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Microtonality in the Post-spectralist Context: Microintervalics in the Compositions of Gabrielius Simas Sapiega and Mārtiņš Viļums[1]

1 Introduction

In the compositions and musical research of the second half of the twentieth through the early twenty-first century, the problem of microintervalics emerges as the issue of an innovative creative perspective or utopia. Even though in the second half of the twentieth century most composers were clearly influenced by pre-existing musical traditions, the desire to "update" and move forward created appropriate conditions for the formation of hitherto unexpressed musical views, the changeover of the elements of the language of music, and re-interpretation of musical material. The entire musical context of that period was strongly affected by philosophical ideas brought to the foreground, including the relationship of artist-creator and their creation, a work of art, as one of the most prominent. That was one of the greatest ideas which affected the field of twentieth-century music as well as other fields of art, such as the visual arts or the emerging phenomenon of performance art. The avant-garde composition was characterized by the integration of historical reflections and, increasingly, of the newly developed theories closely related to the philosophical angle. From the very beginning of the twentieth century, each artist, when talking of their works, could not avoid a discourse on topics such as the aesthetics they professed, the fields of investigation, the experiences diluted by philosophy. Such trends encourage to take a broader view of the manifestations of microintervalics in music, that is, from the analytical as well as from the philosophical and aesthetical viewpoints.

The author of this article was inspired to investigate the manifestations of microintervalics and to present his insights from his personal practice of composing music: the creative search for the expansion of the sound dimension, a wish to get better acquainted with the origins of the phenomenon, the works of other composers, theoretical studies, and the possibilities of expression opened by them.

1 The chapter was written as the part of the project "Sound Utopias: Cultural Impulses and Institutional Contexts of Lithuanian Music (Trans)avant-garde", funded by the Research Council of Lithuania (LMTLT), agreement No S-LIP-18-39.

Although the issue of microintervalics was most often raised by avant-garde composers, the origins of the phenomenon can be detected much earlier, such as in the Pythagorean theory of music or in Arabic modal structures. The very term microintervalics appeared relatively recently, as a link with Edgard Varèse's compositions: its explanation remains pragmatic and laconic, and the meaning indistinct and rather vague.

For analysis of the phenomenon of microinterval music in twentieth and twenty-first century music, a mere method of analytical research does not suffice. Such fields of vision make us deviate and evaluate the relationship between creator of art and the very work of art as an object, the direction of whose interpretation is determined by a historically changing relationship between the creator and their work. Therefore, from that viewpoint, all the interpretations are materialistic as "an objective thing next to other objective things of the world" (Šliogeris 2017, 7).

The works of twentieth-century composers, the philosophy professed by them, and analytical studies become an important starting point for the emergence of new compositions and their investigation. The issue of microintervalics in the discourse of musicology was increasingly actualized until it became unavoidable, a seemingly naturally perceived part of the contemporary music matter, a philosophical viewpoint – the specificity of an aesthetic relationship between the creator of art and a work of art. Therefore, it is very important to update and expand the context of the research on microintervalics using the influence of the past music and the ideas and strategies revealed by the creation and philosophy of the twentieth and twenty-first centuries.

In the music of the twentieth and twenty-first century, microintervalics has been disseminated in a wide range of forms (formalistic, extramusical, timbral, the broadening or updating of a whole tone scale, the restructuring of a traditional musical form, etc.). All those changes are likely to be inseparable from the historical, aesthetic-philosophical, and musical structure development. Therefore, the main problem is how the quality of expression of a microintervalics-based composition (functions and meanings) has been changing over the last century and what the prospects are of its getting established in contemporary composition.

In this article, the manifestations of, and the changes in, microintervalics in the twentieth and early twenty-first century music will be analyzed from the viewpoint of the development of the language of music and the structure and expression of the composition as well as from the philosophical viewpoint.

One of the main goals of this article is to investigate the manifestations of microinterval music and the strategies of its use in the fields of the avant-garde

and twenty-first century music composition. To achieve the goal, three main objectives have been formulated:

1. to review the definition and the problems of the microinterval;
2. to analyze and summarize the microinterval processes in twentieth and early twenty-first century music, to establish the stages of their development, and to evaluate them from the theoretical, historical, and philosophical viewpoints, and
3. based on the outcomes of the analyzed works, to localize the works of the twentieth and twenty-first century composers in the field of conversion of microintervalics.

2 The definition of microtonality and related problems

Microtonality, microinterval, or *mikrotone* is a twentieth-century phenomenon in music associated with the works of Julián Carrillo, Alois Hába, or Charles Ives (Griffiths et al. 2001). On looking more deeply into the term, it becomes apparent that it was first used as an interface with the works by Edgard Varèse. The term was rather pragmatically explained in the *New Grove Dictionary*:

> Any musical interval or difference of pitch distinctly smaller than a semitone. (Griffiths et al. 2001)

In the *Encyclopedia Britannica,* it was defined in a broader sense and in a rather laconic manner, and the entry was formulated as a single common concept: *microtonal music* or *microtonality.* Even if the titles were different, the definitions were somewhat similar:

> Microtonal music, music using tones in intervals that differ from the standard semitones (half steps) of a tuning system or scale. (Nettl 2016)

Both definitions were not really precise in terms of the meaning of the word combination, as the concept of *tonality* is related to the tonal system. Therefore, the term *microtonality* would be more apt for such cases when variations of the tonal system in a creative process using microintervals or microchromatic systems are meant. Due to the established use of the term, it shall be used in the article without specifying its meaning too much, as that would call for a separate study.

Another microtonality-related term, widespread and well-established in the literature. is *microtone*, which could be more clearly called a *microinterval*. Attention should be paid to the fact that a microtone is a term defining a single meaningless sound. Any interval or sound in music is contextualized by other sounds that surround it. In other words, the human ear mainly identifies the differences between sounds only in a context (from the interval viewpoint). That is reaffirmed by the definitions presented both in the *New Grove Dictionary* and in the *Encyclopedia Britannica*: "a music interval." The problematicity of the concept was dealt with in the monograph by Gražina Daunoravičienė-Žuklytė, which seemingly attempts to eliminate the previously predominating term and emphasizes the aspect of intervalism.[2]

A microtone (Greek *mikros* + Latin *tonus*) in the direct sense of the word is "a small tone" or "a small sound"; it is a kind of a musical metaphorical abstraction, indistinct and controversial, and does not actually define its own nature, as, when speaking about respective ''dimensions'' of the sound, we can define them only in relation to another tone. In his paper "Kritische Anmerkungen zur Komposition mit Kleinstintervallen" (Gieseler 1988, 172), Walter Gieseler proposed the abandonment of misleading concepts and presented the terms which reflected the aspect of this relationship: *microintervals,* or the *small intervals* (*Kleinstintervallen*).

The very term *tone* in music, in the correlation of the historical and theoretical aspects, maintains a rather distinct controversion by its metaphorical character:

> The interval equal to the sum of two semitones and hence referred to as a 'whole tone,' usually perceived as a major 2nd; in equal temperament, the sixth part of an octave. (Drabkin 2001)

When viewing the concept of tone through the prism of historicity, attention should be paid to the fact that, in the Pythagorean system of tuning,

2 In the chapter "The World of Microdimensional Music by Rytis Mažulis," Daunoravičienė argues: "The ideology of musical microdimensions (and the etymology of the concept) [...] emphasises the radical minimalisation of the relationships of different phenomena of the compositional material realised in time – pitches (intervals), gradation of durations and dynamics, etc." (Daunoravičienė-Žuklytė 2016, 320). Here the author adopts the extended perception of microdimensional music, proposed by composer Mažulis, which covers more than the concept of microchromatics proposed by Kholopov, i.e. the microintervalics is attributed the following aspects: rhythm, timbre, and dynamics. One can suggest that Mažulis, as well as Daunoravičienė, could have been fascinated by the theory of conceptualisation of musical space by American musicologist David Lewin, where musical space covers three dimensions: the parameters of pitch, rhythm, and timbre, each of them structurised and classified by module (more about Lewin's theory: LEWIN, David. 2011. *Generalized Musical Intervals and Transformations*. New York: Oxford University Press).

the *pure tone* was the "excess" of two perfect fifths above the octave, that is, counting from sound *c*, interval c^1–c^2, whose ratio was 10 : 9. In other words, in just intonation, tones of two sizes existed: the main one (the same size as the Pythagorean pure tone) and the small one (a version between the main tone and the major third with a ratio of 10 : 9).[3] Consequently, in the music of Antiquity, a major second was regarded rather as a wider gap between the parts of a stretched string than a *semitone*,[4] and its finer division was perceived as the sum of two *semitones*. Thus, if the most important and starting point in Antiquity was a *tone,* then any finer *semitonic* segmentation of a sound was related to the transgression (lat. *transgressio*) of microintervalics. Moreover, the emphasis on the differences of a *semitone* suggested an obvious conclusion: microintervalics could not be the only and ideal archetypal term for those musical phenomena. Microintervals, given the existing *semitone genos,* can be divided into microintervals (intervals smaller than a semitone) and macrointervals (intervals larger than a semitone).

The term *microchromatics* was first used in the works of Russian musicologist Yuri Kholopov (1976) to define the types of "interval *genos*" (Холопов 1976, 589) and were applied to all microtonal systems: the old (*enharmonic genus* – γένος ἐναρμόνιον – Greek) and the modern ones (Alois Hába's quarter-tone system). The concept of microchromatics helps to avoid inaccurate derivatives, such as *microtonality* or *microtonics.*

Thus, upon reviewing the most prominent contemporary works on microtonality and the problems caused by it, we conclude that microtonality is not a precise and universally applicable concept to define the types of interval *genos*. Therefore, next to it as the most widespread (especially in the analysis of the Hába system), the generic term proposed by Kholopov, that of microchromatics, shall be used in my article. The term microtone, which also calls for revision, shall be replaced by the semantically and structurally more precise term *microinterval*.

3 Strategies of analysis

In the search for tools to systematize, unfold, and summarize the theoretical aspects of microintervalics, this section presents a summarized taxonomy of correlations between the historical space, musical space, and analytical aspects.

