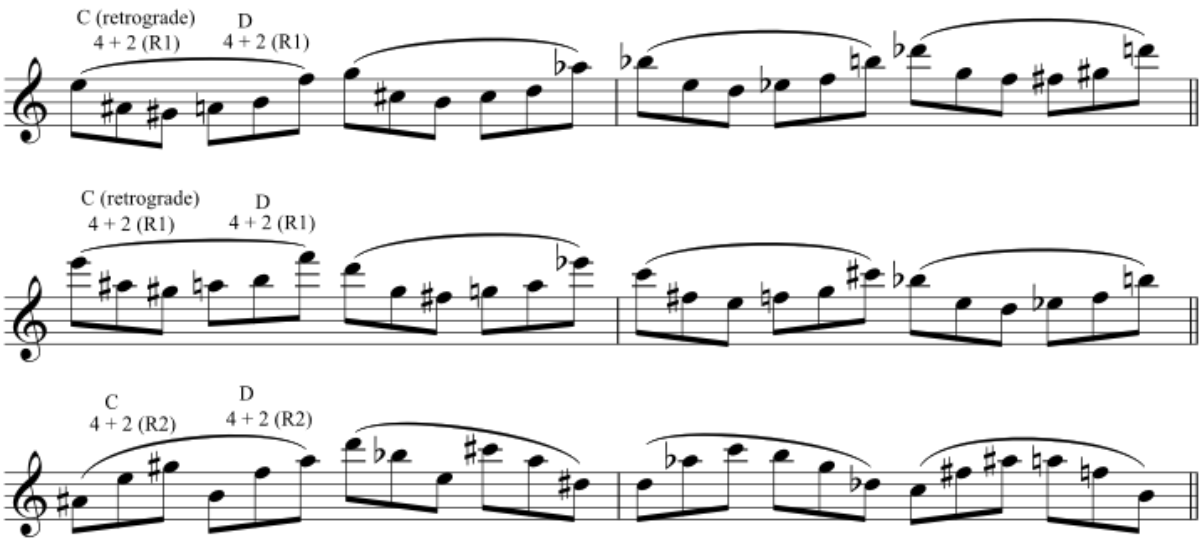
The same trichord combination in second rotation triggers the interval of an augmented fourth. Both lines in the example below show operations with trichord combination B+A, with B put in retrograde. In both lines the interval combinations are transposed at distances of major seconds. In the second line the intervals between all trichords are minor seconds. In the first line the intervals between the trichords inside the combination are minor seconds, but those between the last note of each combination and the first note of the next one are ascending minor thirds.



[ex 4.7.6.10]

Both inversions of the trichords C and D contain the augmented fourth interval as well. Both the first and the second line display transpositions of trichord combination C+D, with C put in retrograde. In the first line they are transposed a minor third up, in the second line a major second down. The intervals between the trichords inside the combinations are again minor seconds.

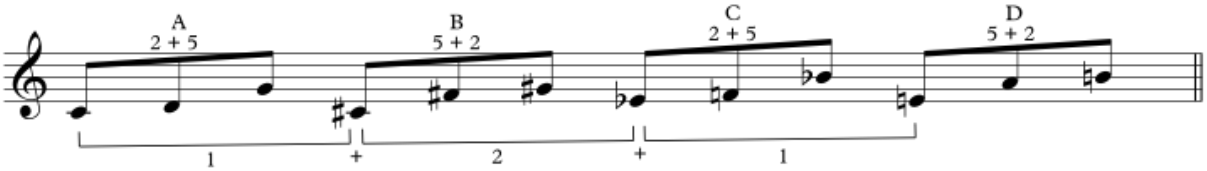
The third line shows variations with trichord combination C+D in their second rotations. The first bar displays C+D ascending and, transposed a major third up, descending chromatically. The second bar continues the descending line by two combinations of trichords in alternating directions, a major second apart.




[ex 4.7.6.11]

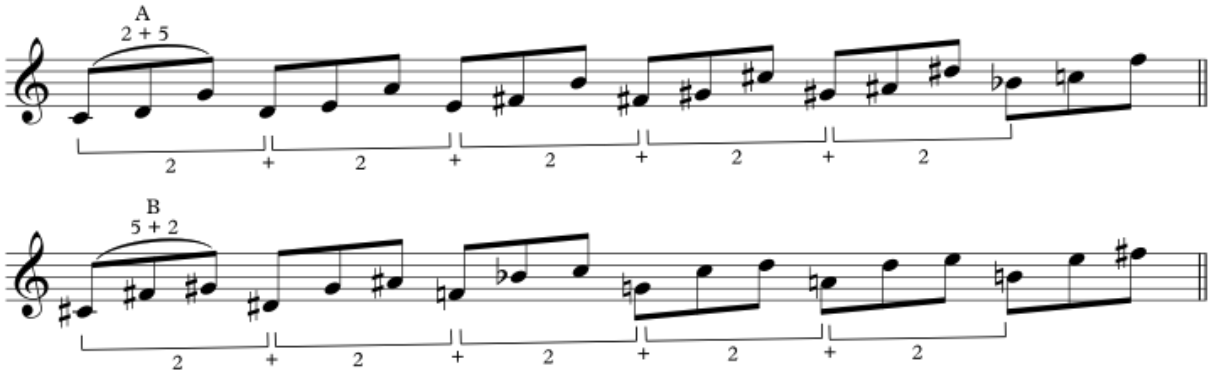
### 4.7.7 Trichord 2+5

The last trichord family to be discussed here is that of 2+5. In the next example the basic row of trichord 2+5 is steered by trichord 1+2.



