

Lietuvos muzikos ir teatro akademija
Lietuvos kompozitorių sąjunga

Lithuanian Academy of Music and Theatre
Lithuanian Composers' Union

18-oji tarptautinė
muzikos teorijos konferencija

Vilnius, 2018 lapkričio 13–15

18th International
Music Theory Conference

Vilnius, 13–15 November 2018

**MUZIKOS
KOMPONAVIMO
PRINCIPAI:**

nuo audijavimo
link komponavimo

**PRINCIPLES
OF MUSIC
COMPOSING:**

Links between Audiation
and Composing

XVIII

Vilnius
Lietuvos muzikos ir teatro akademija
2018

ISSN 2351-5155

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Pratarmė

Šis leidinys – tai mokslinių straipsnių rinktinė, sudaryta remiantis 18-osios tarptautinės muzikos teorijos konferencijos „Muzikos komponavimo principai: nuo audijavimo link komponavimo“ pranešimais. 2018 m. lapkričio 13–15 d. Vilniuje vykusią konferenciją surengė Lietuvos muzikos ir teatro akademija ir Lietuvos kompozitorių sąjunga. Konferencijoje savo idėjas pristatė bent dvi dešimtys muzikologų ir kompozitorių iš Lenkijos, Serbijos, Lietuvos, Jungtinės Karalystės, JAV, Vokietijos, Rusijos, Ukrainos. Moksliniai straipsniai sugrupuoti į tris potemes.

I potemė – Audiacija ir komponavimo procesas: teorinė ir technologinė perspektyva. Audiaciją, kaip pirminę kompozitoriaus santykio su skambesiu manifestaciją, iš kurios kyla komponavimo ypatumai, autoriai nušviečia skirtingai. Berto Van Hercko nuomone, audiacija yra kūrybinio proceso dalis. Pagal tai, kaip kompozitorius garsu sukuria prasmę, priklauso skambesio audijavimo pobūdis bei traktuotės ypatumai kompozicijoje (procesas, forma ir pan.). Rogerio Redgate'o akiratyje – analitinis audiatyvinis procesas, kuris pasitelkiant notaciją introspektyviai nusakomas a) kaip pirminis skambesio supratimas, b) prasminga jo plėtotė ir c) reiškinio įvaldymas. Audiacija kaip lūkestis arba tęstinumas, bendraautorių Aleksandro Kontičiaus ir Milošo Zatkaliko teigimu, yra pašamoninis gebėjimas reprezentuoti fiziškai neskambantį skambesį. Ši galia glūdi tiek kompozitoriaus, tiek klausytojo mentalitete ir yra nepakeičiama komponuojant. Autoriai darbe pasitelkia psichoanalizės konceptus (*id, ego, fort-da game*, dalinis objektas ir kt.). Spontaniško pirmapradžio (archajiško) kūrėjo santykio su skambesiu audijavimas šiuolaikinėje muzikoje yra Rimanto Janeliausko pasirinkta tema. Sigitas Mickis siekia susisteminti įvairias ritmo audijavimo strategijas, leidžiančias atsiskleisti kompozitoriaus individualumui.

II potemė – Audiacinės tendencijos ir jų raiška šiuolaikinėje muzikoje. Akcentuodami vieną ar kitą muzikos elementą ar darinį (intervalą, struktūrą, sintagmą ir pan.), straipsnių autoriai užčiuopia kai kurias bendresnes audijavimo tendencijas šiuolaikinėje muzikoje. Kintantis tritonio intervalo audijavimas (*prohibition vs apotheosis*), pasak Boženos Čiurlionienės, inspiravo nemažai naujų komponavimo principų, sistemų, procesų. Raimonda Žiūkaitė aptaria nuo audijavimo nepriklausančių neo-rymaniškųjų triadų manipuliacijų apraiškas šiuolaikinėje lietuvių muzikoje. Andrius Maslekovas nagrinėja tarpmodalinius muzikinių parametų (tono aukščio ir skambesio kokybės) ryšius ir iš jų kylantį audijavimo modelių susiliejimą šiuolaikinėje muzikoje. Frakcionavimo ir susilydymo struktūrų poliarizaciją, audijuojant tembrą šiuolaikinėje muzikoje, tyrinėja Aistė Vaitkevičiūtė. Martinas Vishnickas siūlo praplėsti pedagoginę audijavimo sistemą, kuri padėtų suvokti naują klasikinės gitaros morfologiją ir tinkamai panaudoti išplėstines atlikimo technikas. Maja Bosnić mums pristato mažai išžvalgytą tyrimų lauką – technologijų veikiamus audiacijos metodus. Savo straipsnyje ji aptaria šiuolaikinių technologijų implementacijas įvairiais audiacijos lygmenimis, supažindina su technologiniais sprendimais savo bei kitų kompozitorių kūriniuose bei kūrybiniuose procesuose.