3 Based on the definition of a tone proposed by the *New Grove Dictionary* (Griffiths et al. 2001).

4 A semitone is meant.

Musical space, also known as microdimensional music, is a rather new concept that has been taking root and squeezing into the spheres of perception and analysis of contemporary music:

> [T]he concept of macrodimensional music summarizes the minimalization of the principal relationships (intervals) of material elements of the art of sounds. (Daunoravičienė-Žuklytė 2016, 321)

Such perception of musical material goes beyond the limits of perception itself; that is, most of the *micro* and *macro* processes used in microdimensional compositions are not heard by the audience. Therefore it is automatically perceived that the consciousness of such a radical composer becomes immersed not in the contemplation of audible sounds but rather interacts with certain traditions or theories. Given all those aspects, we need to emphasize, and the conclusion suggests, that such musical material cannot be analyzed or perceived from an unambiguous aspect of the contemporary theoretical viewpoint. For that reason, before analyzing microchromatic compositions, we shall first review them in an appropriate context, that is, in the interaction of time and thought, and the ideas of the period.

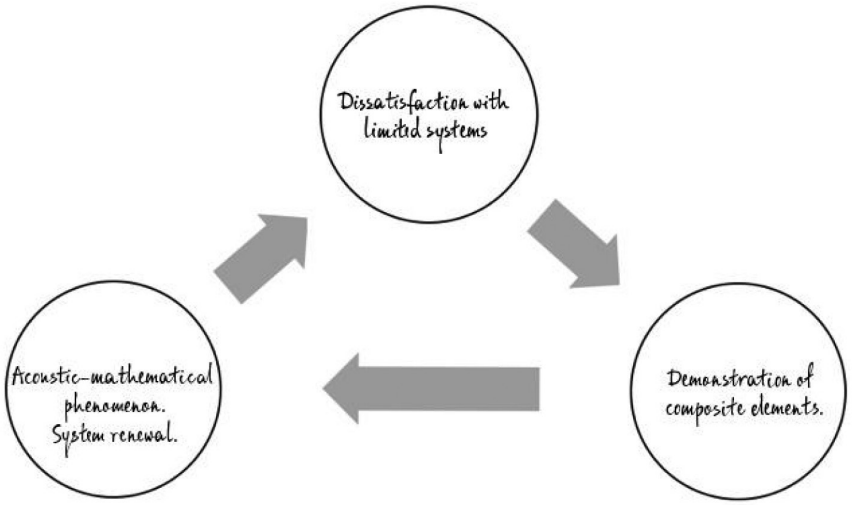
First, we should first identify the microinterval composition trend stages in twentieth-century musical practice. For that purpose, we can use targeted periodization proposed by musicologist Vitalija Mockutė-Aleknienė (Mockutė 2009):

- the late nineteenth century to 1920: a period of grave dissatisfaction with the limited possibilities of semitone systems (Ferruccio Busoni, Richard H. Stein, Jörg Mager);
- 1920–1925 to WWII: the decline of aesthetic categories, the progress of microintervalics, and the significance of demonstration of compositional elements (Georgy Rimsky-Korsakov, Charles Ives, Alois Hába, Ivan Wyschnegradsky);
- since 1945, an acoustic-mathematical phenomenon, based on the updating of the equal temperament, when an octave is divided into more than 12 parts (Adriaan Daniël Fokker, Björn Fongaard, Ton de Leeuw, and composers of spectral music).

This exploration of a modernist identity can have rather strong links with the revival of the ancient musical theoretical systems, a return to what musicians attempted to eliminate for centuries, that is, the sound of “impure” or untampered, tuning.

Such a historical resurrection of the *micro* compositional principles for a new life can be summarized as a vicious cycle, rotating in the composer's persistent search for the revival of the compositional principles for new sound material without abandoning any of the three stages,[5] since the objectives and aspirations remain the same and unchanging in the consciousness of the creator; as Greek philosophers used to say, the identification and contraposition of the two modes of the contact of man and the thing:[6] *doxa* and *epistēmē* (*ἐπιστήμη*).[7]

All three stages can be presented in a schema of circulation of the trends of microinterval compositions, when each stage becomes exceptionally important and significant, even beyond the touchline of history, and simultaneously forms a new context but is not eliminated from the general one.



Scheme 1. A scheme of the circulation of the trends of microinterval compositions

If the first angle that a microinterval composition, like any other work of art, has to be evaluated from, is an aspect of circulations of historical trends, then the second one is slightly deeper and better defines the aspect of the

5 We mean the above identified historical stages.

6 In this case, a work of art.

7 A doxic contact does not require any particular efforts of man, i.e. the mode of everyday active or passive experience. While *epistēmē* is mainly characterised by a well-known saying "to find out, to understand, or to get acquainted", i.e. it presents the opposition to the doxic contact. Accordingly, an *epistēmē* individual overcomes the illusions and anonimity of the everyday experience. A new qualitative and unique view on things emerges that is called "theory" by Greeks.

phenomenon itself and of its communication in a closed circle of ideological metabolism. For a similar reason, Yayoi Uno Everett (2004) presents "a network of communication and meanings," which helps to give meaning and to stabilize respective relationships between the "encoder" and the "decoder" (see Scheme 3). Everett notes that:

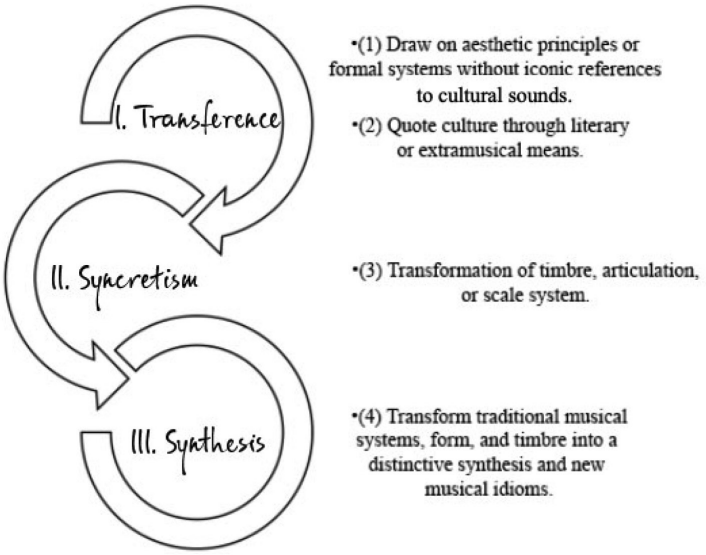
> [I]n exploring of various "filters," therefore, it is important to note that the reading of music becomes multivocal and cross-cultural in the very task of exposing (but not necessarily reconciling) the positions held by composers, audiences, theorists, musicologists, and ethnomusicologists. Their strategies and focal points provide perhaps isolated, yet complementary, perspectives in exploring the interplay of cultural dimensions that shape our understanding of the hybrid art music repertoire. (Everett 2004, 14)

If we take those ideas into account, we face a rather acute and important problem: in the analysis of various relations, and it is clear that they are only a few, the issue of cultural syncretism or, in other words, the aspect of synthesis in the reality created by humans and the essence of the thing remains unanswered. Thus, syncretism here becomes the process of diffusion of cultural elements which initiates changes in both value and form:

> Syncretism assumes an approximate measuring of the degree of compatibility between musics, and prediction of the typical direction of resulting change. (Nettl 1955, 107)

All those aspects, especially when we want to properly evaluate and analyze microinterval music, become important starting points from the perspective of the theoretical angle of music, the totality of relationships, and the network of complexes.

Everett proposed seven categories (two of them left aside in this article), based on the inculcation of compositional strategies and summarized in three principal aspects – (I) transference (transfer), (II) syncreticm, and (III) synthesis, with several existing subspecies, applicable only to the area of exotic music. In the present paper, only five are used and revised by retaining the essential principles (the abandoned categories are suitable for thorough investigation of the integration of ethnic instruments into contemporary musical compositions).



Scheme 2: Categorization of microinterval inculcation in a musical composition (based on Yayoi Uno Everett model, published in Everett 2004, 16)

Through the theory of music space analysis by David Lewin and the model applied to microchromatics, upon in-depth study of the interaction of the relationship of a person and a work of art, and by confirming a network of communications and meaning, further in my article I intend to analyze microinterval compositions by revealing them and ascribing them to one of the three principal aspects in accordance with the principle of inculcation of compositional strategies. In order to do so properly, I will introduce the historical-theoretical context which will abstract the predetermining strategy of evaluation of relations and their correlation prescribed by the content of a work of art. To each of those aspects, given its specificity and the correlations of relationships, including those already mentioned, other methods of analysis will be applied: transference – modal analysis; syncretism – spectral and modal analysis; and synthesis – modal and spectral analysis and the reductive relationship correlation of those analyses in order to properly disclose the "drama" of microintervalics: gigantomachia in the situation of hominized thingness.

4 Dissemination of microintervalics in the second half of the twentieth through the twenty-first century

After WWII, European music culture acquired a new face: the new musical systems did not focus only on microintervalics, which in essence was a very distinct and unexpected turn in the first decade of the twentieth century, but on the contrary, they turned towards an even more unexplored and newly discovered area – the postwar avant-garde, which became a field of serialization of musical parameters and the search for new electroacoustic opportunities. The quarter-tone, without rejecting the contribution of the previous theories into music, was still rather popular in the contexts of the matter of contemporary music and functioned in the creative practices of the outstanding composers of the twentieth century:

- Pierre Boulez (1925–2016) in the second version of his piece *Le Visage nuptial* for soprano, alto, female choir, and orchestra used quarter-tones[8] as those that were heard distinctly and clearly and were easily distinguished from the ordinary ones. In the end, he took the composition back after its performance and decided to never again use them (Zeller 2003, 56).
- Iannis Xenakis (1922–2001) also used quarter-tones, although the most characteristic use of them in his compositions was indefiniteness when performing *glissando*.
- John Cage (1912–1992) used microintervals in his compositions for prepared piano (e.g. *Sonatas* and *Interludes*, 1946–1948) in a rather aleatory manner: when playing the instrument, unpredictable microintervals were extracted. That was one of the ways to escape from the equal tempered tuning (as opposed to Partch) (Zeller 2003, 56).