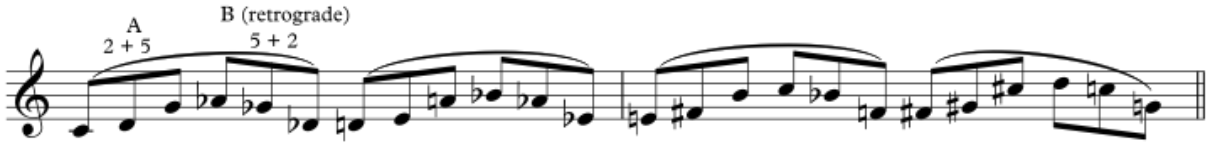

[ex 4.7.7.1]

The example below shows two patterns in which the trichord is transposed at distances of major seconds. In the first line this is done with trichord 2+5, and in the second line this is done with trichord 5+2. In the first line, the first two notes of all trichords together belong to the c whole tone scale, and all third notes of the trichords together belong to the g whole tone scale. In the second line, all first notes together form the $c^{\sharp}$ whole tone scale, while all second and third notes together form the $f^{\sharp}$ whole tone scale.




[ex 4.7.7.2]

By combining these two trichord collections based on trichord combination A+B, and by putting the B trichords in retrograde the following sequence results.

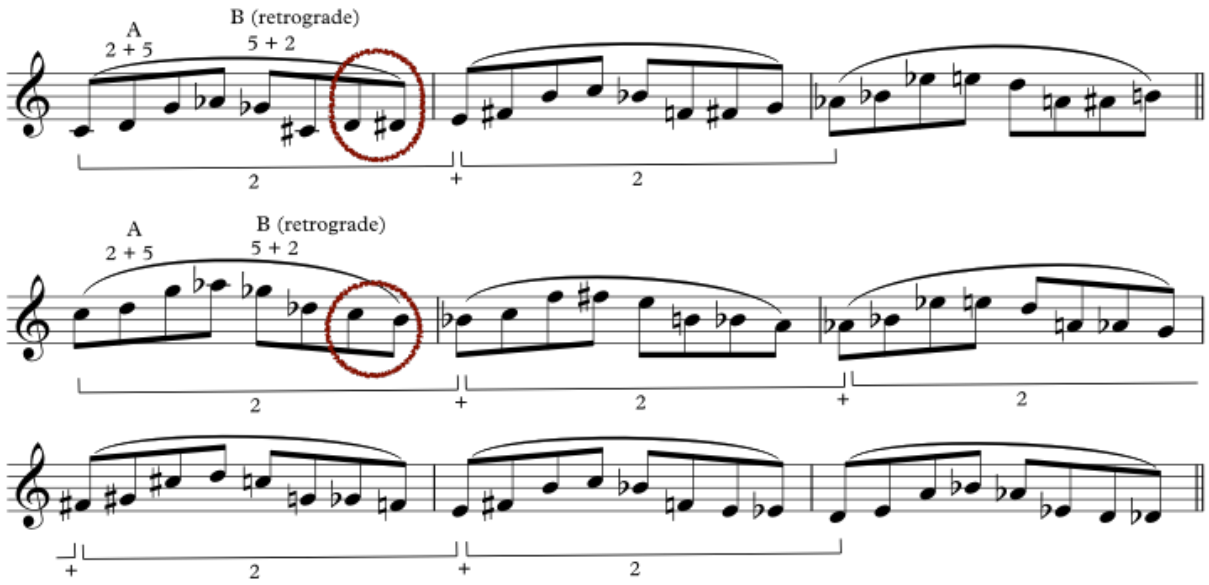



[ex 4.7.7.3]

The lines in the following example show variations of the sequence above, using extended trichord combinations. The first line is based on trichord A+B, with B played in retrograde. After the last note of trichord B, the c♯, I have added two chromatic notes (encircled) to lead to the second trichord combination that starts at a distance of a major third above the first. The same operation is repeated and results in the third pattern.

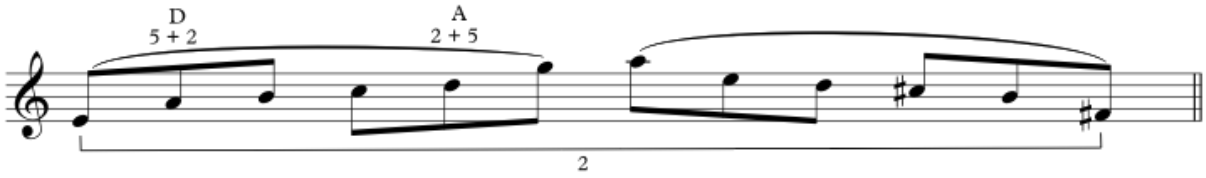
The second line also starts with trichord combination A+B, but now, after the last note of trichord B, enharmonized into d♭, two descending chromatic notes are added, to lead to the next trichord combination, starting a major second below the first.

With these operations I combine my preference to connect patterns by using chromatic leading tones with the creation of four-note groupings to solve the dominance of three-note groupings in the operations with the Tone Clock so far.