III potemė – Audiaciniai kompozitorių stilistikos ir evoliucijos aspektai. Logiška manyti, kad be audijavimo nėra ir stiliaus. Tačiau audijuojama visuma nelengvai aprėpiama. Tad neatsitiktinai straipsnių autoriai susitelkia į atskirus šiuolaikinių kompozitorių stilistikos aspektus. Prisiliedamas prie posttonalios Schoenbergo muzikos Stephanas Lewandowski šalia klausia suvokiamo paviršinio skambesio atranda ir koegzistuojantį giluminį sluoksnį, atsiveriantį klausai tik po pastarojo teorinės seto analizės. Markas Konewko įvardija Messiano stilistikai būdingą vienovę, pasireiškiančią audijavimo, improvizavimo ir sinestezijos tarpusavio ryšiais. Analizuodamas Michaelio Finnis „Verdi transkripcijas“ Alastairas White'as pasitelkia Jacques'o Lacano koncepciją, kad paaiškintų „tarpkultūrinio peraudijavimo“ fenomeną.

Baigdami apžvalgą pažymėsime, kad leidinio straipsniai gali būti diferencijuojami pagal pakraipas – mokslinę teorinę ir praktinę. Ir nors absoliučių ribų nėra, vienus straipsnius sąlygiškai galima išskirti kaip vertingesnius moksliniu teoriniu požiūriu (autoriai: Bert Van Herck, Roger Redgate, Aleksandar Kontić ir Miloš Zatkalik, Rimantas Janeliauskas, Sigitas Mickis, Božena Čiurlionienė, Andrius Maslekovas, Aistė Vaitkevičiūtė, Stephan Lewandowski, Mark Konewko, Alastair White), o kitus – praktiniu (autoriai: Raimonda Žiūkaitė, Martin Vishnick, Maja Bosnić).

Tikimės, kad 18-osios muzikos teorijos konferencijos straipsnių rinktinė sulauks skaitytojų dėmesio ir bus įdomi kiekvienam besidominčiam šiuolaikinės muzikos audijavimo problemomis. Redakcinė kolegija tikisi skaitytojų dėmesio tiek čia, Lietuvoje, tiek užsienyje. Būsime dėkingi už visas pastabas ir atsiliepimus apie leidinį. Organizatorių vardu dėkojame visiems rėmėjams ir rengėjams.

Prof. dr. Rimantas Janeliauskas

Foreword

This publication is a collection of articles of scientific and artistic research, which are based on the presentations made at the 18th international conference of music theory “Principles of Music Composing: Links between Audiation and Composing”. The conference took place in Vilnius on 13–15 November 2018. It was organized by the Lithuanian Academy of Music and Theater and the Lithuanian Composers’ Union. Around twenty musicologists and composers from Lithuania, Poland, Serbia, the United Kingdom, Germany, the United States of America, Russia and Ukraine presented their research at the conference. The articles in this collection are divided into three subthemes.

Subtheme I. Audiation and Compositional Process: Theoretical and Technological Perspectives. Audiation is a primary manifestation of a composer’s relation with sound and the source of all peculiarities of compositional process. The authors reflect this subtopic in a variety of different angles: according to Bert Van Herck, audiation is a part of creative process. He discusses the parallels between the means by which a composer employs sound in order to create a meaning and the nature of audiation of sound, as well as compositional approaches (such as process, form etc.). The research by Roger Redgate focusses on the analytical audiative process, which is being introspectively described as a) the primary comprehension of sound, b) its meaningful development and c) the dialogue between auditory and notation. A scientific tandem formed by Aleksandar Kontić and Miloš Zatkalik tackles audiation as an expectation, or prolongation, which according to them, is a subconscious ability to represent sound without it physically being present. This ability is deeply rooted in the mentality of both, the listener and the composer and is irreplaceable in compositional process. This paper employs a number of psychoanalytical concepts and thus creates interdisciplinary ties between musicology and psychoanalysis. Rimantas Janeliauskas addresses the archaic relation with sound and spontaneous archetypical compositional patterns that emerge in the music of nationalist composers of the 20th century. Sigitas Mickis strives to systematize various strategies of audiation of rhythm that allows the individuality of the composer to unfold.