Karlheinz Stockhausen (1928–2007) developed the system of equal division in his electronic piece *Studie II*, where all the sounds were equal to the same proportion $\sqrt[25]{5}$ (Fritsch 2007, 118).[9]

Luigi Nono (1924–1990) starting to use microintervals in his compositions rather late. He first used microintervals (quarter-tones) in the string quartet *Fragmente – Stille – An Diotima* (1980) and later followed the manifestations of the use of other types eighth-tones, and sixteenth-tones (e.g. an orchestral piece *A Carlo Scarpa, architetto, ai suoi infiniti posibili*, 1984).

8 The composition was performed in 1957.

9 That means that an interval with the ratio 51 (the octave with natural major third) is divided into 25 intervals with equal ratios of a frequency (slightly higher than a semitone).

György Ligeti (1923–2006), like everyone else, tried to use microintervals. A quarter-tone became a starting point for him. Interestingly, in his explanatory notes for String Quartet No. 2 (1968), he left it to the performers' discretion to produce microintervals of unestablished sound, much smaller in size than quarter-tones. In his later works, another principle of the use of microintervals stood out: exploitation of different tempering systems (e.g. supposed tone temperament in *Passacaglia ungherese*, 1978, and just intonation system in Violin Concerto, 1990–1992).

Further dissemination of microintervals can be highlighted in the main post-war musical trends, such as *Musique concrète*, *Electronic Music, New Complexity*, and *Spectral Music.* The second half of the twentieth century moved in the direction of the search for new aesthetics: microintervals became naturally perceived as part of contemporary music.

When analyzing the works of avant-garde composers, it is possible to retrospectively identify some traits typical of the aesthetics and techniques of microinterval music. Following proposals made by Austrian composer Georg Friedrich Haas (b. 1953), we can identify four basic typical aspects approaching the dissemination of microintervals (Haas 2003, 59):

1. the use of regular pitches typical of a chromatic 12-sound system in equal tempered tuning. The method is closely related to the equivalent octave subdivision which produces a number of larger or smaller pitches than the 12 sounds, for example, 19 equal tones in equal tempered tuning, which consists of 19 equal distance sounds in the octave, or 10 equal tones in an equal tempered tuning system consisting of 10 different pitch sounds in the octave;
2. the use of a pitch system through natural harmonic series and a series of the component overtones;
3. generation of harmonic beats impulses using very small, but still audible intervals;
4. the use of microintervals through aleatoric composition principles, when microintervalism manifests itself in different random ways, such as corresponding piano preparation,[10] percussion sounds, glissando, or ad libitum retuning of the instrument strings.

10 We mean the cases when the composer leaves it to the performers' discretion to prepare the instrument and does not prescribe the conditions of the process and the outcome.

Therefore, it is very important to take a critical view of such a classification of microintervals as a processual action in a musical composition. Seeing and knowing some cases of microchromatic music having recently emerged, especially due to the increase in research and the appearance of new musical contexts, the division must be extended:

5. the use of a well-known tuning system, for example, Pythagorean tuning, exploitation of a tone tuning system elaborated by the composer themselves or a system belonging to some other than European tradition;
6. the establishment of a pitch hierarchy by means of overtone configurations from the (instrumental) spectrum re-synthesis;
7. the use of microintervals as a structural means;
8. predominant exploitation of non-specific microintervals as the diversification of the coloristic relief.

5 Manifestations of microtonality in spectralist compositions

The most prominent turn towards the integration of microintervalics took place after the Group L'Itinéraire[11] had formed in 1973. It produced a new conception of aesthetics in the search for timbral modulations. Such a feature of aesthetics could be regarded as not merely aesthetic, but as a certain philosophical view on a musical composition or the sound itself. The movement was well known under the name of *la musique spectrale* or the French spectralist school (Dufourt 2000, 88).

The term spectrum used in music can in principle be described in many different ways, but in our case, we mean sinusoidal waves (partials). Each sinusoidal wave is characterized by frequency, amplitude, and phase. FFT (fast Fourier transform) shows which components are included in the spectrum when the sound is split into its sinusoidal elements (Sethares 2005, 15). In other words, all those elements became basic for the representatives of spectralism in shaping the spectrum. On the other hand, even if the aesthetic views of each spectralist from the Group L'Itinéraire were seemingly clear, a contradiction also emerged: not all the representatives of all the styles understood the meaning of the term of spectralism in the same way:

11 The group consisted of Hugues Dufourt, Gérard Grisey, Tristan Murail, Michaël Levinas, and Roger Tessier.

> They always call our music *spectral.* Neither I nor Gérard Grisey are responsible for that ascription, which seems very inaccurate to us. (Murail 2005, 149)

However, the majority continued using the concept in that way; no concepts that would be more precise or better defining the creative features of the French spectralist school came up.

Based on Claes J. Biehl's work *Microtonality in the Post-spectral Era,* several essential features characteristic of spectral music can be identified:

- the development of a new language of music based on the scientific knowledge of acoustics and psychology (technological methods);
- scepticism with regard to compositional models (critique of serialism);
- emphasic centrism of the sound/ timbre as a "live organism" (a naturalist view);
- the establishment of a pitch hierarchy, the properties of which were formed by a series of overtones as the main reference point.

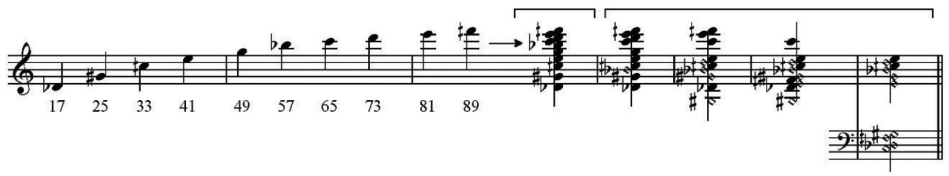
One of the fundamental reference points in spectral music is the overtone series. According to Gerald Resch, one of the essential differences between the compositional techniques of Partsch and the spectralists and the work with overtone series is the choice of a more "biomorphic" model by spectralists (Resch 1999, 17). Usually those techniques include FFT spectral (instrument) analysis, which seeks to establish the hierarchy of partial tones, the fields of formants (i.e. partial tones possessing a strong acoustic energy in the spectrum), frequencies, pulsation, noise limits, and elements of sound saturation or distortion. Such information received from the analysis is used in the resynthesizing of the spectrum to distribute partial tones between different instrument combinations. Since these elements define the sound timbre, that "orchestration technique" allowed the spectralists to resynthesize anew and to engage in timbral composition.[12] The predominating and forming harmony in spectral music was perfectly illustrated by Tristan Murail's term harmony-timbre. The emphasis placed on the significance of timbre and its inseparable link with harmony was a striking feature of the musical material of both Murail and other spectralists. Thus, in essence, Murail himself manipulated the fact that there was no difference between the two concepts of timbre and harmony. The composer himself frequently used resynthesis

12 One of the most prominent examples was the composition *Partiels* by Gérard Grisey, based on the spectrum resynthesis. The spectrum was formed from sound E extracted by trombone.

since those operations provided corresponding hybrid structures; there the spectrum of resynthesis of the timbral characteristic mutually interacted with the construct of harmony.

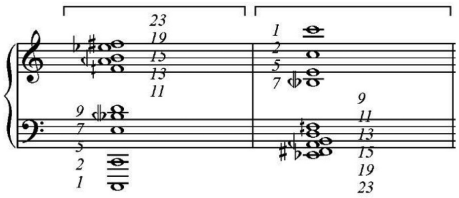
When such composers as Grisey and Murail started to apply spectral analysis, in the course of time, the use of one instrumental sound during the analyses did not suffice: the "production" of spectra artificially generated by algorithms began, that is, FM and RM/CT.[13] Those were the three principal techniques used for pitch generation. The other three techniques were applied in composition: harmonic, inharmonic, and subharmonic.

The concept of harmoniousness, inharmoniousness, and subharmoniousness predetermines the harmonic properties of the overtone series. In the context of spectral music, the concept of harmoniousness means a spectrum whose only elements are integers. An inharmonic spectrum manifests itself in elements which are not mere integers. In other words, between the natural ratios or partial tones, there are other sounds as well. For example, the spectra of most of percussion instruments are inharmonic. Another spectrum development technique is subharmony. It is a technique that inverts a row of intervals from the overtone series – in such a case, large intervals appear in the high register, and the smaller ones, in the low one (Examples 1 and 2).



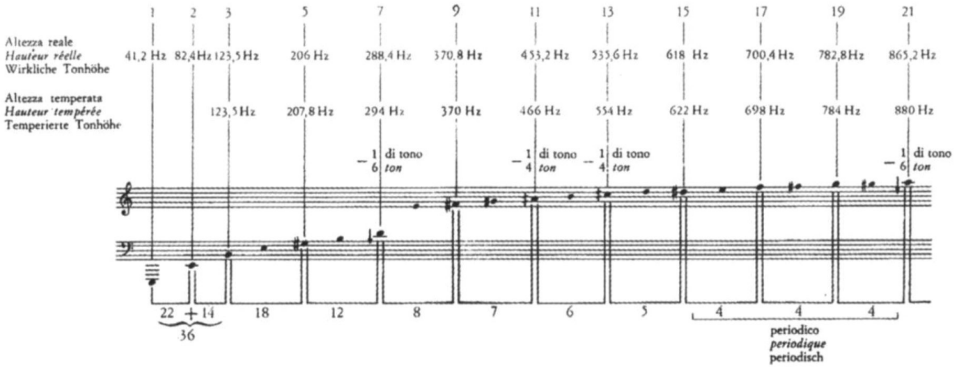
Example 1: A gradual progression from harmonic to increasingly inharmonic spectra

13 FM – frequency modulation, RM – ring modulation, CT – combination tones.



Example 2: Harmonic and subharmonic spectra

To summarize the regularities of the techniques of spectral theories, we can conclude that spectral techniques, in essence, generate hierarchical ratios of microinterval pitches which manifest themselves in different shapes: natural intervals of the overtone series, components of the spectrum produced by instruments, or pitches formed by means of algorithmic procedures. In other words, in their compositions, spectralists use microintervals – a consequence of corresponding analyses and calculations employed in composition.

