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Pitch and Harmony: A (Rational) Method Based on (Intuitive) Aural Experience

Abstract. Pitch and harmony are difficult topics in contemporary practice. It is a fact that much of the music written today focuses on other parameters such as extended techniques, sound-based structures, textures, gestures, etc. While a lot of innovation is found in these areas, the question of pitch remains even if in the background. All sounds do have some pitch content, so how to deal with pitch? The twentieth century has seen many theories of pitch, starting with dodecaphony, that are highly rational but lack an intuitive aspect. Especially the concept that the horizontal and vertical aspects of pitch are in essence the same is problematic. This is apparent in the Pitch-Class set theory where the voicing of chords is barely discussed. Therefore a new method will be proposed that includes the voicing as part of the identity of the chord. In our perception of harmony, not all frequencies are equal: some seem to reinforce each other, while others clash. The overtone series and the concept of virtual pitch is a good model to clarify this phenomenon, and a theory of consonance and dissonance is consequently developed. Harmonies can be described adequately, in which consonance and dissonance are extremes on a large sliding scale. Some benefits of this new model are: it is applicable for different tuning systems (including various microtonal systems); complex and/or ambiguous chords can be described accurately according to our perception. The theoretical model presented here builds on the work by Célestin Deliège "*L'harmonie atonale: de l'ensemble à l'échelle*" (2001) and Robert Hasegawa "*Tone Representation and Just Intervals in Contemporary Music*" (2006). To clarify this method, two extended examples will be discussed. The first is "*Piano Etude No. 1*" (1999/2003) by Unsuk Chin; the second is "*Feria*" (1995/1997) by Magnus Lindberg.

Keywords: post-tonal harmony, harmony, consonance, dissonance, virtual fundamental, overtone series, Robert Hasegawa, Unsuk Chin, Magnus Lindberg.

1. Introduction

1.1. Harmony in Post-Tonal Music

Harmony is a neglected topic in post-tonal music. Post-tonal harmony is often thought of as avoiding "tonal clichés". This turn away from harmony has resulted in music written with a focus on other parameters. Therefore in the past century, we have seen an increase in rhythmic complexity, a focus on motivic construction, textural composition, extended techniques, and so on. The creative energy in these fields has greatly added to the innovation of new music and brought wonderful new works to the repertoire. While none of these approaches is incompatible with harmonic strategies, often the importance of harmony did move to the background in light of the musical narrative. However it has been observed that each sound has a pitch component, even noise. So perhaps it might be useful to find a way to talk about pitch and especially harmony in post-tonal music.

1.2. A Striking Paradox Regarding Harmonic Language

When the harmonic language of the (tonal) past is concerned it is often stated that the composers used an existing language. This is placed in sharp contrast with the hard task that composers face in the post-tonal era: now composers have to develop a new language, ideally for each and every new piece. This seems a rather blunt statement that needs some nuance. It is a fact that listeners familiar with the so-called standard repertoire can distinguish tonal composers from each other: Bach does not sound as Haydn; Brahms does not sound as Mozart; Beethoven does not sound as Chopin... This is because each of these composers changed, adjusted, and developed the tonal language they inherited.

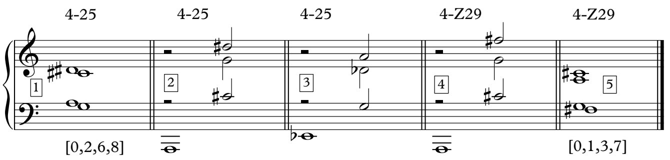
Therefore, the tonal language should be considered as a system that was in continuous evolution where each generation of composers rebuilt part of the tonal language. And if the tonal language was not a fixed system handed down from generation to generation, but a system that was shaped by the composers who used and modified it, then why would there not be some common element in the pitch language today? Indeed, this evolution that we observed in tonal music perhaps did not end with Mahler and Schönberg. Would it be possible to consider that music in the post-tonal era continues an evolution of the pitch language?

