ON THE TONAL STRUCTURE OF HELENA TULVE'S *VERTIGE*: SUGGESTIONS FOR THE VOICE LEADING ANALYSIS OF POST-TONAL MUSIC

Kerri Kotta

It is typical of the language of the new music that the characteristic features of an individual work cannot be discussed in depth without the prior establishment of a relatively original set of analytical tools. Helena Tulve's *Vertige*[1] for amplified piano is no exception. Although the style of the work can be related to the different *streams* of art music at the end of the 20th century, e.g. the spectral music, the unfolding of the musical canvas of the composition cannot be explained exclusively in terms of French spectralism. In this paper I try to establish a set of analytical tools which help to describe the structural features of the aforementioned work. In particular, I will concentrate on the voice leading and its relations to the other aspects of the tonal structure of the work.

[1] The work is not published. The copy of the autograph of the composer can be obtained from the Estonian Music Information Centre, http://www.emic.ee/

The analysis of voice leading structure of the music of the 20th century often poses a question of discrimination between structural levels. Whereas in the tonal music, the existence of the functional harmony helps to define whether a tone or a chord functions as a structural or non-structural entity, the post-tonal music usually lacks such *universal* harmonic criteria. The goal of the present paper is to establish such criteria for the piano piece of Helena Tulve. For that purpose I try to describe the analytical approach which combines some features of the harmonic analysis by Paul Hindemith [Hindemith 1940] with the principles of (quasi-) Schenkerian voice-leading [Schenker 1979] in order to discriminate between relatively consonant and dissonant tones of different harmonies, and different harmonic zones, i.e. the larger harmonic units that arise by linking together different adjacent foreground harmonies with similar or harmonically close primary tones. The harmonic zones in their turn help to determine the prolongational units on the middleground of the voice leading structure. Finally, the voice leading sketch of the whole piece will be outlined, in which the musically most salient pitches or harmonies will be referred as structurally most important. Applying the analytical approach of harmony discussed in this paper I try to show in addition that the aforementioned pitches or harmonies can be referred as harmonically most stable in the context of this particular piece.

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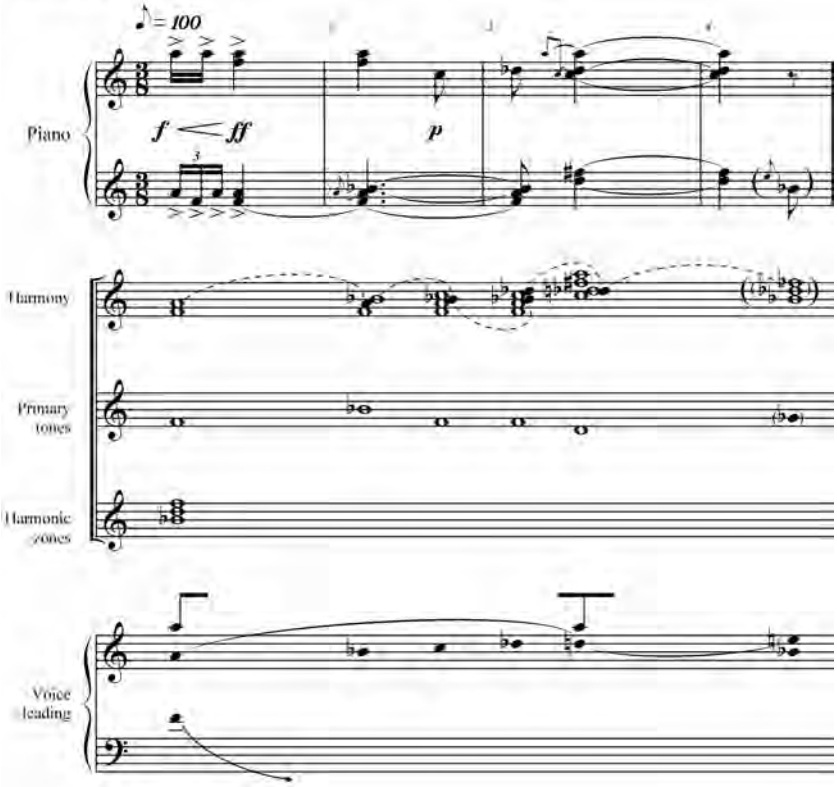
The piano piece was written in 2000 and has been performed several times in Estonia as well as other countries. Analogously to the other works of the composer, the musical language of the piece can be described as fluid and changing. Helena Tulve usually avoids sharp contrasts or well articulated caesuras between different thematic areas or formal sections;

this is often replaced by the constant transformation of one musical idea into another.