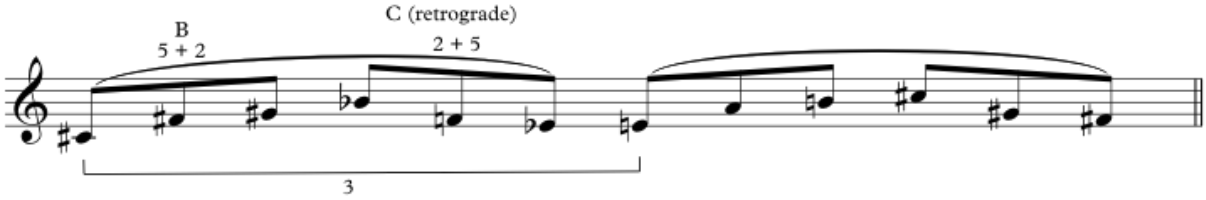

[ex 4.7.7.4]

The following examples show trichord combinations in prime forms, displaying obvious tonal colors. In the first example trichord combination D+A evokes the harmonic color of Am7. It is followed by its transposition a major second up, and put in retrograde, sounding as Bm7.




[ex 4.7.7.5]

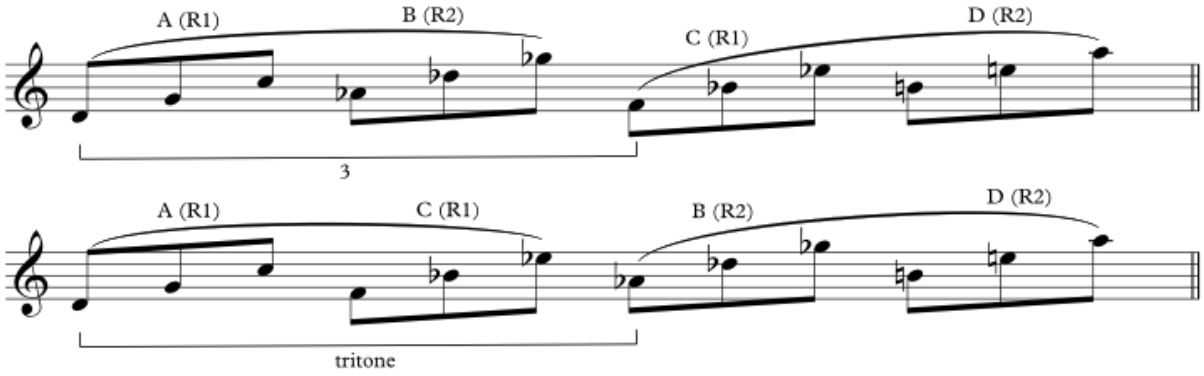
The second example shows trichord combination B+C, with C put in retrograde. This evokes the sound of F#maj7. The next trichord combination starts a minor third interval above the first, as a result of my preference to play a leading tone to connect both parts. This second part of the sequence sounds as Amaj7.




[ex 4.7.7.6]

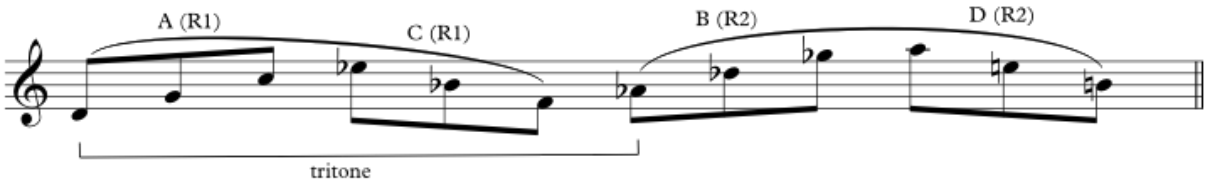
Both the first inversion of trichord 2+5 and the second inversion of trichord 5+2 display the trichord 5+5, a stacking of two intervals of a perfect fourth. In the example below, the first line I applied these inversions to the basic row steered by trichord 1+2. In the second line the same inversions are applied, but the order of occurrence in the basic row

has been changed into A – C – B – D. As a result, the intervals sound at a distance of a minor third interval.



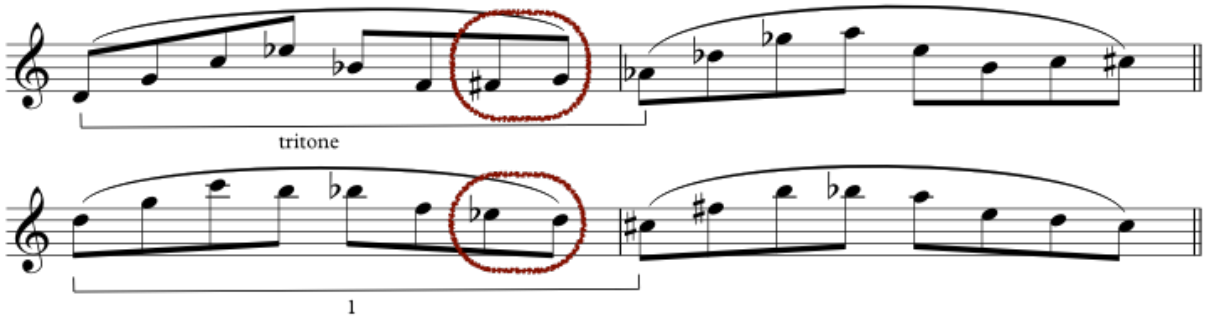

[ex 4.7.7.7]

As a variation to the sequence above, it is played with the trichords in alternating directions, by which the steering interval of a minor third sounds at all connections of the trichords.