Subtheme II. Audiation Tendencies and their Manifestation in Contemporary Music. By analyzing different musical elements (such as pitch, timbre, interval, structure, etc.) the authors here reveal audiative tendencies and peculiarities of contemporary music. Božena Čiurlionienė addresses the evolution of the audiation of tritone (prohibition versus apotheosis), which inspired a number of new compositional approaches, systems and processes. Raimonda Žiūkaitė discusses the manifestations of audiation-less manipulation of triads inspired by a neo-Riemannian approach in Lithuanian contemporary music. Andrius Maslekovas tackles transmodal relations between musical parameters (pitch and sound quality) and a consequential fusion of their audiative patterns in contemporary music. Aistė Vaitkevičiūtė investigates the polarization of fractionation and fusion of the structures in the audiation of timbre in contemporary music. Martin Vishnick offers ways to upgrade a pedagogical approach to audiation, which would help to understand new morphologies of classical guitar as well as properly familiarize with the extended techniques. Maja Bosnić explores a rather new field – technology-assisted audiation. In her paper she addresses the means of implementing technology in various stages of audiation; she also explains the role of various technology-related solutions in the works and creative processes of her own and other composers.

Subtheme III. Audiation Aspects in Relation to Creative Evolution and Style. It is safe to assume that individual style could not exist without audiation, therefore the authors here delve into personal stylistic aspects of individual composers. In his analysis of post-tonal music by Arnold Schoenberg, Stephan Lewandowski, alongside the directly comprehensible musical surface, discovers a deep layer, which emerges into our aural perception only after completing its set analysis. Mark Konewko delves into the stylistic unity of Oliver Messiaen, which is formed by relations between audiation, improvisation and synesthesia. Alastair White employs the concepts by Jacques Lacan for his analysis of Michael Finnissy’s “Verdi Transcriptions” in order to explain the phenomenon of “trans cultural reaudiation”.

We would like to conclude this brief introduction with an observation: the articles in this issue can be divided into two main categories – scientific (theoretical) and more practice oriented. Even though no clear boundaries are present, we would like to conditionally discern the articles that stand out in their theoretical value (authors: Bert Van Herck, Roger Redgate, Aleksandar Kontić and Miloš Zatkalik, Rimantas Janeliauskas, Sigitas Mickis, Božena Čiurlionienė, Andrius Maslekovas, Aistė Vaitkevičiūtė, Stephan Lewandowski, Mark Konewko, Alastair White) and the ones that shine with their practical (artistic) insights (authors: Raimonda Žiūkaitė, Martin Vishnick, Maja Bosnić).

We hope that Volume XVIII of “Principles of Music Composing” will be popular with the readers and will attract attention of those who are interested in contemporary music and audiation. All comment and criticism are welcome. On behalf of the editors, I thank all who contributed to the preparation and publication of this volume.

Prof. Dr. Rimantas Janeliauskas
Translated by Andrius Maslekovas

1

AUDIACIJA IR AUDIATION AND
KOMPONAVIMO PROCESAS: COMPOSITIONAL PROCESS:
TEORINĖ IR THEORETICAL AND
TECHNOLOGINĖ TECHNOLOGICAL
PERSPEKTYVA PERSPECTIVES

Audiation: What to Listen for?

Abstract. If audiation is the skill to write down what the inner ear imagines, then audiation implies notation. Therefore audiation is the result of a process of learning. This can be problematic if audiation is applied to the process of composition. To compose implies finding new ways of creating music, while audiation on the other hand relies on the learned ways of creating meaning in music. This tension between audiation and composition will be discussed in this paper.