Certainly, in post-tonal music this evolution is complicated. In the first place because we do not yet have the historical distance that clarifies common tendencies, but also and importantly because pitch has become so closely interconnected with other parameters by the use of extended techniques, noise, multiphonics, emphasis on textures and gestures, and so on. However, as mentioned already, even noise contains an element of pitch, and if this leads to some kind of common pitch language, it might be useful to discuss the use of harmony in post-tonal music.

2. Analyzing Post-tonal Harmony

2.1. Harmony in the 20th Century

A decisive factor for pitch in the 20th century was Schönberg's claim that harmony was the vertical dimension of melody (and melody being the horizontal dimension of harmony). This claim was the basic assumption for the development of his new dodecaphonic technique. As a result the traditional distinction between melody and harmony has disappeared in most of post-tonal theory. Or put differently, there is no specific theory for harmony any more. Indeed, the most well-known and widespread theory for post-tonal music is the Pitch-Class set theory. This theory has advanced our understanding of non-tonal music in many ways, but it is problematic if the focus is specifically on the harmony. To clarify the problem of the Pitch-Class set theory with harmony, please play the five chords from Example 1.



Example 1. The problem of Pitch-Class sets for understanding Harmony

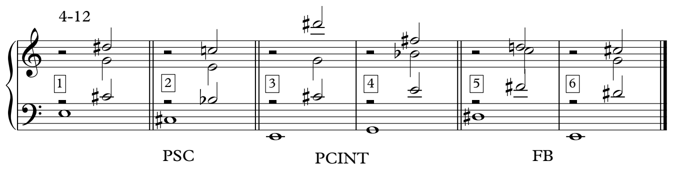
The first three chords belong to the same Pitch-Class set: 4–25 with prime form (0, 2, 6, 8). Yet they do sound very different from a harmonic viewpoint: the first chord sounds rather as a cluster, the second and the third chord are very consonant, each built on a different pitch (the second chord is built on A, the third chord is built on E♭). The last two chords are examples of a different Pitch-Class set: 4–Z29, with prime form (0, 1, 3, 7). Notice how similar the fourth chord sounds to the second chord: they share three pitches, including the bass note. More generally, the three chords in the middle seem to have more in common with each other due to the relative consonance resulting from how the chords are voiced. The difference between the wide voicing of chords 2, 3, and 4 on the one hand and the cluster like chords 1 and 5 on the other hand is more revealing for the harmonic experience than the distinction between the two underlying Pitch-Class sets.

With this example in mind, it is obvious that the Pitch-Class set theory does not deal with the way we perceive harmony. Therefore, for harmonic purposes the Pitch-Class set theory is problematic. While the Pitch-Class set theory is very rational indeed, it does not correspond with our intuition based on our perception of harmony. If harmony is in any way an important factor for the coherence of the music, then we should be able to find a way to express this harmonic coherence in a theoretically different way. That being said, the usefulness of the Pitch-Class set theory is not to be questioned. Much of our understanding of post-tonal music has come indeed from the Pitch-Class set theory. However, for our understanding of harmony we need to find other tools.

2.2. Pitch-Class Set Theory and the Voicing of Chords

In search of other tools, we will start by looking at what is already available for discussing harmony. Important work has been done regarding the voicing of Pitch-Class sets by Robert Morris (1995). Morris proposes three categories: PSC, PCINT, and FB. Each of these categories defines the voicing of chords in more or less restricted ways: PSC is a relation between two chords that are transpositions of each other. They share the same intervals between the corresponding chord tones. PCINT preserves the order of pitch classes from the bass up, with the possibility of having octave transpositions between any two chord-tones. That is, the intervals from bottom up are preserved with the possibility of mod 12. FB stands for figured bass and preserves all intervals related to the bass with mod 12. Therefore the intervals between the chord tones can change because the order of the pitch classes from the bass up can change completely as long as the intervals (with mod 12) in relation to the bass are the same.