[ex 4.7.7.8]

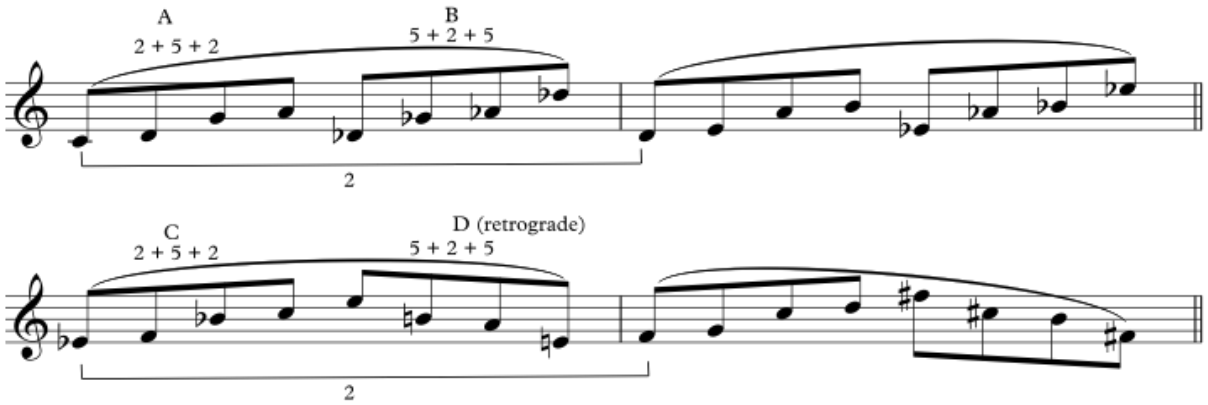
Two variations of this sequence are played in the example below. Once again I have added two chromatic leading tones at the end of both trichord variations A+C and B+D above, to create four-note groupings and to suggest conventional voice leading at the connection of both parts of the sequence.




[ex 4.7.7.9]

Another way to create four-note groupings is to extend the trichord by repeating its first interval. For instance trichord 2+5 is extended into trichord 2+5+2 and trichord 5+2 is

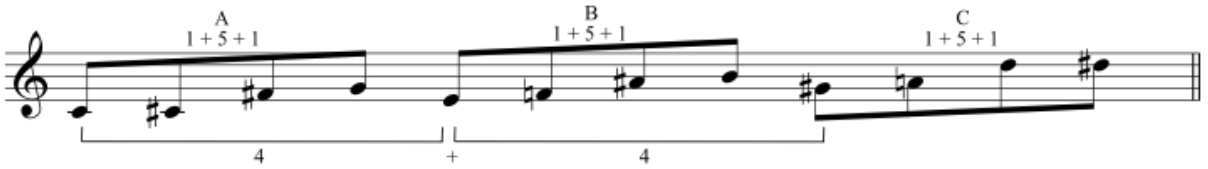
extended into trichord 5+2+5. In the next example this is applied to the trichord combinations A+B and C+D and their transpositions of a major second up.




[ex 4.7.7.10]

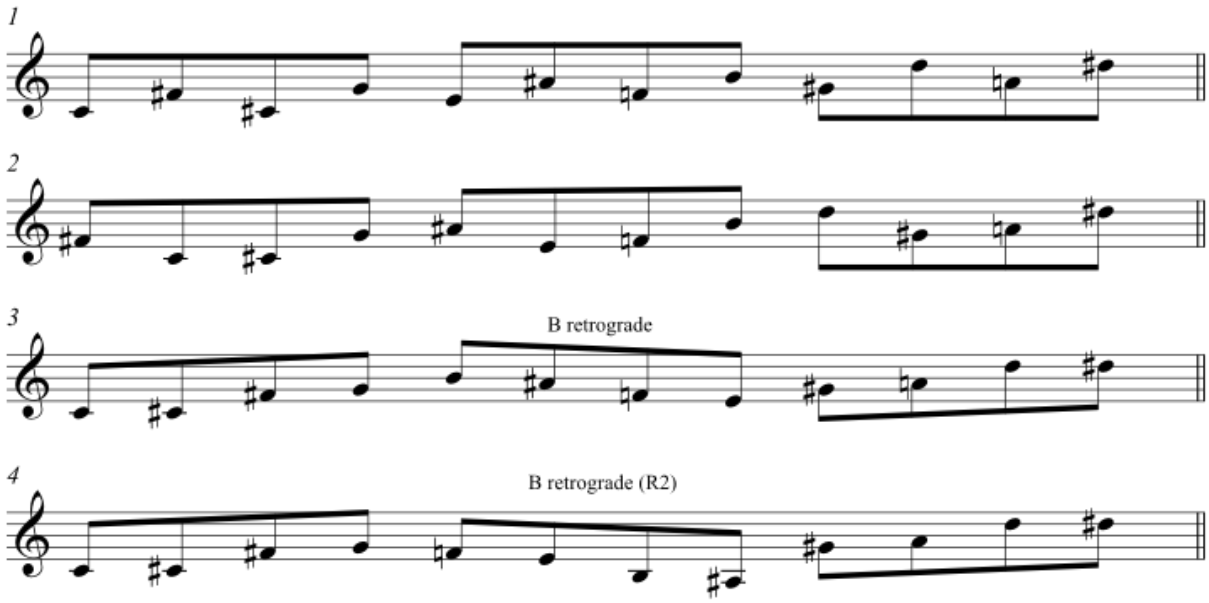
### 4.7.8 Tetrachord 1+5+1

The following example displays tetrachord 1+5+1, the second of Babbitt's all combinatorial four-notes sets (see section 4.3.2). It is steered by trichord 4+4.