Although the piece cannot be described as tonal in the sense of the 18th or 19th century tonal harmony, it creates a certain type of balance between stable and unstable pitches or harmonies. Therefore, it cannot be explained in terms of the equality of twelve tones. As a result, the different harmonies acquire certain structural position and meaning as the work progresses.

The opening measures of the piano piece and their harmonic and voice leading analysis are shown in example 1.

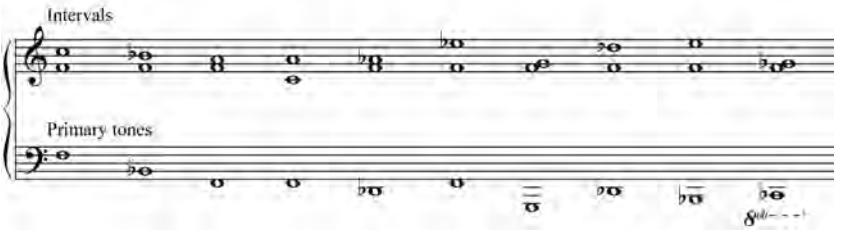
Example 1



The two upper staves are the original piano score. The downward system which is made up of three staves constitutes the harmonic analysis. The pitches that make up the harmony are shown in the uppermost staff of the system. According to Paul Hindemith, almost all chords have *roots* determined by the root of their lowest, most *consonant* interval [Wason 2002 : 69]. Every interval in its turn has a primary tone. In defining the primary tone, the tones of an interval are understood as the lowest possible harmonics of a hypothetical fundamental tone, which, in its turn, is then understood as the primary tone of the aforementioned interval. For example, in the overtone series, the lowest perfect fifth occurs between the second and third harmonics. Whereas the second harmonic (the lower tone of the fifth) represents the same pitch class as the fundamental, the lower tone of the fifth is the primary tone of the interval. The primary tone of

any other interval can be derived correspondingly. The intervals and their primary tones are shown in example 2.

Example 2



The primary tone of the lowest, most consonant interval of the harmony is also the primary tone of that harmony. For example, if the harmony includes a perfect fifth, the lower tone of that fifth is the primary tone of the harmony; if the harmony includes several fifths, the lower tone of the lowest fifth is the primary tone of the harmony. In case the harmony includes no perfect fifth, one should look for its inversion, a perfect fourth. In that case the upper tone of the (lowest) fourth is the primary tone of the harmony. But if the harmony includes the fourth neither, one should look for a major third; in that case the lower tone of the (lowest) major third is the primary tone of the harmony etc.

The pitches that are designated as whole notes in the uppermost staff of the harmonic analysis in example 1 are the first seven harmonics or overtones of the primary tone of the harmony. They also make up a consonant interval or minor seventh (sometimes a major second) with the primary tone of the harmony. These pitches can be referred as *chordal* or *harmonic* tones. The pitches that are designated with the black noteheads make up a dissonant interval with the primary tone (except minor seventh, or, in some cases, major second) and can be described as added, *non-chordal* or *non-harmonic* tones. In most instances the added tones can be related to the harmonic tones of the previous or subsequent harmony (look at the dashed curves between the harmonic and non-harmonic tones in example 1). Thus, the added or *non-harmonic* tones can be explained as a result of certain type of figuration which can be called an *anticipation-suspension* technique.