To understand better the interaction between these related fields we will turn to the music of Steve Reich and Gérard Grisey. Both composers are interested in the concept of gradual change, and are invested in the perception of change in reaction to the abstract music of their predecessors. In spite of the obvious similarities, their music is very different. In addition a very specific idea, the distortion of re-recording by a tape recorder is discussed in *Mémoire/Érosion* by Murail and Alvin Lucier's composition *I am sitting in a room*. The similar ideas about sound result in quite different musical applications. These similarities and differences of the comparisons will be placed in the perspective of the philosophy of Michael Polanyi, and in particular his concept of focus in creating meaning.

With this theoretical framework from Polanyi's philosophy, different attitudes of listening are clarified: is music using sound to create a discourse; or is music the unfolding of sound without a discourse. Bringing this back into the context of audiation, and specifically to the tension between audiation and composition a broader picture arises. How does the composer create meaning through sound, and how is this particular way of audiation communicated in the score? This may clarify the framework a composer is working with, and perhaps the compositional process itself.

Keywords: audiation, notation, meaning, Polanyi, perception, process, experimental music, spectral music.

Prologue

The ability to hear music by imagining the sounds is crucial for any composer. Yet, the role of audiation in the compositional process is not often discussed. When studying with Luc Brewaeys (1959–2015) – he was well known for his jokes – he once asked me “*what is a good composer?*” and answered by saying “*a good composer hears what he writes*”. And he continued “*but do you know what makes an excellent composer?*” and the answer following was: “*an excellent composer writes what he hears*”. While this seems a silly play with words, I believe Luc Brewaeys meant that this little pun pointed at something more. Something that is difficult to put into words. Let us attempt to clarify this relation between audiation and composition. Perhaps this can help to understand better the compositional process itself.

1. What is audiation?

First, let us consider what audiation is. Most commonly one would say that it is the ability to notate what is heard. Audiation is an important skill that is part of musical training. In dictation: (1) the students notate what they (think they) hear; (2) they correct mistakes; (3) reflect on why they made a mistake; and this process is repeated until the students have reached the level of audiation that is required. None of this is new, however, when audiation is considered the concept of notation is assumed. Audiation is therefore not only the training of the ear, but also teaching the concepts of notation. To make this connection with notation explicit is important if we are interested in exploring the connection between composition and audiation. Indeed a score as *Pression* by Helmut Lachenmann, or *Anticredos* by Trevor Wishart (Example 1) seem not typical when we think of dictation in the context of musical training. So what has prompted composers such as Lachenmann, Wishart, and many others to reinvent the notation?

2. Audiation in Relation to Musical Notation

Understanding the connection between audiation and notation brings out the complexity of audiation in composition. Composers have developed many different kinds of notation, which might imply changes in the way they audiate. To get a more concrete idea of these changes, some examples will be discussed below with the purpose of showing the variety in notation. The question will be how notation affects the performance and what the reasons for doing so are.

Example 2 shows the beginning of *Last Pieces* for piano solo by Morton Feldman. No meter is indicated; no rhythm; and the pitches have no stems. Besides the pitches, the only indication is “Slow. Soft. Durations are free.” Despite the apparent freedom to the performer, the intention is unambiguously clear. The improvisational character of this piece would be difficult to notate in traditional rhythmic notation, and – most likely – the free floating character of the sounds would not be the same. Therefore, Feldman has chosen the best notation possible for his music: the apparent lack of rhythm is not a weakness but instead forces the performer to focus on the sound precisely in the way Feldman wanted.

The image shows a page of a musical score for percussion instruments. At the top, it is labeled 'Page 5'. The score is divided into several staves, numbered 1 through 6, and a section labeled 'SD'. Each staff contains rhythmic notation, including notes, rests, and dynamic markings such as 'mf', 'f', and 'sfz'. There are also various annotations and symbols throughout the score, including arrows, asterisks, and other markings. The notation is dense and detailed, typical of a complex percussion score.

Example 1. Page 5 from *Anticredos* by Wishart

Slow. Soft. Durations are free.

The image shows a musical score fragment for a string quartet. It consists of four staves, two for the first violin and two for the second violin. The music is written in a slow, soft tempo, with the instruction 'Slow. Soft. Durations are free.' at the top. The notation includes notes, rests, and dynamic markings, with a focus on melodic lines and harmonic textures.