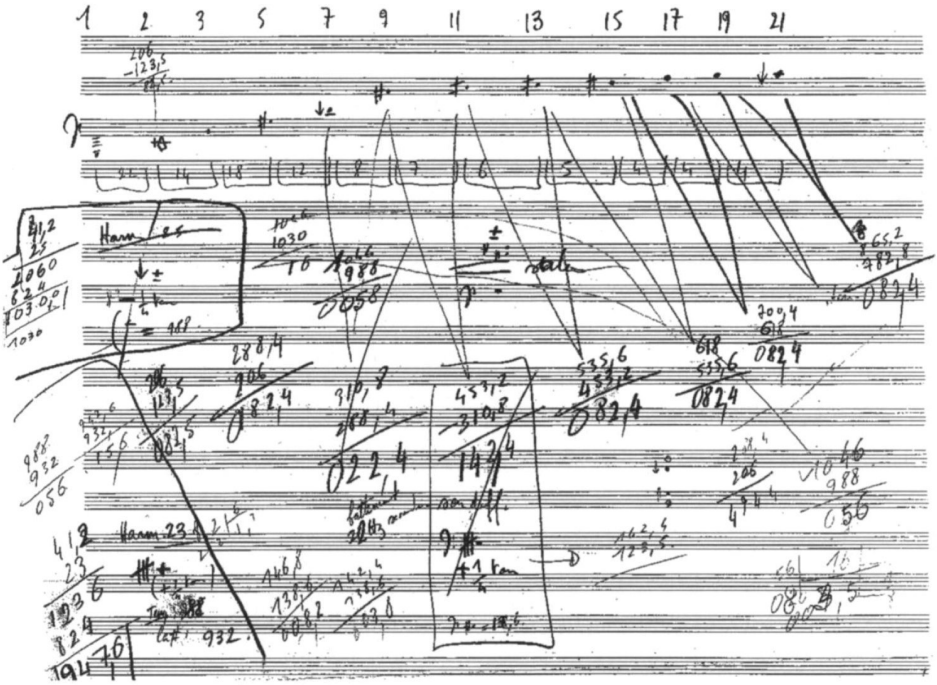


Example 3: Spectrum of Grisey's Périodes*, decoded and reflected in the score (Baillet 2000, 419)*[14]

On the other hand, unlike the techniques of Partch or Johnston, which strongly focused on the relationships of the microintervallic pitches, spectralism became a trend of music in which microintervalics became incorporated into the very musical parameters and their processes. Neither Grisey nor Murail paid much attention to the precision of microintervals; discrepancies

14 As we can note, the spectrum made a rather large impact on the structure of the musical composition: Sn (natural harmonic series), Sh (pitch series), Si (interval series (microintervals) between successive pitches).

between the systematic precision and practical impression emerged – quarter-tones and eighth-tones were used, and sometimes simply omitted.[15]



Example 4: Grisey's Périodes*, a fragment of the original sketch*[16]

Although spectralism played a very important role in world music contexts, the use of microintervals was not limited to that trend of music. Microintervals were also used in post-spectralist compositions. All of the post-spectralists were ascribed to the Second Generation of French Spectralists,[17] even though most composers of the early twenty-first century not only directly or fragmentarily exploited the spectral music-generated techniques of aesthetic perception of a music sound as a "live organism" in the musical texture but also used the incorporation of the integration of systemic structures, failing

15 The phenomenon can be detected in the composition *Désintégrations* (1982–1983) of Tristan Murail: in movement seven, approximate microintervals closest to a semitone are used so that they could be performed at an indicated tempo. It is one of the means to facilitate the performance of the composition.

16 Collection Gérard Grisey. Music manuscripts: sketches and drafts. Dérives, 1/3, Paul Sacher Stiftung, Basel.

17 The most prominent representatives are composers Philippe Hurel (b. 1955) and Manfred Stahnke (b. 1936), and, of course, with reservations, Hans Zender (b. 1936).

to avoid the opposition and an internal dramaturgical conflict between the association of "impure" sounding music. When viewing such a phenomenon from an objective side, one property very important for post-spectralists emerges: the spectrum as a reference point, and not the main predominating element, when re-interpreted, functions as a declared aesthetic angle of the perception of a music sound.

6 Microtonal practices of post spectralism (Viļums, Sapiega)

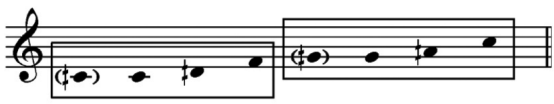
To present examples of the application of microtonality in early twenty-first century composition practices and incorporate the author's theoretical and practical experiences, in this section, analyses of compositions by Mārtinš Viļums and Gabrielius Simas Sapiega will be discussed from the viewpoint of microintervalics.

Mārtinš Viļums's *Gāw ēk-dād kard* (2001) for mixed choir

Mārtinš Viļums (b. 1974) is a Latvian composer and musicologist whose work features post-spectralist music composition techniques and the micro-sonoristic technique he developed. Very distinct creative principles typical of the composer manifest themselves on the scale of multiple sound, as a form, internal sound hierarchy, and articulation as well as in the aspects of the musical texture "coloring."

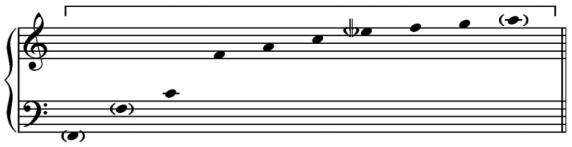
A composition the distinctly reflects all those features is *Gāw ēk-dād kard* for a 24-voice choir. Like most spectralist compositions, this one is also characterized by another meaning having been given to the timbre, articulation, or the tone series modulation.

On reducing the score of the composition and identifying the main elements of the pitches of the mode, the technique of a symmetrical mode transposition becomes evident. This mode transposition technique was unique in the compositions of spectralists as well as in the modal microchromatics system developed by Hába.



Example 5: Symmetrical mode transposition

Another very distinct and obvious feature of spectralism, which in Viļums's composition is used to give another meaning to the harmony of the sound of the musical space, is the employment of a harmonic series from sound F in which microinterval manifestations (as S_i) cannot be avoided:

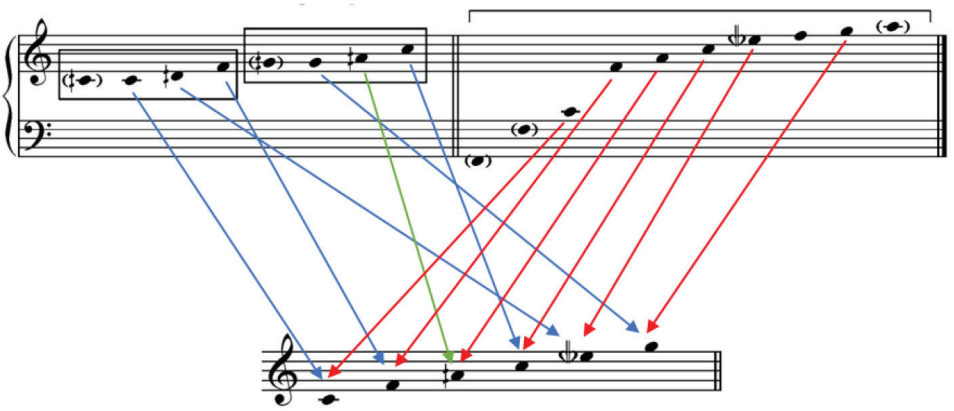


Example 6: The space of overtones

When viewed more attentively, the modal structure of Viļums's composition features some essential, exceptional features as well as strategies for the use of microintervalics:

- the symmetrical mode transposition closely interacts with the space of overtones and produces a common condensed modal outcome;
- from the intercultural musical viewpoint, the functioning of the mode and its interaction with all the other elements of the language of music have close allusions to the old Arabic modes;

as seen from the examples, both Hába and Viļums "link" two symmetrical modes through the ratio of $1\frac{3}{4}$ tone.



Example 7: Harmonic space

In such a post-spectralist musical composition, the issues of mode and other elements, such as, form, harmony, sound articulation, microchromatics, timbre, and dynamics, are incorporated. All those parameters join into a single musical texture and thus express the essential features of the aesthetics typical of Viļums's compositions, which suggest an intercultural context similar to that found in the archaic music of Arabian countries: poetic expression and the implications of supramusical phenomena.

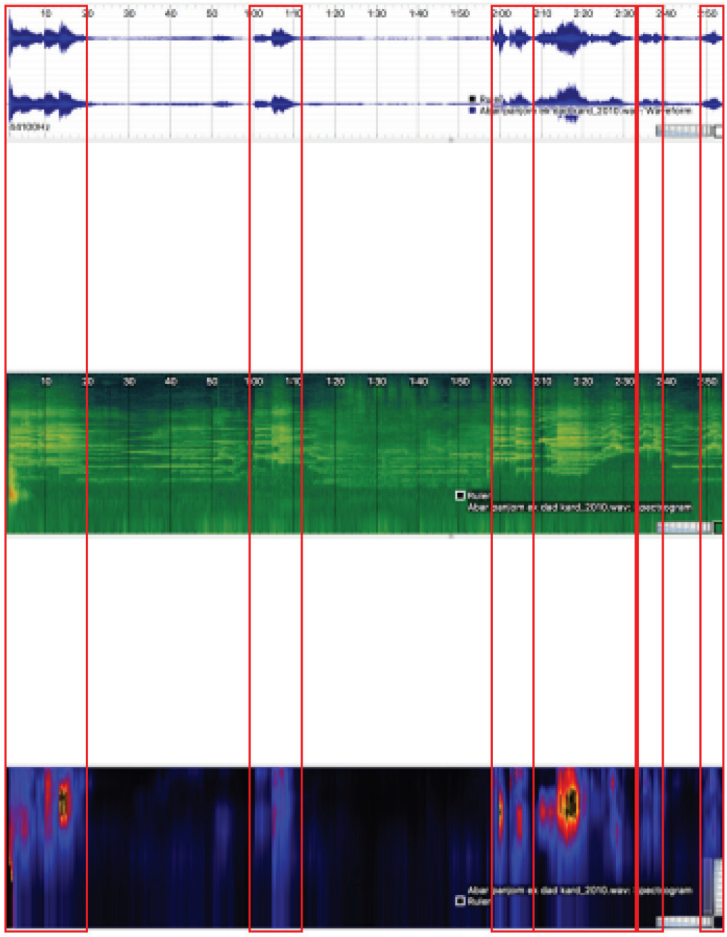
Due to the interaction of distinctly polyphonized elements of the language of music and the use of transpositional symmetric modes, Viļums's composition clearly features the principles of polychordism typical of Hába's theory when several elements of the language of music composed of two modes overlap simultaneously and merge into one qualitative object, such as a mode or a chord saturated with microintervalics. Here the issue of form cannot be avoided and can be directly related to both a different meaning being given to each element of the language of music treated as a "live" and constantly mutating, changing, and developing cell as well as to the sphere created by harmonic spaces of giving meaning to sonoric fields, with the verticals of sound conveying/consolidating individual parts of the composition.