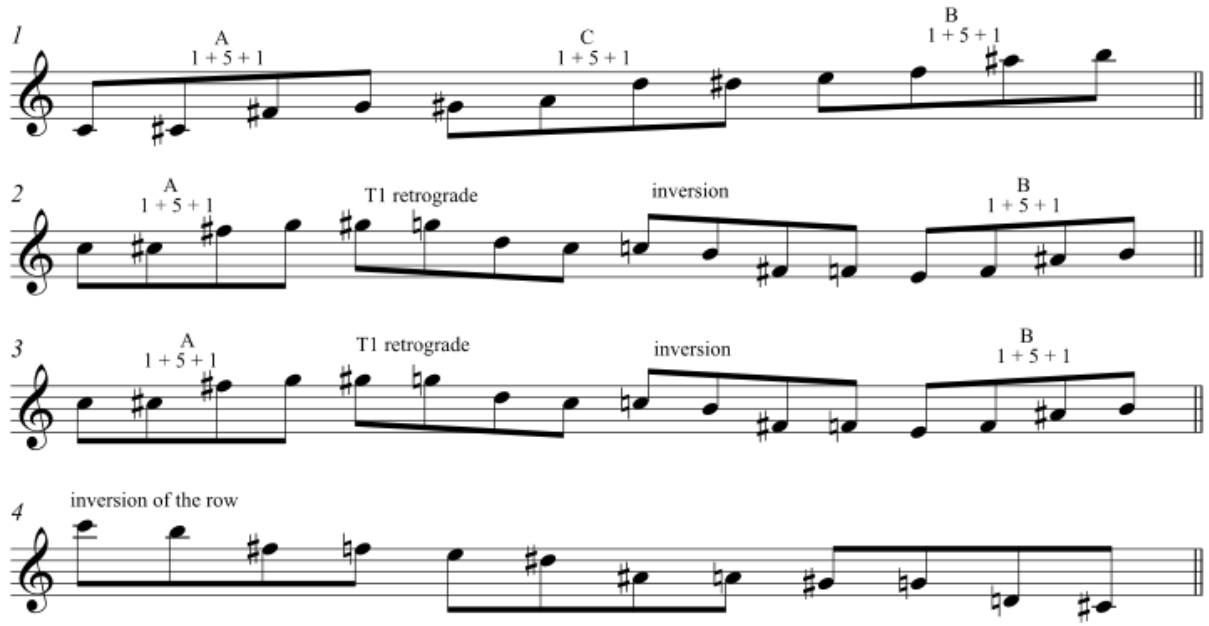

[ex 4.7.8.1]

The next example shows the implied augmented fourths intervals. In bar 1 they are played in ascending directing and in bar two in alternating directions. In bar 3 the second trichord of the row (B) is played in retrograde and in bar 4 in the second rotation of the retrograde. By this rotation, the 4+4 steering that is obvious in bars 1–3, is obscured. As a result, the lines sound less predictable than those in the bars before.




[ex 4.7.8.2]

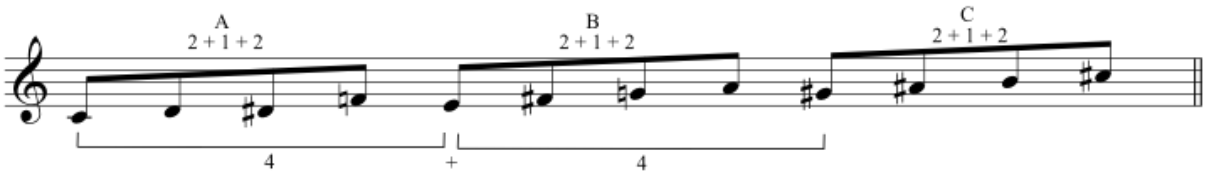
In the following example tetrachord B has been extrapolated to avoid the compelling sound of the 4+4 steering trichord. It is true that it is still present in the steering trichord c–g♯–e, but the minor second intervals between the connecting notes between the intervals obscures the sound of the two augmented fifths (c–g♯–e) in the permutated steering trichord.




[ex 4.7.8.3]

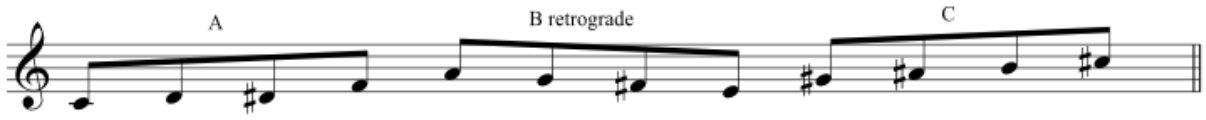
### 4.7.9 Tetrachord 2+1+2

The following example displays trichord 2+1+2, the fourth of Babbitt's all combinatorial four-notes sets. It is steered by trichord 4+4.