Example 2. Beginning of *Last pieces* by Feldman

The opening of *Atmosphères* by Gyorgy Ligeti is the next example (a score fragment is not provided as the score is well known and because it would be too small to be legible). In this composition Ligeti creates textures of different densities, dynamics, and ranges. This is a play with abstract properties of sound in the sense that there is no melody or harmony to guide the listener, and at the same time it exposes sound in its raw unpolished form allowing a direct expression without any attempt to temper this unmitigated experience. To achieve this Ligeti seems to use traditional notation. Without any question, the practical reasons when working with a large orchestra are important. However, Ligeti redefined notation: bar lines are no longer an indication of meter. The score is more akin to the final edit of a sound editor where you can see the sounds in time. We can conclude that Ligeti has manipulated the notation to his compositional needs, facilitating to transmit his own compositional ideas by eliminating the aspect of notation (meter in particular) that would distract from his intentions.

(1) the dynamic level of the second violin should match the other instruments

Violins 1 & 2
Alto
Cello
Elect./DMP 7

Example 3. First page of *Nymphéa* by Saariaho

The third example shows the beginning of *Nymphéa* by Kaja Saariaho. Using sounds on an axis from noise to pure sound is one of Saariaho's main preoccupations. To communicate this, she developed an additional sign in her scores: a black line the thickness of which indicates the amount of noisiness. While the score looks conventional besides the black lines, the sound of Saariaho's music is marked by the transitions to and from distortion. Often the pitches are not recognizable any more, leaving the black lines as the most prominent factor in the score.

The fourth and last example is a series of three short excerpts from the first movement of the second symphony by Witold Lutosławski. The first excerpt shows the brass with limited pitches and repeated staccato notes in a prominent role. The simultaneous playing of the ten brass instruments results in a controlled rhythmic chaos. Even though the character is very different, the technique is similar to the example by Feldman. Again, the result could not have been written out in rhythmic detail without changing the character. The second excerpt shows the same technique, but it is worth noticing that here Lutosławski has included a few noticeable legato markings. They are indeed remarkable because these are the first legato signs in this composition. Excerpt 3 then, following shortly after, completes the journey by emphasizing legato. Until here (number 8 in the score), Lutosławski has realized a gradual discovery of legato starting from staccato. It needs to be added that this is not the end of the first movement, and from here on Lutosławski plays with all the materials at hand. Also to be noted is that the emphasis on articulation may stick out in the beginning, but the use of harmony, pitch, and timbre becomes very important for the development of the form of this movement, in particular the legato material in the double reeds.

It is clear that the previous examples are not an analysis of the pieces. However, they do show a variety of ways to notate, mostly as a deviation from traditional notation. This variety points to a particular focus on sound that the composer wants to communicate with – or even to impose on – the performers and the listeners.

The phenomenon of sound cannot be represented completely in one single notation. Therefore to notate means to choose, more precisely: to choose which aspect of sound to focus on. So in the four examples discussed above, each of these composers had a different sound in mind to shape their compositions. Through their notation they did convey this new way of listening, resulting in the scores as we know them. New or adjusted notation systems are therefore the result of a different kind of audiation. It reveals how a composer listens and how we are invited to listen.

trbe 1
trbe 2
3
4
cor. 1
cor. 2
3
4
tbn 1
tbn 2
3

Il pouarrac az do anaku dyrygenta(2) | répéter jusqu'au signe du chef(2)

7

P.G. 2"

fl.
5 tomt.
cel.

8

2
4

ob.
c.ing.

P.G.
poco più lento
rit.

Example 4. Three excerpts from Lutosławski – Symphony No. 2, first movement

3. Audiation: An Attitude Towards Sound

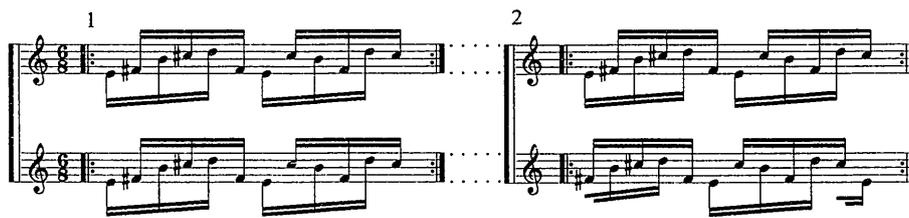
The connection between audiation and notation being clarified, it also has become clear that this poses challenges for the connection between composition and audiation. These challenges are the result of different attitudes towards sound, and how the composer wants the listener to experience the sound. Therefore, it might be useful to consider how composers use sound, leaving the aspect of notation aside.