These categories are clarified with musical examples in Example 2: Chord 1 is considered the model, therefore Chord 2 is PSC (a transposition of Chord 1); chords 3 and 4 are PCINT (the order of the pitch classes is preserved from the bass up, but with octave displacements); and chords 5 and 6 are FB (the intervals above the bass are preserved with mod 12, but the order of the pitch classes is not).



Example 2. PSC, PCINT, FB – three categories for voicing PC sets by R. Morris

This is certainly a valuable addition to the Pitch-Class set theory; however, Morris is accepting the limitations of the context as set by the Pitch-Class set theory. Two chords that are similar harmonically (for example, chords 2 and 4 in Example 1) are simply different Pitch-Class sets. The similarities he proposes are only within a given Pitch-Class set and harmonic similarities between different Pitch-Class sets are not discussed.

A different perspective on post-tonal harmony comes from Célestin Deliège (2001), who was very critical of the Pitch-Class set theory. When formulating his thoughts on post-tonal harmony, Deliège was also inspired by the concept of the figured bass. But being influenced by spectral music, the intervals above the bass are indicated as overtones of the bass note and not in numbers of semitones. The order of the chord tones is left undetermined in his proposal (similar to the FB category of Morris). Deliège's approach to post-tonal harmony is the result of his critique on the Pitch-Class set theory. He wanted to contribute to the understanding of harmony in a constructive way, attempting to find a way out of the impasse of post-tonal harmony. Deliège found the model of the overtone series a viable method to think about harmony in contrast to the Pitch-Class set theory.

2.3. Harmony and the Concept of Consonance

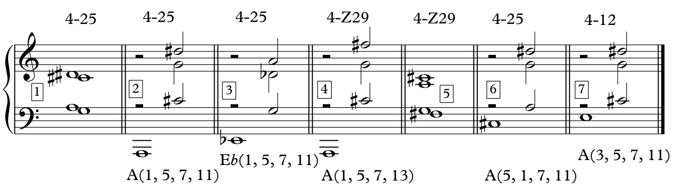
In the search for new tools for analyzing harmony in post-tonal music, we should question what harmony actually is. It seems obvious in tonal repertoire, but for some reason it seems less clear for post-tonal music. The triad is the harmonic reference when thinking of tonal music. Other intervals are melodic, or if placed in a harmonic context they are considered dissonant. This clear distinction is indeed troubled in post-tonal music. All intervals seem to be possible in a harmonic context. So, perhaps the distinction between melodic and harmonic intervals is gone indeed, and Schönberg was right after all.

However, does it not seem strange that our concept of consonance is based on intervals since the beginning of western music in the Middle Ages? Reconsidering the notion of consonance might clarify how the current situation came into being and in particular why the concept of consonance has eroded. Traditionally each interval has a specific quality that results in either consonance, or dissonance. As a first observation, it is perhaps useful to recall that with the development of counterpoint leading to a complex tonal system, the third (and the inversion, the sixth) became consonant. Before that only perfect intervals were considered consonant. Assuming this logic, would a new definition of consonance not be able to place post-tonal music in a new perspective? And a renewed concept of consonance could perhaps make harmony relevant again in the context of post-tonal music.

2.4. Consonance and the Perception of a Virtual Fundamental

Since the groundbreaking work by Hermann von Helmholtz (1875), there has been done a significant amount of research into what consonance actually is and how our perception of sound and consonance works (Terhardt 1984). A key concept for consonance is the virtual fundamental (Parncutt 1988). Pitches are perceived as consonant when they work together to create a virtual fundamental. When pitches compete for different virtual fundamentals we perceive them as dissonant. How does this work? Simply put: if the pitches resemble the structure of the overtone series the lowest pitch of the overtone series is the virtual fundamental. This means that the overtone series is the model for consonance instead of isolated intervals.