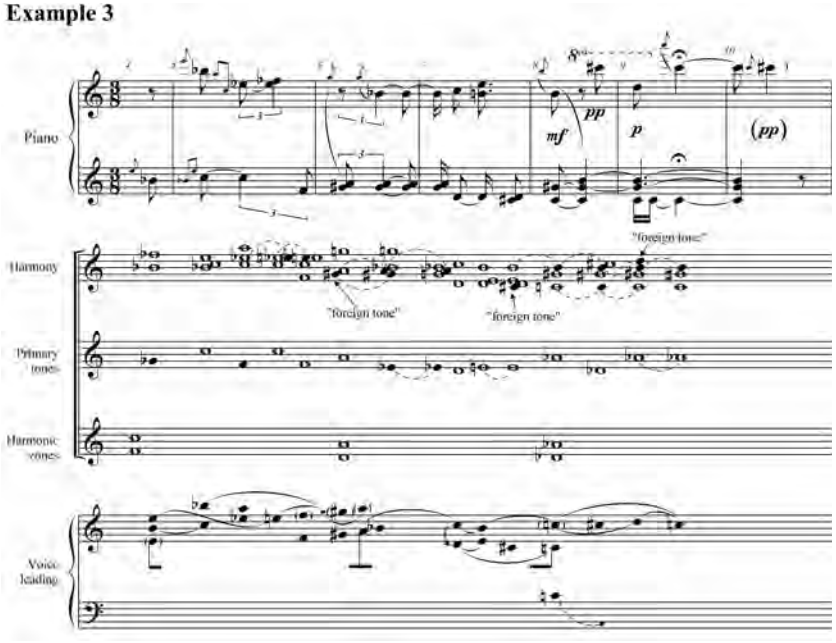
The primary tones of each harmony are shown in the middle staff of the system. If the harmony includes the primary tone, the latter is designated as a whole note. In some more *dissonant* harmonies the harmony does not include its primary tone. It can happen when the primary tone of the harmony is determined by its lowest minor third, major sixth, major seventh, minor second or tritone (i.e. by the interval in which neither of its tones can be the primary tone of the interval; look at example 2). Primary tones of such harmonies are designated as black noteheads. The harmony and the primary tone in brackets in measure 4 represent the harmony of the subsequent formal section and are shown in this example only to

demonstrate the relation between the chordal and non-chordal tone (the non-chordal D♭ in measure 3 can be related to D♭ implicit in the harmony on the last beat of measure 4). The lowest staff of the system represents the most fundamental harmony of the passage, the harmonic zone. As already mentioned it emerges as a collection of (strongly articulated) primary tones, which belong to the same harmony (i.e. all tones of the harmonic zone have to be the representatives of the pitch classes of seven first harmonics of a certain fundamental tone).

Thus, the measures 1–4 can be understood as a composing out of the harmonic zone B♭–D–F. In terms of voice leading, the section unfolds as the stepwise ascending fourth line A–D in the inner voice supported by F in the lower voice (look at the lowest system of the example 1). In its turn, the ascending fourth A–D in the inner voice prolongs A, the primary tone (*Kopfton*) of the structural upper voice. Such reading has its roots in the form (the measures 1–4 make up a relatively well articulated phrase) but it can be justified also in terms of harmony. One of the characteristic features of the structure of the section is that the stepwise ascending fourth in the voice leading graph synchronizes with the composing out of the harmonic zone B♭–D–F (compare the harmonic analysis and the voice leading graph in mm. 1–3): the opening sonority of the subsection (major third F–A) which displays the first tone of the harmonic zone corresponds to the first tone and the final sonority (C–D♭–D♮-F♯–A) which displays the last tone of the harmonic zone corresponds to the last tone of the ascending fourth of the voice leading graph.

In comparison with the previous section the measures 4–10 that make up the next formal section of the work are more ambivalent in their nature and offer more than one possible reading (look at example 3).