The topic of how composers use sound is too large. Sound can be used in many ways: think for example of the heated debate in the 19th century between absolute music and programmatic music. The question at the time was whether or not musical sound could refer to external elements. In the 20th century composers found a multitude of different applications: *musique d'ameublement* by Satie; *Gebrauchsmusik* by Paul Hindemith; musical references by Alfred Schnittke; raw primitivism in *Le Sacre du Printemps* by Stravinsky; folk music by Kodály and Bartók; a structuralist approach by serial composers; the appropriation of exotic elements to build a new language by Messiaen etc. No need to continue the list! One cannot compare these composers and their approach to sound as they have very different intentions. What is needed is a very clear delineated comparison, with scientific clarity.

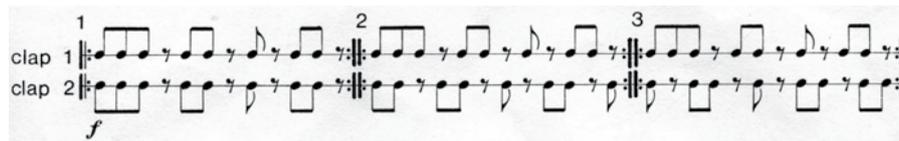
For such a comparison the similarities between Gérard Grisey – or the spectralists on the one hand – and Steve Reich – or American experimentalists on the other hand – are too striking to ignore. Reich (1968) remarks: “I am interested in perceptible processes. I want to be able to hear the process happening throughout the sounding music.” And also: “What I’m interested in is a compositional process and a sounding music that are one and the same thing.” And Grisey (Grisey & Fineberg 2000) writes the following about spectral music: “Coming into being in the mid-seventies, ... spectral music offered a formal organization and sonic material

that came directly from the physics of sound, as discovered through science and microphonic access.” And more specifically on musical form: “From its beginnings, this music has been characterized by the hypnotic power of slowness and by a virtual obsession with continuity, thresholds, transience, and dynamic forms.” As Jérôme Baillet (2000: 65–74) explained, Grisey often took breathing as a model for form. Breathing-in represents the transition from relaxation to tension; and breathing-out represents the transition from tension to relaxation. It is interesting to see how both Grisey and Reich are interested in sound, and in the perception of sound. They are not interested in abstract constructions as a compositional method; this is to be understood as a reaction against serialism for Grisey, and against Cage in the case of Reich. From their interest in perception and making the audibility of a process a priority, they developed musical forms based on gradual processes. Next we will investigate how they applied these concepts in their music.

1/67 Version

Example 5. Rhythmic motive of *Piano Phase* by Reich with the first rhythmic change

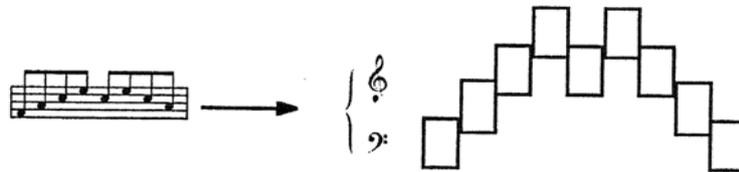
To realize his musical processes Steve Reich focuses on the rhythm. In *Piano Phase* (1967) the motive played by two pianos, gradually moves against itself (one stays steady, the other one speeds up gradually). The result is that the two pianos get out of sync until they are synchronized again, when the motive shifted one note. After completing this process 12 times (the number of notes of the motive) the two pianos are again playing the motive together (Example 5). The form of the music is indeed determined by the process, in a clear transparent way as Reich set out for himself. Reich realizes the same idea with a slightly different technique in *Clapping Music* (1972). In this composition the two performers shift through the rhythmic motif as in *Piano Phase*, except that the shift is by increment, not gradual. Notice that the rhythmic motive in *Clapping Music* includes rests (contrary to *Piano Phase*) so that each shift results in different interlocking rhythms between the two performers (Example 6).