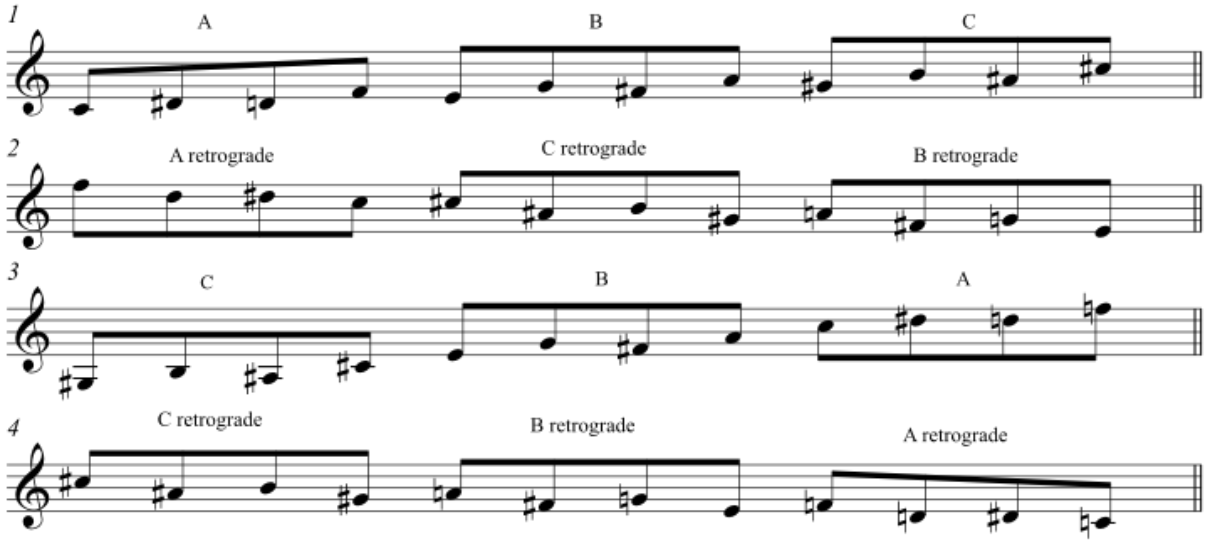

[ex 4.7.9.1]

By playing the second tetrachord in retrograde, it sounds a bit less predictable, and the obvious minor tonal color gets slightly obscured.




[ex 4.7.9.2]

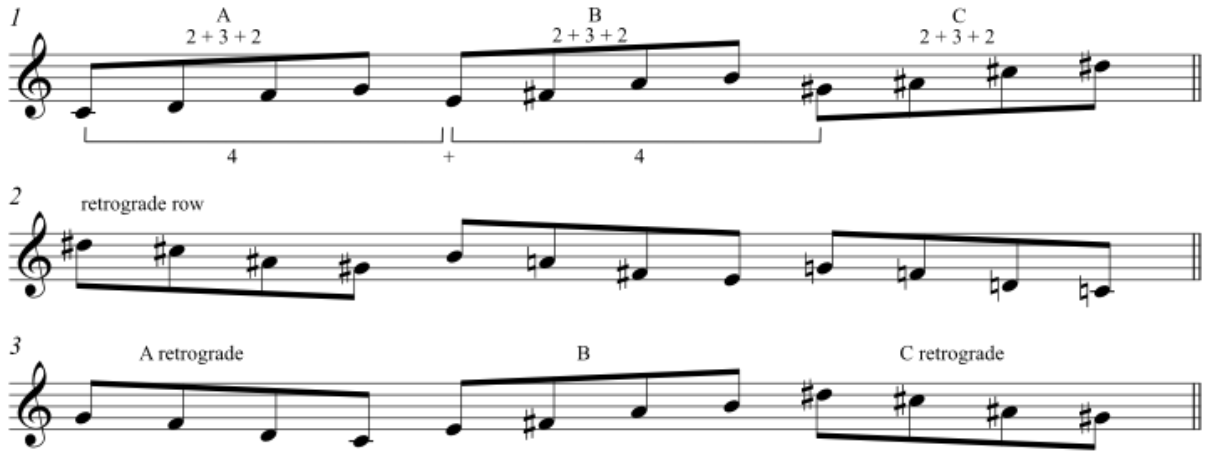
The next example shows the minor third intervals implied in these tetrachords, played in ascending and in descending directions. In bar 3, I have again changed the order of the tetrachords to obscure the compelling augmented color of steering hour 4+4.




[ex 4.7.9.3]