Example 3



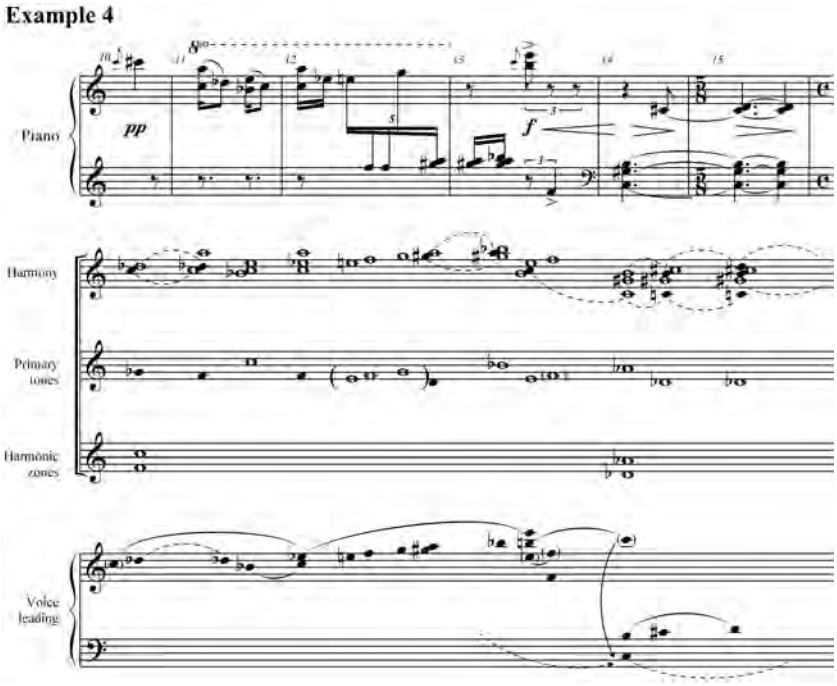
For example one can interpret the grace note A in the second beat of measure 5 as the recurring *Kopfton* whereas it appears in the same register as A in measure 1 and makes up the embellishment with the grace note C as in measure 3 (compare the measures of the piano score in examples 1 and 3 respectively). However, the reading that stems from the harmonic analysis offers no support to such interpretation. In harmonic terms, this section can be described as a displacement of harmonic zone F–C in measures 4–5 with harmonic zone D–A in measures 6–7; the latter is replaced in its turn by the harmonic zone D♭–A♭ in measures 8–10. Thus, the section includes three larger harmonic units which determine three middleground prolongational units respectively: the first in measures 4–5, the second in measures 6–7, and the third in measures 8–10. Whereas the grace note A emerges in the middle of the first prolongational unit of the section, it is better to interpret it as a passing note between B♭ and G: the former is the first strongly articulated tone and the latter is actually the last tone of the first prolongational unit.

The voice leading structure of the second section can be described as an arpeggiated six-four chord (E–A–C) in the upper voice (look at the bottom system of example 3). The three tones of the six-four chord articulate the beginnings of the three middleground prolongational units. In the lower level of voice leading structure, the tones of the six-four chord are connected through the complex net of different level neighbor note figures, sometimes embellished with the chromatic passing tones, and ascending or descending thirds.

The harmonic structure of the section includes a new feature: the *foreign tones*, i.e. the tones that cannot be related to the harmonic tones of the previous or subsequent harmonies using the anticipation-suspension technique (look at the uppermost staff of the middle system in measures 6, 7, and 9). The foreign tones are the pitches that can be explained in purely contrapuntal terms. However, interpretation of the foreign tone G♯ (measure 6) as a chromatic passing note between G and A (look at the voice leading graph) shows another characteristic feature of the tonal structure of the piece: the turning of a horizontal line into vertical sonority (G♯ and A are not coming one after another as shown in the voice leading graph but at the same time; compare the voice leading graph and the piano score). Similar phenomena happen in several places throughout the piece and can be related to the time aspect of the work. It can be described as a time space between two subsequent tones which becomes infinitely small. Such a phenomenon is sometimes prepared by the acceleration of rhythm. Explanations of other foreign tones raise no difficulties: C♯ in measure 8 can be explained as a chromatic passing tone and D in measure 9 as neighbour note to C♮ (look at the voice leading graph in example 3).

The next section displays a rather straightforward picture in which the horizontal aspect of the tonal structure is dominating (look at example 4).