Thus, *Gāw ēk-dād kard* features a combination of several transformed intercultural characteristics: the Pythagorean system of sound perception and order organization is not merely a mathematical order saturated with calculations, but it is also a kind of philosophical, doctrinal idea of musical composition and human life. It is very important to understand that the composition also highlights the context of the perception of makam[18] and the music composed in it: the aspect of combining, exposing, and conveying poetry and the elements of the language of music as units of literature. In other words, the interpretation of a closed system, as well as of harmony is brought to the foreground as a harmonic, spatial matrix that conveys the structural and aesthetic nature of the sound. All that is transferred by the transformation of intercultural thought to the dimension of internal sound and there differentiated through the characteristics of articulation: the relationships of the figure-texture-noise enabling a composer to write compositions saturated with microintervalism. Microintervalics plays an important role in the formation of sound colorings typical of Viļums's compositions, that is, the main sound articulation principles: rearticulation of the main characteristics of sound and the timbral, dynamic transformation achieved/modelled through different strokes or other specific techniques of performance.

18 A modal system of traditional Arabian music.

Thus, if we look at the analysis of the composition, we will notice features typical of syncretism: the common development and merging of two philosophical and musical views, which creates a new angle of observation retaining the essential features of the former ones, inevitably related to the qualities of sound and their rearticulation characteristics created by the strategy of the use of microintervalics.

The manifestation of that syncretism can be conveyed by corresponding angles of observation and the aesthetics professed by the author:



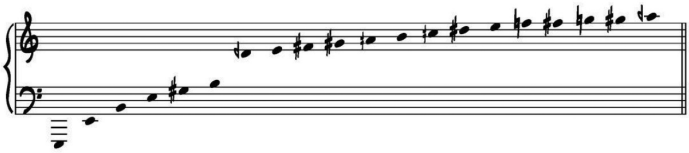
Example 8: Microcyclic and metamorphic timbre correlation; control of the internal properties of the timbre through compositional techniques

The essential principles that become evident in this musical example include syncretism when the object hominization occurs; that is, both artificial and natural elements of the language of music are equally involved in the micro-interval relation of the desubstantializing sound and its properties.

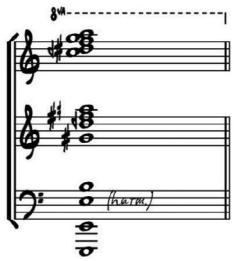
Gabrielius Simas Sapiega. *Aux charmes ignorés* (2018) for symphony orchestra

Aux charmes ignorés (Nepažintas grožis) for symphony orchestra is the recreation of a traditional musical system, the form, and the timbre of the sound by new musical idioms. The composition is based on the sound organisation systems typical of spectralism, while unusual combinations of different instruments complement the colour palette of the orchestra with the timbre and the development of sound masses. In the process of composition, Gabrielius Simas Sapiega (b. 1990) made use of two starting points – transformation and syncretism – seeking to give meaning to and express the phenomenon of synthesis when the traditional musical systems, forms, and timbres are recreated into new musical idioms.

All the movements of the composition are based on the inhaling-exhaling-rest parameter favored by spectralists. The rest parameter in the composition is implemented by a regular, periodic E harmonic spectrum. Intensity and its tides are manifested through the transition and inharmonic spectrum in which the harmonic spectrum most closely approximates and converges with the natural tone row overtone series.



Example 9: Harmonic spectrum from sound E

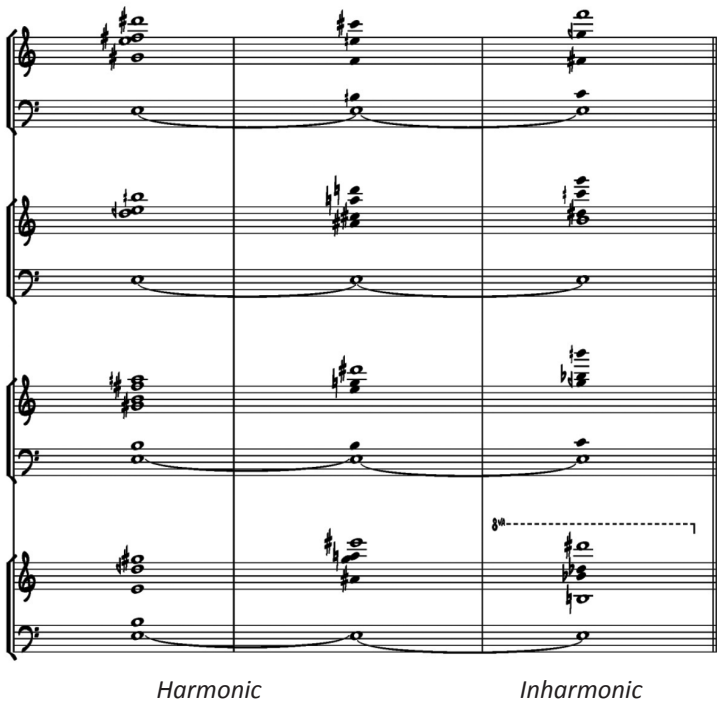


Example 10: Reformed harmonic spectrum from sound E, forte dynamics

In *Aux charmes ignorés,* the re-formed spectra move in equivalent directions towards one another by the transition technique, the spectrum changed in the aspect of dynamics.

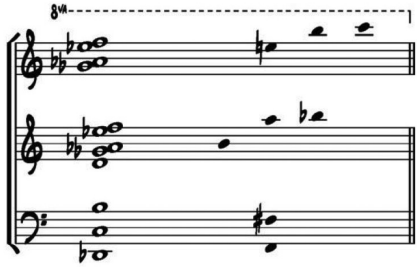
The harmonic spectrum in the composition is modulated into an inharmonic spectrum. The inharmonic spectrum in the composition appears only a few times. Before "disappearing" for the last time, it is seemingly erased in noise as well as the harmonic spectrum started in it (bar 1).

The timbral modulations in the composition are performed by means of a spectral analysis, when from the same sound as the main spectrum sounds are removed merely by changing the instrument playing technique, and eventually the instruments and the main sound.



Example 11: Harmonic spectrum for modulations from the common sound

The techniques employed for the spectrum modulations: double-bass – *pizz*., *sul pont*., and *ordinario.* The spectrum in the composition is also regarded as a mode, that is, a modal variant of the spectrum able to form harmony.



Example 12: The chord distinguished from the modal spectrum (notes with black noteheads are added only after it sounds. The sounds of the spectrum are also reduced)

The fundamental measures in the exploitation of microintervalics include:

1. Pitch: trills between tiny intervals or glissando.
2. Volume: between crescendo and diminuendo.
3. Rhythm: the exchange of long-short values.
4. Timbre: changes in the pressure put on the strings of the violin or between a specific and non-specific sound.

A low timbre was imitated by different combinations of instrument groups which tried to extract the very diverse sonoric/colorist texture of *an attack* and its microinterval composition, and in some places, a distinct *pulsating* cloud of sound was used through the integration of microintervals. By gradually changing the composition, the color and the function of microintervals was changed: from "supporting" the spectrum to the expansion of the harmonic plan.

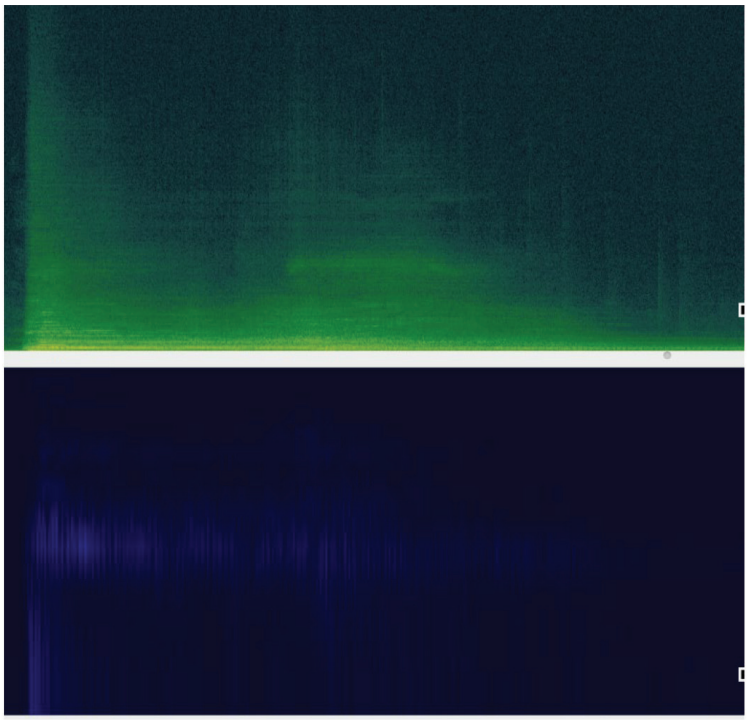
All the dramaturgical material of the composition was organized on the following principles:

- *sound* and *perception* composition principles, microintervalics*;*
- the priority of timbre in the orchestra: the interaction of composite (complex) sounds creates new ones;
- new perception of music time: rehearsal/process (not only consonances, but also the composition of the same instruments is meant;
- development of sound masses, noise inclusions.