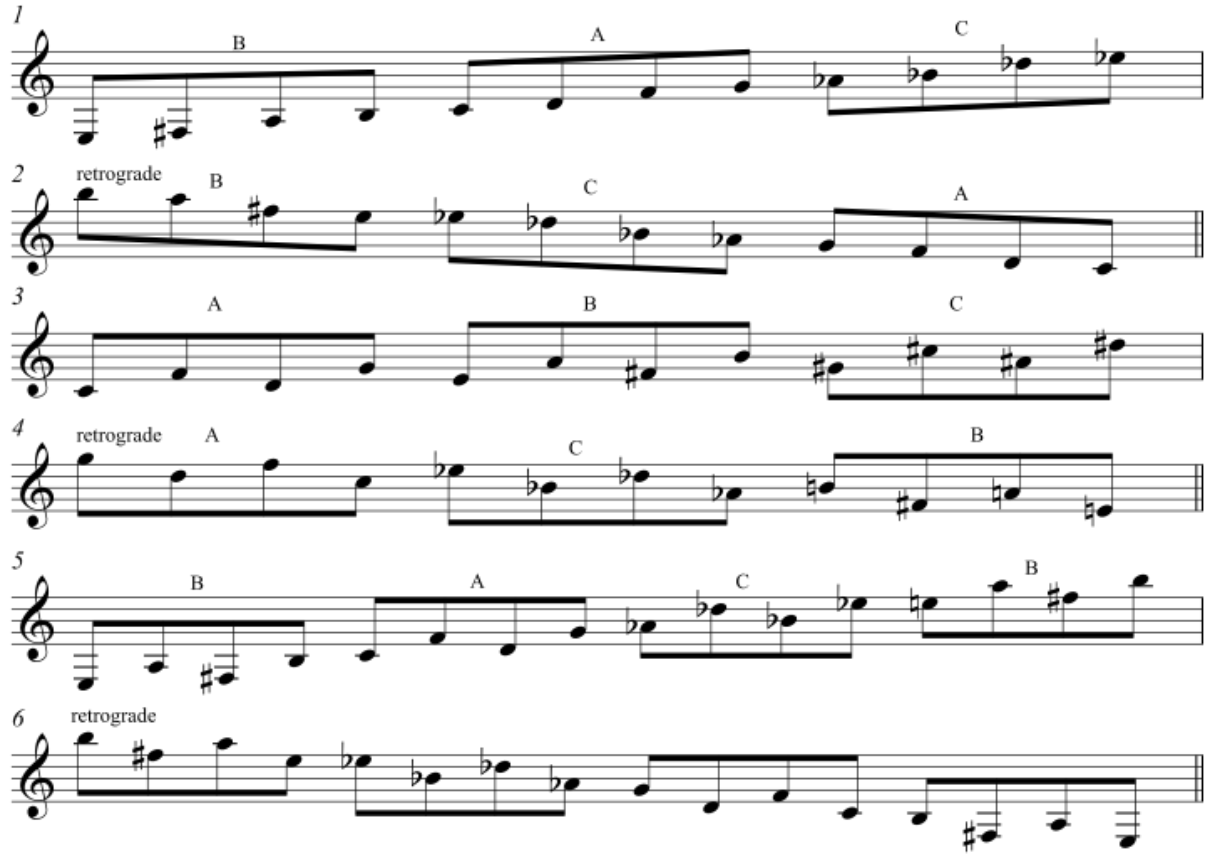
### 4.7.10 Tetrachord 2+3+2

The next tetrachord is 2+3+2, the fifth of Babitt's all combinatorial source set. Bar 1 shows the basic row, steered triad 4+4, while bar 2 the basic row is put in retrograde. Bar 3 displays the basic row with tetrachords A and C in retrograde.




[ex 4.7.10.1]

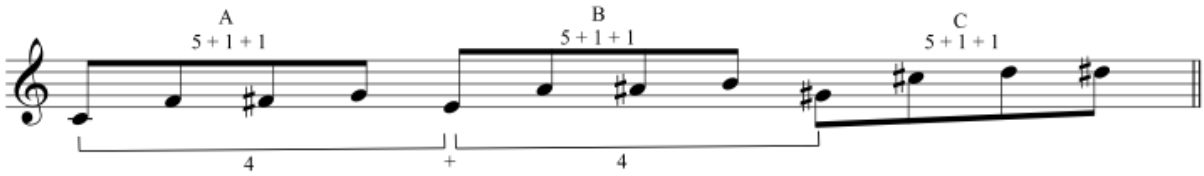
In the following examples three different dispositions of the tetrachords are combined with three different retrogrades.




[ex 4.7.10.2]

### 4.7.11 Tetrachord 5+1+1

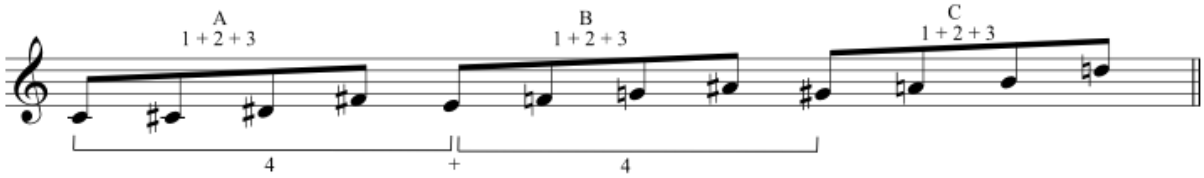
The next example displays the sixth basic row of Babbitt's all comprehensive four-notes source sets, a permutation of row 1+5+1 discussed in section 4.7.8. The steering trichord is again 4+4.




[ex 4.7.11.1]

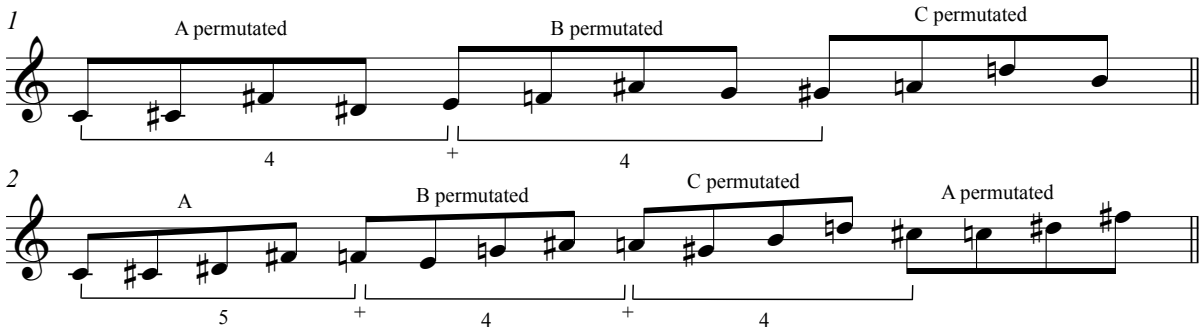
### 4.7.12 Tetrachord 1+2+3

The next example shows the basic structure of a twelve-tone row constructed with tetrachord 1+2+3 and steered by trichord 4+4. This row does not belong to Babbitt's all combinatorial four-notes sets, but was suggested by De Marez Oyens (1997) (see section 4.3.2).