Based on this research, Robert Hasegawa (2006) has developed a comprehensive method for analyzing rich and complex chords. Hasegawa clarifies the concept of consonance based on the model of the overtone series. An extremely important aspect is that the voicing of a chord can change everything. This was already demonstrated in Example 1, but here we finally have a model with which we can analyze any given chord. And it needs to be emphasized: the voicing is part of the chord in this method. Hasegawa's analytic description of chords indicates the virtual fundamental of the chord (traditionally called the root) followed by the overtones relating to the chord tones in between brackets.



Example 3. Harmony in relation to Pitch Class sets

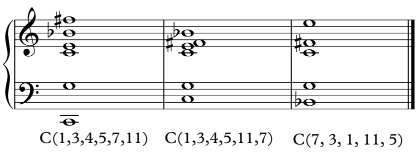
With this in mind we can revisit the chords of the first example. In Example 3, the same chords are analyzed with the method developed by Hasegawa. Now the relationship between the harmonies of chords 2, 3, and 4 is immediately clear. Chords 2 and 3 are transpositions, and chords 2 and 4 are closely connected as they are almost identical: the chord-tone representing overtone 11 is now changed to representing overtone 13. Here we have a method that confirms how we intuitively perceived the chords of example No. 1. To emphasize the contrast, in Example 3 the names of the Pitch-Class sets are indicated above each chord. These labels are unrelated to the aural experience of the harmonies.

In addition, it should be noted that this approach is flexible: the bass note does not need to be the fundamental of the chord as it was the case in the model proposed by Célestin Deliège. See for instance Chord 6 in Example 3, or even more radical: the fundamental does not need to be present in the chord as for example Chord 7 in Example 3.

One small difference in my analytic approach must be noted: where Hasegawa uses the model of the overtone series as a strict and unchangeable order of pitches, I allow for octave transpositions as long as the order of the chord tones is unchanged. This is similar to the flexibility of PCINT described by Morris. An example is found in the analysis of the third chord: E♭ (1, 5, 7, 11) where Hasegawa would have written E♭ (2, 5, 7, 11). In this particular case the difference is small. But it can simplify the numbers, and their reading significantly: for example, chord six would read as A (5, 16, 28, 44) in the strict approach of Hasegawa.

2.5. From Consonance to Dissonance

If the overtone series represents perfect consonance, then any deviation creates some degree of dissonance. With this in mind, the first chord of Example 4 is perfectly consonant. The second chord is less consonant. There are two reasons: the bass note is an octave higher; and the F♯ is placed an octave lower which results in an out of order sequence of the overtones as seen in the analysis. This chord, voiced in a range smaller than two octaves would only be perfectly consonant with fundamental two octaves below the bass note, and is therefore less consonant than the first chord. However, consonance is relative: the second chord is much more consonant than the third chord in which the overtones represented by the chord tones are seemingly completely out of order. From this example, we can state that the more overtones as represented by chord tones are being displaced, the more dissonant the chord will be. Therefore this method is very versatile: it allows for a gradual change from consonance to dissonance in a very controlled manner.



Example 4. Gradually increasing dissonance by adjusting the voicing

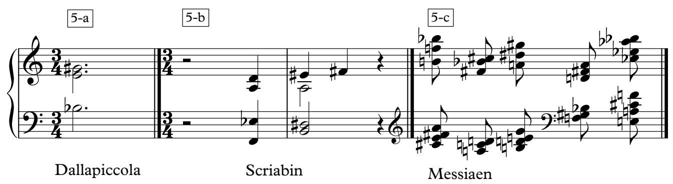
The versatility of this approach does not end here: because chord tones represent overtones, there is inevitably some adjustment of intonation needed: the overtones do not fit perfectly in a 12-tone equal temperament scale; chord-tones represent the nearest overtone. Using quarter tones, the adjustment needed is smaller and the chord-tones representing overtones can be more accurate. Therefore it is clear that by using the overtone series one can adjust to any given tone system from 12-tone equal temperament to just intonation. It is one of the strengths of this method that chords including any kind of microtones can be analyzed. An example of this can be found in Hasegawa's article, with the analysis of three chords from Vortex Temporum by Gérard Grisey that include quarter tones.