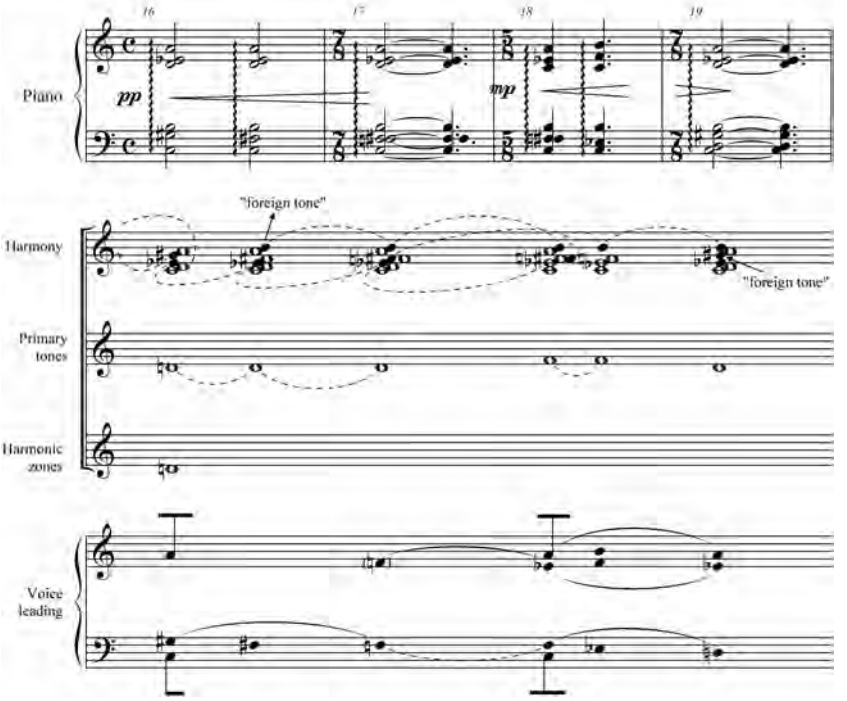
Example 4



Therefore, the harmonies are rather dissonant and their primary tones weakly articulated (look at the black noteheads of the staff which displays the primary tones of the harmonies in measures 10–12). The primary tones in measures 12 and 13 are in brackets because they represent the single pitches (i.e. the pitches themselves) instead of primary tones of harmonies. The section includes no foreign tones and displays a moderate use of anticipation-suspension technique. The whole section can be interpreted as a moving from harmonic zone F–C to harmonic zone D♭–A♭ (one can add a short intermediate zone B♭–E or B♭–F in measure 13; the latter is not included in the example). The motion from one harmonic zone to another is articulated by the ascending octave C5–C6 in the voice leading graph. The octave in its turn is divided into minor third C–E♭, augmented fifth E♭–B♮, and minor second B♮–C in measures 10–12, 12–13, and 13–14 respectively. Such division corresponds to the formal (motivic) as well as larger harmonic layout of the section.

The last section under discussion is shown in example 5. It composes out the harmonic zone represented by a single D.

Example 5



A thick and complex harmony is a result of a relatively frequent use of anticipation-suspension technique. The section includes also two foreign tones: B♮ and G♯, the interpretation of which needs a broader context and is left beyond the scope of the present discussion. The voice leading analysis in the bottom system is supported formally as well as harmonically: the section includes two *motives* or short progressions of three chords in measures 16–17 and 18–19 respectively. The chords of the first progression share a common primary tone D. The second progression begins with the chords that share the primary tone F and returns to a chord with primary tone D. These two progressions (motives) correspond to the two prolongational units of the voice leading. Both units prolong A in the upper voice and C in the lower voice in their deepest level of the voice leading structure. The first unit displays the passing note motion in the *tenor* voice whereas the second unit connects the descending third in the tenor *voice* with the neighbor note figures in the *alto* and *soprano* voices.

As demonstrated in the previous examples, in most instances the formal (motivic) layout of the piece can be taken as a basis for the determination of a middleground prolongational unit in the voice leading structure. In examples 1, 4, and 5 the short formal sections correspond to the middleground prolongational units as well as harmonic zones. However, in example 3 where the measures 4–8 make up a formally undivided whole, only the results of the harmonic analysis (i.e. the emerging harmonic zones) can be taken as a basis of the determination of the middleground prolongational units of the voice leading structure.

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After describing the tonal structure of the opening measures in detail, it is also relevant to outline the structure of the entire piece. For that purpose one has to look for the pitches and harmonies, which are dynamically, rhythmically, registerally, or otherwise prominently articulated. Whereas the stability condition can be replaced by the salience condition in the voice leading analysis of post-tonal music [Lerdahl 1989], the aforementioned pitches or harmonies can be referred as *structural*. In addition, I try to show that in the context of this particular piece these salient musical pitches or harmonies meet also the stability condition, i.e. their primary tones form a part of the most important harmonic zones of the piece.