[ex 4.7.12.1]

The next two lines are examples of permutations of the tetrachords. These permutations again create a more smooth transition from one tetrachord to another by replacing the major second interval in the basic row by a minor second interval. As a result of these permutations in the tetrachords the 4+4 steering chord is again obscured in bar 1. Due to the permutations of tetrachord A at the end, bar 2 has a steering tetrachord 5+4+4.




[ex 4.7.12.2]

**Evaluation**

The examples in this section represent my subjective selection of numerous possibilities of combining trichords, clarifying the thinking behind their construction. They are meant to serve improvising musicians as an inspiration to add variations or to create different combinations according to their individual musical preferences.

In general, the examples given show a preference for connections at distances of minor seconds, because they create the effect of leading tones and therewith suggest a type of conventional voice leading. Second, the examples show a preference for steering intervals that contrast with the prevailing harmonic color of the trichord and the row at stake. Sequences containing these contrasting steering intervals, such as for example major seconds and major thirds contrasting with trichord 1+3, minor third intervals contrasting with trichord 2+4, and minor seconds contrasting with trichord 2+5, evoke an interesting harmonic vagueness. Thereby they have the potential to create new ways to move outside the expected sounds of certain tonal or non-tonal contexts.

## 4.8 Conclusion

The applications of the Tone Clock in this chapter confirm the utility of its twelve-tone operations and elements for the practice of (composing) improvisers in jazz. They show compositional and improvisational techniques based on characteristic operations, both with complete twelve-tone rows and with segments of these rows. In improvisations however, the emphasis is more on manipulating these segments, namely the trichords and tetrachords of the Tone Clock hours. From the perspective of my research aim, to develop improvisational techniques beyond tonal limitations, these operations with trichords and tetrachords appear to be attractive.

O'Gallagher (2013) provides examples of trichords and trichord combinations with explicit references to tonal colors of scales and chords, by which they are supposed to "blend" with the content characteristics of diatonic phrases. Just like Bergonzi (2000) and Garzone (2009), both discussed in chapter 3, I do not intend to refer to explicit tonal colors although I am aware that I cannot prevent them from emerging spontaneously. Few examples of these references can be found in my suggestions for improvisation in subchapter 4.5 and in the patterns presented in subchapter 4.7. The identification of implied tonal colors depends on the individual performers' informed intuition (defined in section 3.3.1) and on their intention to deliberately avoid or create tonal connections. In the latter case, the twelve-tone operations can be merged with fragments of conventional chord-scale approaches. In this respect, I agree with Liebman who likewise

expressed the purpose of his chromatic approach as "… to integrate this material alongside already established and familiar tonal ideas … into a coherent musical statement to satisfy both the intellectual and emotional needs of artistic creation" (Liebman 2013: 9).

The process of learning twelve-tone improvisational idioms is at large comparable with the traditional language acquisition of a jazz student. It includes the creation and manipulation of patterns as deep structures for "spontaneous" variations. Most jazz musicians are familiar with this learning strategy from the day they started to develop their improvisational skills. Similarly, this application of variation techniques is meant to enrich ones "backpack" with a choice of individual patterns that, after being securely memorized, will pop up "spontaneously" during improvisations. However, due to the absence of a substantial body of existing examples, developing twelve-tone skills will appeal more to the student's individual curiosity than to his imitation and emulation of existing examples.

Besides the fruitful application of the Tone Clock as a model to generate interesting melodic patterns, its quality as an analytic tool also helps the (composing) improviser to enrich his artistic palette by applying interventions to existing repertoire. In section 1.4.2, I explained how I re-composed two jazz standards into contrafacts as a step to develop my personal sound. How trichord analysis likewise can help to re-compose a diatonic melody, as demonstrated in section 3.7.2, with my transformation of Parkers "Quasimodo" into the contrafact "Quasi Mad Though". There, I also demonstrated how existing chord changes can be re-composed by twelve-tone ordered successions of alternative chord changes. The reharmonization of Davis' "Tune Up" becoming the harmonic structure of "Count Your Blessings" can be considered as a convincing example. Next, in my discussion of Liebman's "Invocation" I have shown how trichord analysis can be successfully applied to identify complex simultaneities that result from multiple contrapuntal lines, and how such analysis can serve as a thoughtful point of departure for improvisations.

One could argue that trichordal analysis leads to a simplification of the complex web of intervallic structures in a composition or improvisation. It is obvious that selecting trichords, and reducing them to their prime form, neglects the surface of the music with its complexity of distinguishing features as registers, texture, tempo, rhythm, and dynamics. But it is also obvious from the transcriptions of the improvised fragments in this chapter, that experienced (composing) improvisers are not at all tied down by this simple format in the deep structures of their musical grammar.

The theory of the Tone Clock strives for simplicity instead of complexity, allowing the performer to freely employ its "self-explaining quality" that Schat considered as "the most important requirement for a 'common language'" (Schat 1998: 44). Thus, it appears not only a useful, but also an easily accessible tool to embed twelve-tone techniques in the improvisational languages of contemporary jazz artists. By its limited number of intervals and orderings it looks like a relatively simple musical grammar that can be quickly memorized, without the compulsions and restrictions of a complex arithmetical system, but with the basic elements and operations of the twelve-tone system. Tonal references can be avoided or easily obscured by the twelve-tone techniques in its DNA, giving priority to orderings of notes and intervals above their tonal meanings. The next chapter highlights a compositional technique combining serial elements with tonal elements that are more obvious: Messiaen's modes of limited transpositions.