2.6. A Gradual Scale

How useful is this model of consonance for post-tonal harmony? Certainly it does take the spacing of chords into account, and it gives an understanding of how the voicing affects the consonance/dissonance of a chord. But the consequence is that consonance and dissonance are not mutually exclusive as it used to be when the concept of consonance was based solely on intervals: now there is a long scale between consonance and many different forms of dissonance from mild to harsh. This difference between either consonance or dissonance on the one hand, and the new model with a variety of shades from consonance to different intensities of dissonance on the other hand should not be underestimated. In post-tonal music consonance is often a question of more or less consonance in a given context instead of an intrinsic and absolute value of a chord regardless of the context. Perhaps this situation is not as easy as in the (tonal) past, but it allows for more nuances and reflects the variety and richness of post-tonal harmony as it occurs in the music.

2.7. Ambiguous Chords

Since the context is important for understanding the consonance of a chord, it is important to discuss how the analysis itself could be ambiguous. Example 5-a shows a chord that is taken from Measure 3 out of "Quartina" from Luigi Dallapiccola's "Quaderno musicale di Annalibera" (1952) (the melody is left out). This chord can be analyzed in at least four different ways: E (11, 1, 5); B♭ (1, 11, 7); F♯ (5, 7, 9); C (7, 5, 13). Playing the different fundamentals in the low register below the same chord, places this chord each time in a new perspective. This multiplicity of possible viewpoints is one of the interests of post-tonal harmony. The composer can play with the difference between chords with a strong fundamental versus chords where the fundamental is ambiguous. Or one can imagine the same chord being placed in different harmonic contexts. For example this chord in a context of E would be consonant, but the same chord in a different context for example C or even more extreme A would sound quite different. In this way the same chord can receive different meanings depending on the harmonic context.



Example 5. Analyzing ambiguous chords

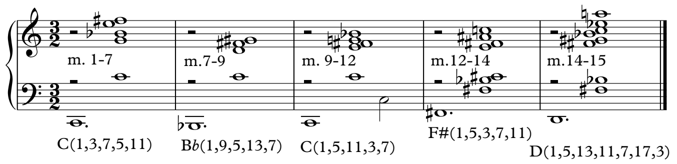
The chord progression in Example 5-b is a reduction of the two opening chords of Schriabin's prelude Op. 48 No. 1 (1905). What Scriabin does, is what was implicit in the chord from Dallapiccola discussed above. The triton E♭-A (enharmonically respelled as D♯-A) is first in the context of F and immediately afterward in the context of B. The two chords can be analyzed as F (1, 7, 10, 13) followed by B (1, 5, 7, 11, 12). Notice that in addition to the two common tones the F is also enharmonically respelled as E♯, albeit in a very different register. From a harmonic viewpoint Scriabin plays here with the possibility of creating a different harmonic context for a few pitches that are held as common tones between two chords. Scriabin uses this harmonic strategy relatively frequent, in particular in his later works.

Example 5-c shows Measure 7 of Messiaen's "Le rouge gorge" from "Petites esquisses d'oiseaux" (1985). These five chords can be analyzed as follows: A (5, 6, 13+, 8, 9, 13-, 17); D (6, 7, 8, 10, 13, 15); G (5, 6, 13+, 8, 9, 13-, 17); B♭ (6, 7, 8, 10, 13, 15); A (3, 4, 5, 13-, 9, 11, 15, 17). These chords are more complex due to the number of chord tones involved and due to the higher partials that are represented by the chord tones as shown in the analysis. This can lead to another kind of ambiguity: instead of one virtual fundamental for a chord, there can be multiple fundamentals. This tension between the two analytic approaches creates a different kind of ambiguity. In the five-chord sequence, chords 1 and 3 are transpositions, as well as chords 2 and 4. Let us have a closer look at chord four. Instead of the analysis given above, it is also possible to consider the following analysis: B♭ (6, 7, 8, 10) and D (1, 5, 3) with the D being a common tone between the two. It seems plausible to hear this chord with the B♭ as fundamental and some colorful extensions in the higher parts. But it seems equally possible to hear this chord with a B♭ as fundamental together with a D major triad on top.