One of the most prominent musical entities of the piece is the pitch class A. It articulates mostly the upper voice of the work and is rhythmically, registerally, and harmonically *colored* in different ways. For example the composer uses thick complex polyharmonic chords with A in the top voice and C in the bass as it happens in measures 16–27 (in part already discussed above), 40, 109–110 (–112), and 122. All the aforementioned sections unfold as the composing out of the harmonic zone D–A or D. As an alternative, the pitch class A is played together with the deep F♯ in the bass (look at measures 39, 64, 71, 89, 92, 99, and 123). Since the tones of the minor third are seen as third and fifth of major triad, the primary tone of the minor third is the prime of that triad. Thus, the primary tone of the interval of F♯–A is also D. Both tones sound always in the same (extreme) registers. As such the interval acquires a semantic connotation and can be seen as a *Leitmotiv* of the piece.

The third most prominent instance of the emergence of the pitch class A is a rhythmically fast repeated loud chord in high register which I call a *clash* (explanation is given below). It appears first time in measure 63 and is then restated in measures 74 and 108. The most consonant interval of the chord is the fifth D–A. Thus, the primary tone of the chord is D again. Beside these three instances, the pitch class A as a part of the grace note figures makes up the fifths with the lower voice D in measure 37 and 97, it is a part of a tremolo in measure 72, it emerges as a top voice of the complex polyharmonic chords which have not C in the bass (look at measures 75, 88, 90, and 114–118). In tremolo, A makes up a minor third with the lower F♯. As already mentioned, the primary tone of that interval is D. In measure 75, the primary tone of the harmony is C♯, but in measures 88 and 90 the primary tone is D again. The measures 114–118 are harmonically more complex and they display a variety of primary tones. However, one of the most frequent primary tones of the section is B♭ which links the section up with the opening phrase of the piece based on the harmonic zone B♭–D–F. A is also prominently articulated in measures 99–104, where all other material is juxtaposed with the *ostinato*-like repetition of the pitch class A. And – last but not least – A can be also present virtually, as an overtone (harmonic) of D (look at measure 29).

The previous synopsis shows that A is present almost all the time throughout the piece, but it appears infrequently as a single tone. Normally, it is accompanied by another tone or tones. As already demonstrated the most important of these tones are C, F♯ and D. All these tones (together with A) make up the prime sonority of the piece. The prime sonority cannot be described as a chord, but as an abstract entity, a collection of tones most prominently articulated within the piece. However, some chords including all four pitch classes of the prime sonority can be found; for example one such chord emerges in measure 3–4. The primary tone of the prime sonority is D.

This is not the only collection of tones which determine the tonal structure of the piece. As the work progresses, the pitch class A is repeatedly destabilized and displaced by B♭. It stops the chord progression in measure 42 being the last and the lowest note of the measure. In measures 44–49 it becomes the central tone of the passage (being also the primary tone of the most vertical sonorities of the section). It forms a significant part of the melody in measures 51–54, which can be called a *yearning* melody (explanation is given below). B♭, spelled out as A♯, forms with A the aforementioned *clash*-chord in measures 63, 74, and 108.

In measure 64, B♭ supported by the deep G in the bass is juxtaposed with the Leitmotiv, the A supported by the deep F♯. The B♭ supported by the deep G in the bass can be found also in measures 87, 91, 97, 98, and 129. The primary tone of the minor third G–B♭ is E♭. B♭ and A make up a sharp dissonance in measure 73. In measures 114–118 B♭ articulates the lower voice of the whole section: whereas A is the most prominent pitch in the upper voice, B♭ is the most stable pitch in the lower voice (almost all grace note figures of the section begin with B♭). Analogously to A, B♭ is sometimes referred through another tone, the E♭ (look at measure 33 where the E♭ comes with B♭ above it, or measures 78–79 where, again, the most prominent tone is E♭, the representative of B♭ which is touched only slightly, as a grace note in measure 79).

Analogously to A, B♭ is usually accompanied by other tones. According to the previous survey, these tones are G, E♭ and D♭ (spelled out mostly as C♯): G appears as a deep bass to B♭, E♭ emerges as representative of virtual B♭ and C♯ accompanies B♭ (spelled out as A♯) in the *clash*-chord. These tones make up another important sonority, which can be called the secondary sonority of the piece. In comparison with the prime sonority, the new sonority has the same intervallic structure being actually a transposed variant of the prime sonority (the tones of the prime sonority are transposed by a semitone up). The primary tone of the secondary sonority is E♭.