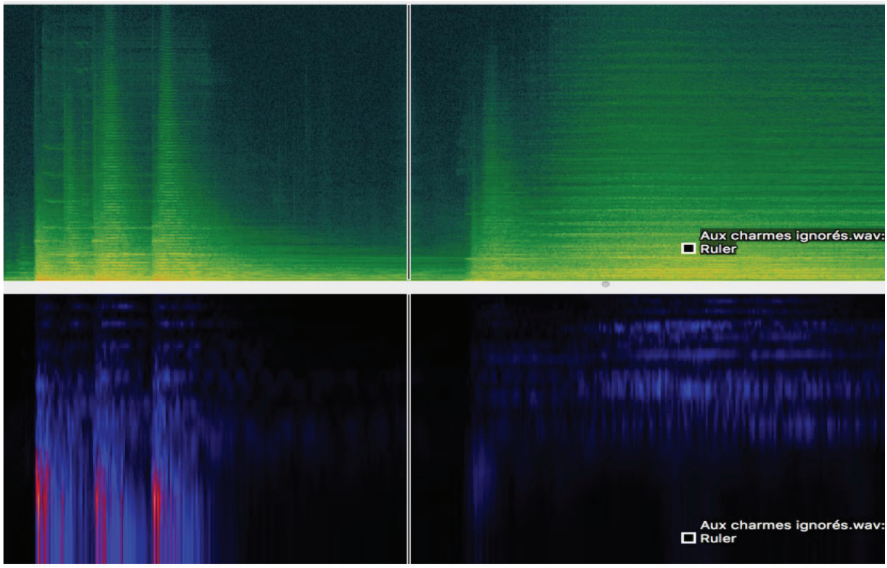
Thus, we can see that, in the process of composition, [dramaturgical material] developed towards the aspect of the humanization of the musical sound

phenomena. That is a rather thin boundary, shimmering in the middle of the action of the very relationships between elements, developing towards contextualization and the mechanical destruction method. The destruction manifests itself in the aspect of the purest academism, which can be regarded as more classical than the "classics" themselves. Specifically, in *Aux charmes ignorés,* the two aspects aptly defined by Šliogeris (the thing and art) are manipulated as undisputable and predicated as an indisputable, turned into a classic and an inspiration to the sensibility and intellectual conflict by "hanging" a work of art and leaving it in the great "Between": spontaneity is receptive, and receptivity spontaneous. In that case, the totality of the elements of the language of music of the composition and the expressed image do not relate as a finite form of the thing. Microchromatics functions as a "form of shapeless intelligence".

The conversion of the chaos of relationships can be noted through the spectral analysis of the musical composition and the analysis of the melodic range of the spectrum.



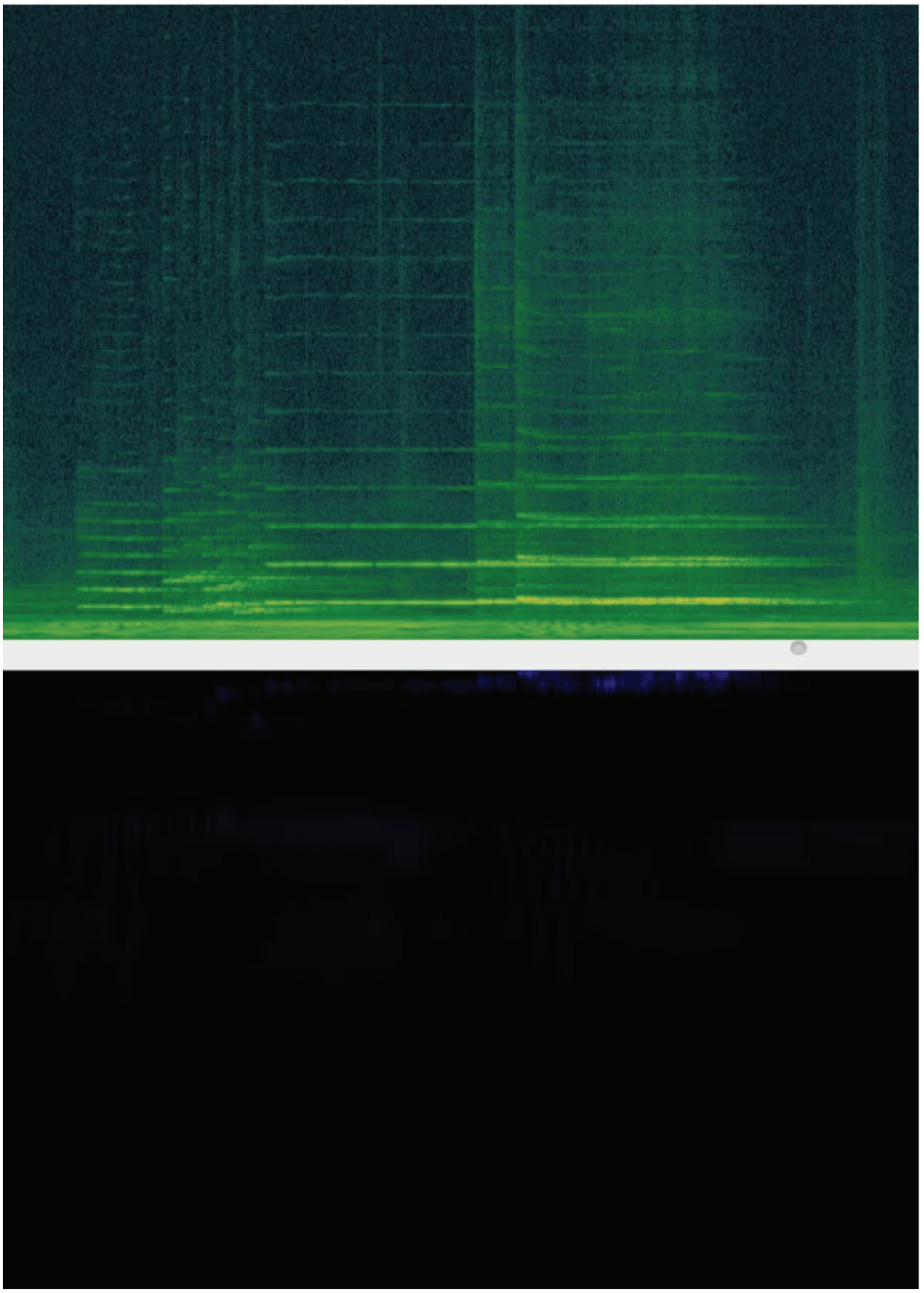
Example 13: The first attack of the composition, not resonating specific sounds



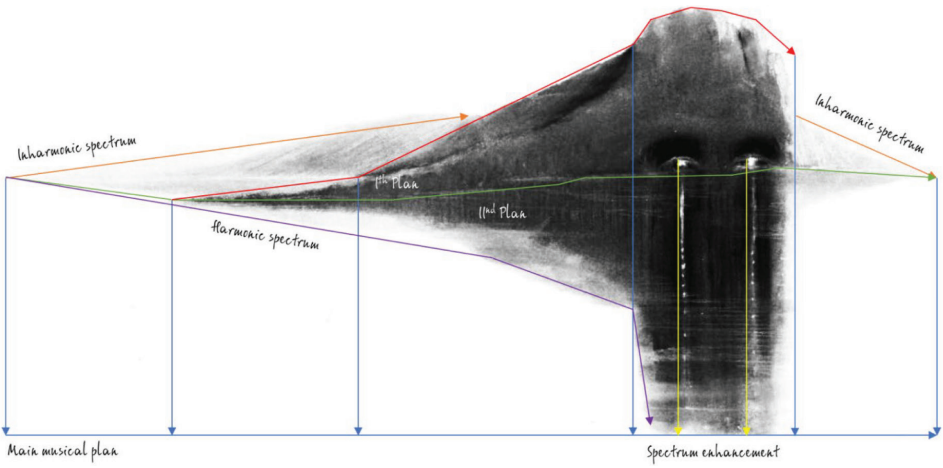
Example 14: The spectrum obtained from the attack. Transformation of a sensual object

We can conclude that all the microintervalics, which seemingly experience a merger of the being with the preservation of its own identity, is transformed into the being – the image of the sensual world penetrating into the greatest *nothing* – the fluctuation between existence and non-existence, form and amorphousness, harmony and noise, sensual harmony and anti-sensual noise. The conversion of microintervalics and modes, having experienced aspects of transformation, reveals the main feature – the aspect of the imperfection of beauty – the contours of the themes of the very works of art as the being and a drama of pure relation, rising above mode and harmony.

Thus, the use of microintervalics and the creation of various philosophical idioms in a musical texture introduces some main aspects for updating the quality of sound. However, before identifying those aspects, it is very important to view the form of a musical composition and the reference point forming the strategies of the use of microintervalics in a post-spectralist creation.