A similar analysis can be given for the last chord: A (3, 4, 5) for the lowest three pitches and then with the C♯ as common tone C♯ (1, 5, 7, 9, 3, 13). It seems less important to find the "correct" analysis but rather to find multiple perspectives on how the harmony can be perceived and how the composer uses these aspects, or not.

2.8. Harmonic Consonance in Unsuk Chin's "Piano Etude No. 1"

The first piano etude by Unsuk Chin is titled "In C" (1999/2003). In this composition she controls the harmony to create a clear sense of harmonic tension. Example 6 shows a harmonic reduction of measures 1–15. In this reduction the bass notes are given together with the prominent notes in the middle register. The high register has been omitted as these pitches have less impact on the harmony.



Example 6. Harmonic Reduction of Piano Etude No. 1 "In C" (m. 1–15) by Unsuk Chin

This composition begins very consonant with the overtone series on C prominently present. In measures 7–9 the harmony shifts to B♭ almost as a neighbor motion returning to C in Measure 9. Notice that in this harmonic shift the middle C and the F♯ above are kept in common. Alternatively measures 7–9 can be analyzed as C (7, 1, 9, 11, 13). This analysis is more dissonant than having the B♭ as fundamental, however keeping the C as fundamental stresses the continuity with the preceding and following harmonies. This double analysis is not a problem but a sign of the harmonic richness of this passage. The analysis in Example 6 stresses the autonomy of the harmony, mostly because it is sustained for some time. When the music returns to C (or continues?) in Measure 9, the chord is slightly less consonant compared to the first measures because the pitches are closer together. However Measure 9 is more consonant than the preceding harmony with the B♭ in the bass. This principle has been discussed in Example 4. Compare in particular chords 1, 2, and 3 of Example 4 with the first, third, and second chord respectively of the harmonic reduction in Example 6. Since the F♯ (in measures 9–12) is placed too low in reference to the overtone series, the harmony is less consonant than at the beginning. Next, in Measure 12 the harmony shifts to F♯. Again, the change of harmony is realized with several common tones: notice middle C, E, and F♯. Even though the harmonies become gradually more dissonant, the harmony on F♯ is still relatively consonant (the awkward spelling comes from melodic considerations in the score) with the lower partials voiced in the lower register. Before the pause in Measure 15, the harmony shifts to D. The principle of common tones is still at work; however the harmony is definitely more dissonant with the augmented triad prominently in the lower register and mostly whole tones that define the sonority above the augmented triad. On top is a diminished triad with A as the highest pitch. And while A is very consonant in D, here it is ambiguous due to the dissonance with the whole tones just an octave below.

The harmonic trajectory from the beginning until Measure 15 is a beautifully controlled gradual increase of harmonic dissonance. This composition is an ideal example for our harmonic method and it seems that Unsuk Chin must have had the idea of consonance and the overtone series in mind while composing this etude.

2.9. Magnus Lindberg: A Clash of Systems

Magnus Lindberg uses pitch structures by using the Pitch-Class set theory, and simultaneously he has integrated a strong sense of harmony from spectral music. Perhaps it seems as if these two approaches cannot coexist. Lindberg certainly is interested to let both worlds clash into each other, but he is equally able to let both worlds merge into rich sonorous chords. As a matter of fact, the harmonic approach discussed here does not exclude the Pitch-Class set theory. If the pitches are controlled by the Pitch-Class set theory while the harmonies are controlled – especially the voicing – by the principles of the overtone series, then both systems can work together.