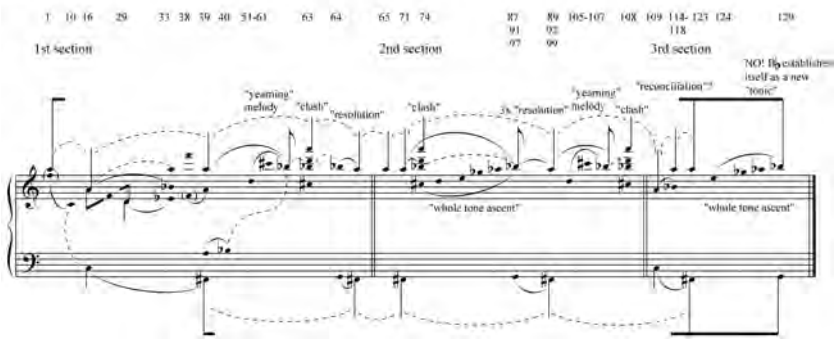
Thus, there exists a kind of polarity in the piece: whereas the prime sonority represents the harmonic stability, the secondary sonority represents the harmonic instability, an urge to go away from the prime sonority. The tonal structure of the piece can be described as a constant fluctuation

between these polarities which maintain their active position throughout the piece. It explains why all the tones of the one sonority appear together as a chord or a (linear) motive rather infrequently. Although it is usually clear which sonority is dominating, most chords and motives are better explained as a mixture of both sonorities.

According to that what was said before, a formal layout of the work can be outlined. The piece can be divided into three larger sections: the first in measures 1–64, the second in measures 65–108, and the third in measures 109–129. In the first and second section, there exist an urge to displace the prime sonority with the secondary sonority. In the upper voice, it manifests as the gradual displacement of pitch class A with pitch class B♭ which brings about the conflict between these two tones representing the two extremes of the piece. The *urge* to leave the prime sonority is expressed through *yearning* melody (it always emerges before the main conflict of the section) and the conflict itself is expressed through the *clash*-chord which combines the tones of the prime and the secondary sonority in the most comprehensible manner. The last section shows an attempt to reconcile these two extremes. The sub-section that forms the main part of the last section is based on B♭ in the lower voice and A in the upper voice (measures 114–118). It seems as if the composer is trying to build up a bridge over these two opposites. But the last measure of the piece brings about the dramatic shift: B♭ in the upper voice and G in the bass establish secondary sonority as a new prime sonority of the piece.

The voice-leading sketch of the piece clarifies it (look at example 6).

Example 6



The background of the voice leading can be described as the stepwise ascent in parallel tenths: A–B♭ in the upper voice is supported by the F♯–G in the bass. The upper voice's A–B♭ is constantly anticipated in the lower level of the voice-leading structure: look at measures 16–33, 39–40 (in the *tenor* voice), 39–61, 71–74, 71–97, 89–107, and 109–114. But there exist also a retrograde version of this ascent – a stepwise descent B²–A. It can be called a *resolution*, because, in a sense, it functions as a cadence, as an arrival on to the solid, stable ground. This descent can be seen in measures 64, 87–89, 91–92, and 97–99. At the same time, the ascent in the upper voice is never supported by the bass in lower level of voice-leading structure as

the descent always is. This qualifies the final ascent, now supported by the bass, as structurally most prominent.

As demonstrated in the previous analysis, the tonal structure of the whole piece can be seen as a constant fluctuation between two opposite sonorities designated as the prime and secondary sonority respectively. Whereas in the music of Helena Tulve the pitch is never seen as something fundamentally different from harmony or sonority (the latter is simply a pitch that is *composed out*), the piece can be understood as an interaction of two pitches, A and B♭. The harmonic language of the compositions of Helena Tulve is frequently worked out starting with a single tone. In this piece, one of the main tones is A. This tone, being established in the opening measures of the work, is questioned and displaced in subsequent measures in order to create an interesting and rich musical canvas.