Example 15: The anthropomorphic sound properties highlighted



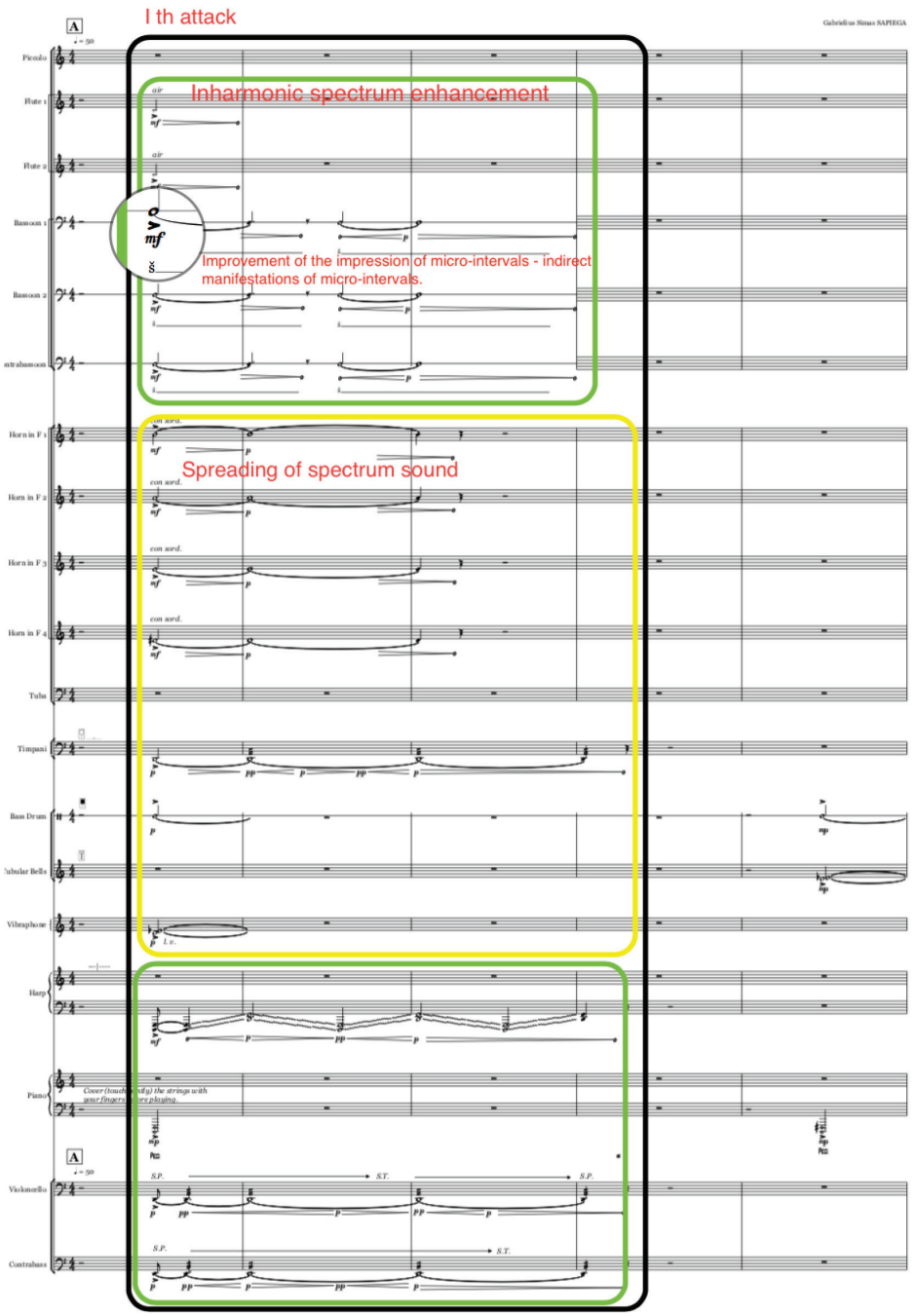
Scheme 3: The strategy of use of the spectrum saturated with microintervalics in Aux charmes ignorés[19]

From the strategy of use of the spectrum saturated with microintervalics, we can very clearly see one of the most distinct features typical of post-spectralists: the spectrum as a point of reference, however, an aspect not fully controlling the compositional process, as was typical of spectralists. As can be seen, the authors who chose the stylistics of post-spectralism acknowledged the spectrum as much as it generated creative material such as that found in the mode, chordics, and microintervalics typical of contemporary music, the principles of orchestration.

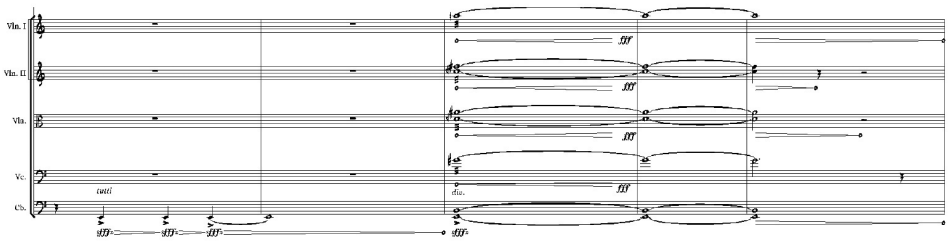
Microintervalics in a musical composition, and especially in post-spectralist music, can manifest itself in different ways. We can identify several main features and functions of microintervalics:

1) Direct manifestations of microintervalics:
    a. microintervals directly obtained from the spectrum function as precise calculations in the composition;
    b. the precisely calculated microintervals are simplified to such meanings that would be much more convenient for the performer to play;

19 In the background: painting *Peace* (1903) by Mikalojus Konstantinas Čiurlionis (1875–1911).

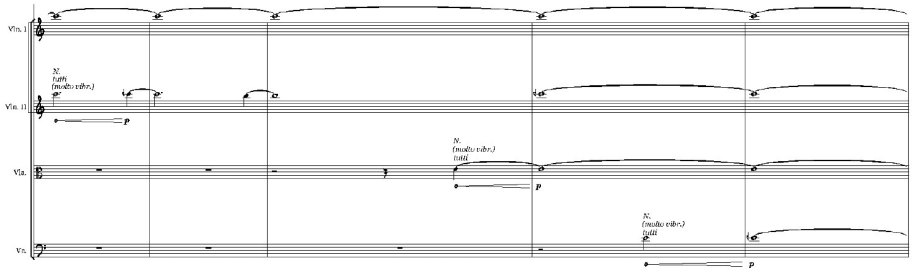


Example 16: Sapiega's Aux charmes ignorés*, mm. 1–5. Re-interpretation of the spectrum*



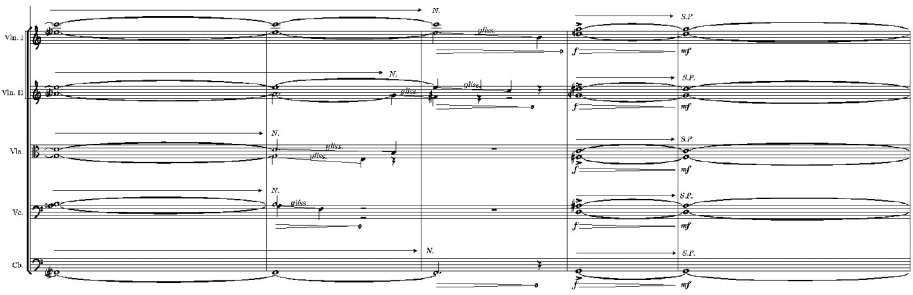
Example 17: Sapiega's Aux charmes ignorés*, mm. 91–5*

c. Compound microintervals can be omitted, and simpler ones can be written instead, even if not of the same sound.



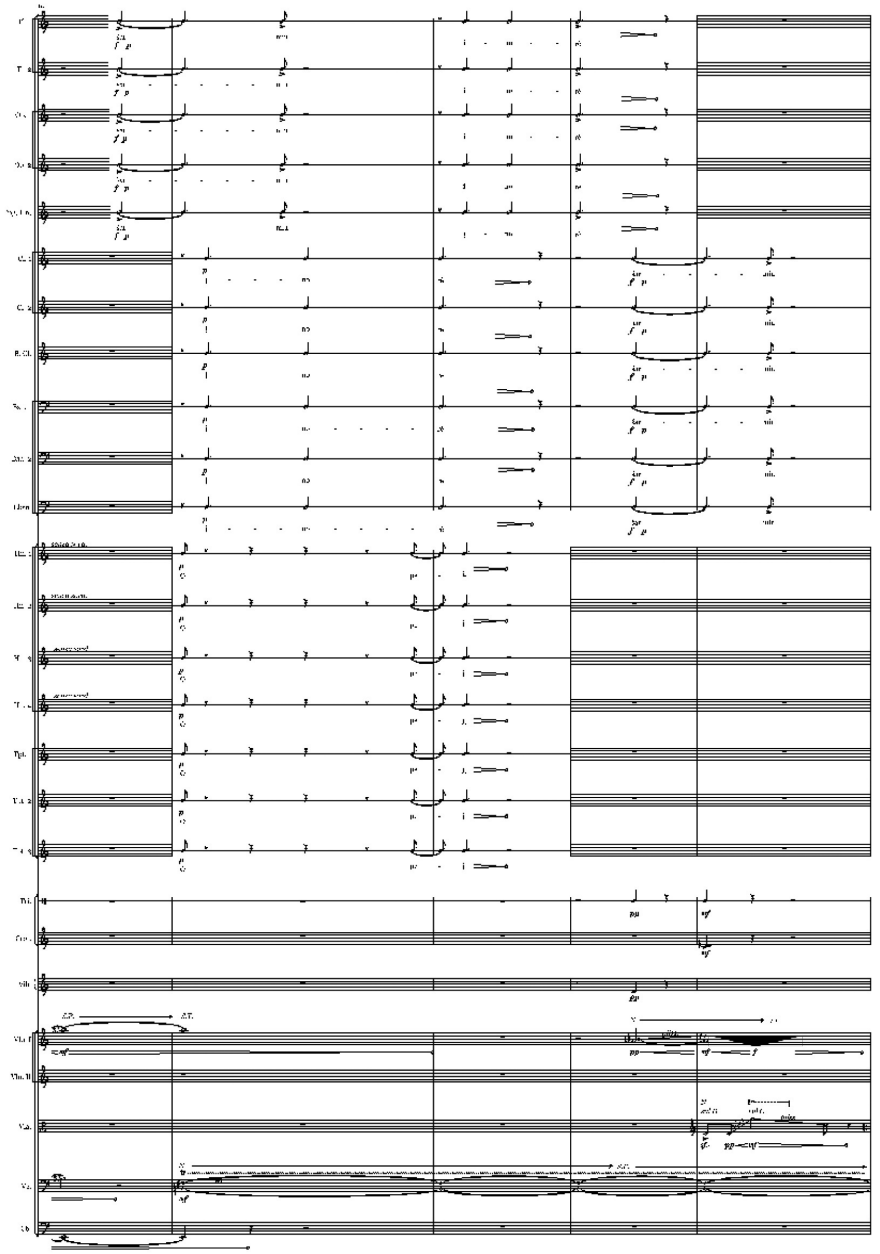
Example 18: Sapiega's Aux charmes ignorés*, mm. 51–5*