In Example 7 a harmonic reduction is given of measures 1–33 of "Feria" (1995/1997). Lindberg achieves a balance between music that has a harmonic focus and music that is not primarily harmonic in nature. The opening measures result in a cluster, initiated by the melody in the trumpet. A sense of harmony is absent in these measures. This cluster is followed by (and alternated with) a motivic component in Measure 7 (and later 12–13). While the emphasis of the motive is melodic, these passages have a stronger harmonic profile because they can be considered broken chords. The chord on the downbeat of Measure 14 has a strong harmonic impact. Yet it has the same intervallic structure as the preceding measures. The triton A♭-D has a perfect fifth above with the A (similar to the two figures in Measure 12), and a perfect fifth below with the D♭ (similar to the first figure in Measure 13). To this symmetrical chord Lindberg has added a B♭. Only three pitches are

Example 7. Harmonic Reduction of "Feria" (m. 1–33) by Magnus Lindberg

sustained, being a transposition of the motivic figure in measures 7 and 12 (A♭-D-A). However, in this case, due to the low register and the long duration the impact is harmonic instead of motivic. These three pitches can be analyzed as D (11, 1, 3) which is rather dissonant. The transition into the following chord (in Measure 18) is very gradual and smooth, probably because the fundamental is kept the same: D (1, 3, 5m, 15, 9). This chord is voiced in a very consonant way with the triad in the lower register covering more than an octave; the dissonant partials 15 and 9 are in the middle register close together. It should be noted that the 5th partial is represented here as a minor third above the bass, hence "5m" in the analysis. From the clash in Measure 14, Lindberg has brought the music to a beautiful radiant (and relatively consonant) sonority in Measure 18. Immediately after, in the upper registers a cluster is being formed leading to the first climax in Measure 22 built on two harmonic centers: E and B♭. This is shown for clarity in the analysis but the music does not sound bi-tonal. The four lowest pitches form a symmetrical chord with the same motives from measures 12–13, but now the perfect fifth is in the middle with a triton below and above (E-B♭-F-B). Where in Measure 14 the symmetrical chord was only partially sustained (with one harmonic center), here in Measure 22 the symmetrical chord is completely sustained with in addition the reinforcement of both tonal centers in the upper chord tones. The wild orchestral chaos is the result of many parameters, but certainly the harmony supports this outburst. Gradually the music turns to a calm, more introvert moment with a chamber music like setting. While this sounds relatively consonant with the superimposition of thirds, there is an interesting aspect of symmetry here as well: the melody that follows is the inversion of the chord that forms the accompaniment. This is a procedure that stems from serial practices rather than harmonic principles.

Hopefully, this short analysis shows how harmony is at work in the music of Magnus Lindberg. Rarely music is only about harmony, and Lindberg uses elements from the Pitch-Class set theory in his compositional method. The focus on harmony in some places and the (temporarily) focus on other aspects of pitch should not be considered a flaw, but rather a sign of compositional variety.

3. Conclusion: Harmony in Context

The two examples by Lindberg and Chin have hopefully been clarifying. With this in mind we should go back to the importance of the context for harmonic consonance. The wide variety of possibilities to create harmony of different gradations of dissonance all the way into consonance is opening new compositional perspectives. But from a theoretical perspective it can be troubling that each composer (or even each composition) can have vastly different chords acting as "consonance". This requires a familiarity with the musical work before an adequate analysis can be made. One should develop a sense of what is specific and then the analysis can find out how this works technically. Discovering a work in this manner and learning a composer's musical language is an investment of time, however not necessarily unlike studying tonal repertoire from the past.

While this article is about harmony and how harmony can be an important factor in post-tonal composition, a complete analysis of a musical work should investigate the music from different perspectives. As stated at the beginning of this article, the musical narrative in post-tonal music can be built on many different parameters of which harmony is only one. Some composers do not focus on harmony, which does not mean that their pitches are randomly chosen, only that the focus of their music is elsewhere. For example rhythm is often the focus in minimal music; and a focus on sound can be achieved by using extended techniques. Therefore the relevance of harmony will vary for different composers. This is a richness of our time, and it means that the harmonic aspect is not necessarily the primordial aspect for musical coherence as it used to be in the past. However, it is my hope that this article has offered a method for investigating harmony, that is the vertical pitch component in post-tonal music.