PAR HELĒNAS TULVES SKAŅDARBA *VERTIGE* TONĀLO STRUKTŪRU: DAŽAS IEROSMES POSTTONĀLĀS MŪZIKAS BALSSVIRZES ANALĪZEI

Kerri Kota

Kopsavilkums

Analizējot 20. gadsimta skaņdarbu balssvirzes struktūru, bieži rodas jautājums, kā diferencēt dažādus strukturālos līmeņus. Tonālajā mūzikā funkcionālās harmonijas esamība palīdz noteikt, vai skaņa (akords) funkcionē kā strukturāla vai ārpusstrukturāla vienība, turpretī posttonālajai mūzikai parasti trūkst šādu *universālu* harmonisko kritēriju. Apvienojot dažus Paula Hindemita harmoniskās analīzes principus ar Heinriha Šenkera tradīcijām, šis raksts piedāvā kritērijus paildzināto vienību[1] noteikšanai balssvirzes vidusslānī[2] Helēnas Tulves skaņdarbā *Vertige* (tulkojumā *Reibonis, apmātība* – red. piezīme) paplašinātajām klavierēm.

Šī kompozīcija tapusi 2000. gadā. Tajā jūtama radniecība 20. gadsimta beigu mūzikas strāvojumu (piemēram, spektrālās mūzikas) stilistikai. Skaņurakstu kopumā var apzīmēt kā plūstošu un mainīgu. Helēna Tulve parasti izvairās no asiem kontrastiem vai krasi izteiktām cezūrām starp dažādām tematisma zonām vai formas sektoriem; raksturīga ir pastāvīga vienas muzikālās idejas transformācija citā. Kaut arī skaņdarbu nevar uzskatīt par tonālu 18. vai 19. gadsimta harmonijas izpratnē, tajā izpaužas zināms līdzsvars starp harmonisku noturību un nenoturību.

Pauls Hindemits uzskata, ka gandrīz visiem akordiem (vertikālām struktūrām) ir *saknes*, kuras nosaka to viszemākais, konsonantākais intervāls. Katram intervālam ir pamatskaņa. Nosakot pamatskaņu,

[1] *Paildzinātās vienības* jeb *paildzinātās harmonijas* – specifisks jēdziens Šenkera koncepcijā; ar to apzīmētas saskaņas, kuras, neraugoties uz pastāvīgu miju ar citām saskaņām, konkrētā skaņdarba posmā dominē un šai ziņā tiek it kā *paildzinātas*. – Red. piezīme.

[2] Šenkers nodala trīs balssvirzes slāņus – pamatslāni, vidusslāni un virsslāni. Pamatslānis jeb pirmstruktūra atspoguļo skaņdarba pamatideju, kas tonālajā mūzikā balstīta tai vai citā vienkāršā secībā, savukārt vidusslānis ir pirmstruktūras aizpildījums ar dažādu balsu līnijām. Virsslānis ir šī attīstības procesa galarezultāts – iemiesojums konkrētā skaņdarbā. – Red. piezīme.

ikvienā intervāla skaņā jācenšas saklausīt iespējami zemāko harmoniju, kas veidojas uz hipotētiski zemākās skaņas. Piemēram, virsskaņu rindā zemākā tīrā kvinta atrodas starp otro un trešo skaņu. Turpretī otrā skaņa (kvintas zemākā skaņa) pārstāv to pašu skaņaugstuma grupu kā virsskaņu rindas pamatskaņa, tādējādi kvintas zemākā skaņa ir intervāla pamatskaņa. Attiecīgi nosakāma arī jebkura cita intervāla pamatskaņa. Līdz ar to harmoniskās vertikāles viszemākā un viskonsonantā intervāla pamatskaņa kļūst arī par šīs vertikāles pamatskaņu.

Secīgi izkārtotas pamatskaņas veido harmoniskās zonas. Tās ir lielākas harmoniskās vienības, kas rodas, apvienojot dažādas blakus esošas harmoniskās saskaņas, ko komponiste izvirzījusi priekšplānā, ar līdzīgām vai harmoniski tuvām pamatskaņām. Harmoniskās zonas savukārt palīdz noteikt paildzinātās harmoniskās vienības balssvirzes vidusslānī. Raksta noslēgumā tiek iezīmētas visa skaņdarba balssvirzes aprises, turklāt muzikāli nozīmīgākās harmonijas atzītas par strukturāli vissvarīgākajām. Izmantojot analītisku pieeju harmonijai, savā rakstā tiecos arī pierādīt, ka tieši šīs harmonijas var uzskatīt par visnoturīgākajām konkrētā skaņdarba kontekstā.

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