2) Indirect manifestations of microintervalics:
   a. By using different sonoristic means and playing techniques, partly controlled manifestations of microintervalics are derived for the outcome of the sound quality;



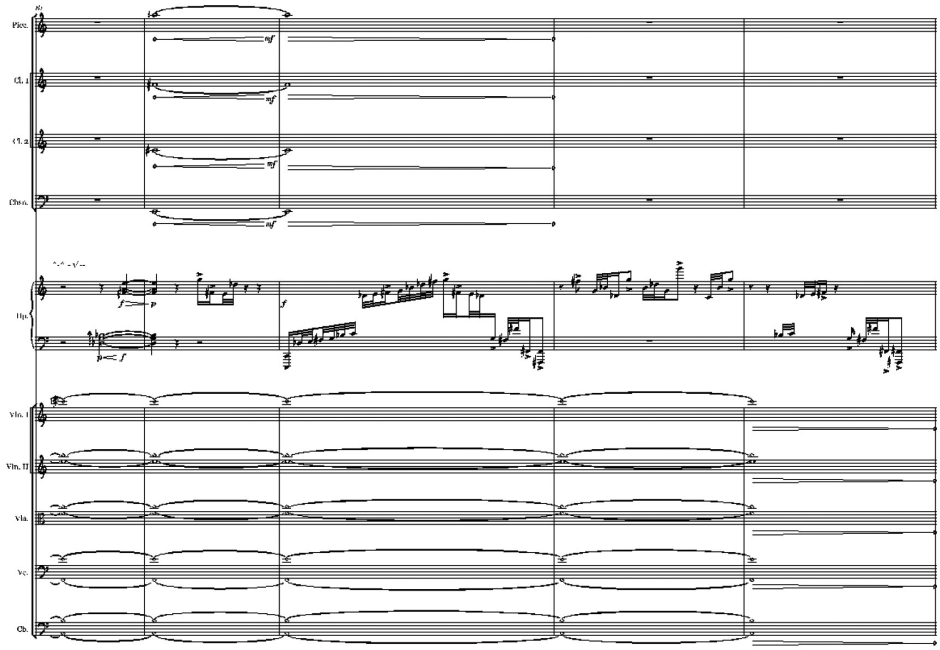
Example 19: Sapiega's Aux charmes ignorés*, mm. 61–5*

b. By using different sonoristic means and side sounds, such as noises, indirect manifestations of microintervalics are obtained, hardly defined, or controlled in a musical texture.



Example 20: Sapiega's Aux charmes ignorés*, mm. 16–20*

3) By means of different orchestration techniques, especially those typical of spectralism, such a quality of sound is derived which would presuppose the quality of sound of the compositions saturated with microintervalics.



Example 21: Sapiega's Aux charmes ignorés*, mm. 81–5*

Such a method of the microintervalic regeneration in musical compositions provides for a broader understanding of microintervalics and for both the comparison and development of new musical and the composer's philosophical and aesthetic fields as well as their updating in a musical texture. Microintervalics, especially in the creations of the post-spectralists, manifests itself in different ways and is developed by several techniques which both contribute to the disclosure of the intervalic nature of the musical composition and move away from the initial point of their use.

7 Conclusions

1. Microtonality is a musical phenomenon with deep traditions in Occidental and Eastern cultures, re-actualized in the early twenty-first century and provided with a new meaning. The very concept of microtonality is not

precise and is not universally suitable to describe the types of interval *genos*. Therefore, in the article, the generic term microchromatics, proposed by Yuri Kholopov, is used. The microtone, a term which also deserves correction, is more accurately represented by the semantically and structurally more precise term microinterval.

Based on the historical and analytical investigations carried out during the research, the use of the term can be defined through the identification of semantic and exploitational properties:

- *microinterval* – the ratio of two pitches, with emphasis on the *semitone genos* when the interval is smaller than a semitone;
- *microchromatics* – a system of pitch organization, based on the application of microintervals;
- *microtonality* – a compositional structure based on the principles of tonal music, when microintervals are used merely as a means to update the quality of sound.

Given the prevalence of the term microtonality in the discourse of the principles of music composition and musicology (Griffiths, Lindley, Zannos, Fox Strangways, etc.), the concept was not rejected during the research and was used for the definition of the microchromatics-related musical phenomena.

2. Upon reviewing the manifestations of microchromatics in the process of the history of music, we gained certain insights into the evolution of the concept of the phenomenon in question as well as into the changes in its understanding and transformation in the twenty-first century:

- in the past musical cultures: the organization of pitches in microchromatic structures was rather a number expressing the relationship and ratio of the pitch hierarchy on the principle of both philosophical and structural thinking;
- in twentieth-century avant-garde: microsystems were regarded as the structural aspects of intercultural transformation by expanding the established tonal systems, based on the theoretical works on the old music, as well as by going into the heart of merely structural “micro” musical sound parameters and exposing them in the musical texture;
- in the music of the twenty-first century: a micro-system is understood not only as a sonoric means of expression and a system of pitch organization, but also as a new aesthetical-philosophical concept: a musical sound is equated with the concept of a “live organism” and

emphatic centrism, and attempts are made to extract both the "micro" and "macro" parameters and processes hiding in the sound.

In the summary and evaluation of the dissemination and the changes in microtonality from the qualitative and quantitative viewpoints, we conclude that it was specifically in the twentieth and the early twenty-first century that the phenomenon acquired new features and angles of viewing, while the changes that occurred can be regarded as *a conversion of microtonality*.

3. Microsystems became established both in the avant-garde and twenty-first century music contexts. When viewing such phenomena from the compositional perspective, a merely analytical viewpoint does not suffice: we must approach a corresponding phenomenon – the thing, that is, the work of art – in which microintervals or michrochromatic systems are exploited both in the direct (analytical) and figurative (philosophical) sense. The affected works by the conversion of microtonality as the being of a substantial individual: that is not just the implementation of the idealized schemas of the thing, but also the direct expression of the meanings of the thing (the work of art).

The disclosure of a corresponding perspective explains a very important prerequisite for the conversion of microtonality, typical of twentieth and twenty-first century music, and simultaneously its outcome: through his creative and theoretical research, the author deals with the issue of the identity of the work of art and expresses authorized contact with microsystems. One of the principal aims which became established in microtonality conversion-affected music is the identification of the work of art with its existence, that is, a desire to change the classical concept of a work of art and its structure from the viewpoint of the perception of pitches and the organization of their internal/external ratios.

4. Based on the categories of the intercultural music analysis technique proposed by Everett, upon the review of twentieth and twenty-first century microinterval music and the analysis of specific compositions, we can argue that, over the period in question, three manifestations of conversion and possible techniques of analysis were functioning: transference, syncretism, and synthesis. In the analysis of the chosen compositions, the compositional aesthetic-philosophical and analytical strategies were identified and the essential features were named due to which corresponding opuses were ascribed to the specific micro-system conversion categories. All that contributed to the application and consolidation of Everett's categories in the context of microtonality conversion. The types of twentieth

and twenty-first century microtonality conversions, their characteristic features, and the composers in whose compositions the appropriate expression was found are presented below:

- *transference* means aesthetic principles or a formal system without explicit references to corresponding direct cultural sound; highlighted musical illustrativeness of microintervals without cultural quotations; literary or extramusical quotations; an aspiration to "revive" and "update" the sound; microchromatics as a structural modal element limited by the tradition of tonal music and musical material as well as pre-tonal music practices – Hába, Carrillo, Partch;
- *syncretism* means changing the meaning of timbre, articulation, or the tone series through the exploitation of microintervals; the perception of musical sound as the integration of a "live organism" and systemic "micro" structures; the integration of microchromatics into musical processes as a potential systemic side effect; and a rotating circle of the Oriental and Occidental viewpoints: between the recording of becoming and being – Grisey, Murail, Viļums;
- *synthesis* means recreation of a traditional musical system, form, or timbre by new musical idioms; the functioning of microchromatics as a form of amorphous intelligence; the conflict between sensuality and intelligence; the totality and expression of the elements of the language of a musical composition no longer corresponds to the finite form of the thing; an over-modal, harmonic, and thematic contour – Saariaho, Sapiega.

The final and comprehensively consolidating cycle of the conversion of microprocesses reveals the musical compositions affected by the aspect of transformation as the most radical oppositions: the substantial existence of the thing and the form from the shapeless, non-substantial material of a pure relationship, that is, amorphous intelligence opens up to sensual things against the background of the pseudo-reality of the amorphous pure relationship in which the form is shaped from the amorphous reality of the pure relationship. The process enables the transformation of micro-systems into the final completion of conversion or open up opportunities for the formation of its new varieties.

5. The microintervalics in a musical composition, and especially in post-spectral music, can manifest itself in various ways. Several key features and functions of microintervalics can be identified:

1) direct manifestations of microintervalics:
   a) the microintervals obtained directly from the spectrum function in musical compositions as precise calculations;
   b) the precisely calculated microintervals are simplified to the meanings that are much more convenient for the performer to play;
   c) compound microintervals can be omitted, and more simple ones written instead of them, although not of the same sound.
2) indirect manifestations of microintervalics:
   a) through the use of different sonoric means and playing techniques, partially controlled manifestations of microintervalics are obtained for the outcome of the quality of sound;
   b) through the use of different sonoric means and side sounds as noises, indirect manifestations of microintervalics are obtained, difficult to define, and control in the musical texture;

3) by means of various, and especially typical of spectralism, orchestration techniques, such a quality of sound is obtained which presupposes the quality of sound of the compositions saturated with microintervalics.

The identified specific manifestations of the microtonality conversion and the notional meanings of functionalism hiding inside it can be used for further studies of microinterval music when analyzing the compositions affected by the conversion of micro-systems, and in the reflection of all that, the relationship of an artist with the work of art and art itself. Although the aspect of the microtonality conversion in the analyzed historical, theoretical, and specific musical examples is related not merely to the exploitation of specific musical material, but also to the chaos of relationships, other abundant systemic inclusions of microintervalics may stimulate further research and to even more precisely specify and define the angle of viewing the conversion of microtonality.

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