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Garso aukštis ir harmonija: racionalus metodas, paremtas intuityvia girdimąja patirtimi

Santrauka

Garso aukštis ir harmonija yra probleminiai šiuolaikinės muzikos praktikos aspektai, tad būtų daug lengviau nurašyti juos kaip tam tikras atgyvenas. Akivaizdu, kad didžioji dalis šiais laikais rašomos muzikos koncentruojasi į kitus parametrus, tokius kaip išplėstinė technika, triukšmas, aleatorinės sistemos, garso artikuliacija grįstos struktūros, faktūros, gestai ir t. t. Šiose srityse matome daugybę naujovių, o garso aukščio klausimai lieka kone antrame plane. Vis dėlto visi garsai pasižymi tam tikra garso aukščio kokybe, kartais silpnai išreikšta, kartais kombinuota su triukšmu, bet tono egzistavimas yra sunkiai paneigiamas. Tad kaip traktuoti garso aukštį ir harmoniją kompoziciniu aspektu?

XX a. atsirado daug garso aukščio teorijų, pradedant dodekafonija, kuri yra ypač racionali. Sudėtingos garso aukščio struktūros dažnai sunkiai siejasi su mūsų girdimąja harmonijos patirtimi. Netikslu manyti, kad horizontalios (t. y. melodinės) ir vertikalios (t. y. harmoninės) garso aukščio struktūros iš esmės yra tapačios. Tai akivaizdu, pavyzdžiui, setų teorijos atveju, kur akordų balsavada yra beveik negvildenama. Taigi šiame straipsnyje siūloma integruoti *intuitio* ir *ratio* pagal harmonijos principą, kai balsavada yra neatsiejama akordų charakteristikos dalis.

Išeities tašku tampa garso aukščio percepcija. Čia turime pasitelkti racionalų paaiškinimą: harmonijos suvokimo ypatybė yra ta, kad ne visus vienu metu skambančius garsus girdime vienodai – kai kurie iš jų sustiprina vieni kitus, kiti tarpusavyje disonuoja („susidaužia"). Obertonų spektras ir virtualus fundamentinis tonas yra parankus modelis, paaiškinantis šį fenomeną; jis padeda suformuluoti konsonanso ir disonanso teoriją. Kompleksiniai akordai, kurių tęstinės skalės priešinguose poliuose yra konsonanso ir disonanso kraštutinybės, gali būti adekvačiai charakterizuoti.

Minėtas teorinis modelis remiasi kitų tyrėjų darbais, tokiais kaip Célestin Deliège *L'harmonie atonale: de l'ensemble à l'échelle* ir Roberto Hasegawos *Tone Representation and Just Intervals in Contemporary Music*. Jis gali būti parankus įvairioms derinimo sistemoms (tarp jų ir mikrotoninėms); kompleksiniai ir/ar dviprasmiai akordai gali būti charakterizuojami pagal percepcijos dėsnius. Šį modelį galima taikyti intuityviai (remiantis klausa) ar realizuoti naudojantis programine įranga (pvz., *Open Music*). Modelį iliustruoja išsamiai išnagrinėti du muzikos pavyzdžiai: Unsuk Chin *Piano Etude No. 1* (1999–2003) ir Magnuso Lindbergo *Feria* (1995–1997).

Percepcijos principais grįstas metodas leidžia laisvai plėtoti muzikinę mintį: tiek intuityviai, tiek ir racionaliai. Nors įtampa tarp šių dviejų sferų gali ir neišnykti, tačiau jos gali būti derinamos, kadangi tiek intuityvi, tiek racionali plotmės yra skirtingi vienos sistemos aspektai ir apeliuoja tiek į loginį paaiškinimą, tiek ir į tiesioginę girdimąją patirtį.