Example 6. Rhythmic motive of *Clapping Music* by Reich with the first two rhythmic changes

Vortex Temporum by Gérard Grisey is inspired by American repetitive music, and especially the rhythmic vitality was a source of admiration. At the same time it is also a critique: where Reich limits the processes mostly to the aspect of rhythm, Grisey wants to integrate all aspects of sound in the process. In *Vortex temporum* the initial source for the material is an arpeggio figure. “The first part of *Vortex Temporum I* ... starts with a melodic undulating cell, and is projected by augmentation on the entire range of frequencies, so that the four pitches that form the initial cell become four separate bands of frequencies”¹ (Baillet 2000: 53) as shown in Example 7. But before Grisey knew the music by Steve Reich, Grisey developed his compositions according to similar principles. As mentioned above, Grisey compared musical form to breathing: from relaxation to tension and back. These transitions between relaxation and tension are made very gradual. As an example the beginning of *Partiels* can be used. The consonant chord of the beginning is gradually transformed through repetitions to the low, noisy cluster at the end of the first section. “During the course of eleven

¹ The translation is mine, the original reads as follows: “La première partie de *Vortex Temporum I* ... débute par une cellule mélodique ondulatoire et s’achève par sa projection ralentie dans toute l’étendue des fréquences, les quatre hauteurs constitutives de la cellule initiale devenant quatre bandes de fréquence séparées.”

repetitions of this sonority, some inharmonic components are gradually introduced to unsettle the initial timbre. ... Inharmonicity is achieved in stages through a downward octave shifting” (Rose 1996). The first chord is based on the overtone spectrum of a trombone and is quite consonant, representing relaxation. At the end of the process the low cluster represents tension. This transition from relaxation to tension is at the same time realized in the rhythm of the double bass leading up to the chord: at the beginning that is regular, at the end of the process it is highly irregular. This is just one example of how Grisey integrates different parameters of sound in his processes.



Example 7. The initial cell of *Vortex Temporum* transforming in blocks of frequencies (or chords)

Both composers use a process to build the musical form. Steve Reich has a very clear principle that is carried out. To achieve this perceptual clarity of the process, Reich reduces all other parameters to extreme simplicity so that our attention is going completely to the process. Therefore the process in the case of Reich coincides with the form. The music of Grisey is different: Grisey works with processes, and they are indeed very audible as well. However a single process does not coincide with the whole composition – with perhaps *Jour, Contre-jour* as an exception. A process for Grisey is part of a larger form, and Grisey keeps control over the process in creating the overall musical form.

A second example for the comparison of how composers use sound is a very specific case: the tape recorder as a model. In case a tape recorder is recording and re-recording there appears the process of distortion. This fact has inspired both Tristan Murail and Alvin Lucier in respectively *Mémoire/Érosion* and *I am sitting in a room*. Notwithstanding the shared starting point, there are obvious differences. *I am sitting in a room* is a composition for tape alone, while Murail wrote a work for instrumental ensemble with horn solo. But also the concept itself is slightly different: Murail takes the tape recorder in a loop as the model, in the way it was used to create delay in performances: “I used the principle of the re-injection loop in a purely instrumental piece, *Mémoire/Érosion*, written for horn and nine instruments ... The horn produces sounds that will be recorded by an entirely imaginary set-up. As in a reinjection loop, the listener will hear each phrase played by the horn repeated after a certain interval of time; it is, of course, the other instruments that produce the re-emission. But the initial phrase (or sound) will never be exactly repeated. With each repetition, the process of erosion will be played out” (Murail 2005). This process of erosion is obviously the compositional process that will develop the piece.

Lucier on the other hand makes a recording of himself speaking in *I am sitting in a room*. Then he records the playback of this recording in the same room: “I repeated the process until I had sixteen versions, one original and fifteen copies ... I chose speech to test the space because it is rich in sounds ... It was crucial to avoid poetic references ... I felt that would only get in the way. I wanted the acoustic exploration to be paramount, the room acoustics and its gradual transformation to be the point of the piece” (Lucier 2012).

It is a remarkable coincidence that these two compositions both take the distortion of the tape recorder as initial inspiration. Yet, the similarity of the starting point results in significant differences. Murail uses the tape recorder as a model for his instrumental composition. The relation is clear and audible, however, he keeps the freedom to manipulate the model according to his compositional needs: “The length of the fictional re-injection loop varies between one and three seconds. The changes in duration are sometimes sudden, at other times gradual (which necessitate more complex calculations). One can imagine many other manipulations through composition, for example, to suddenly stop the re-injection process for some of the instruments and throw them in another loop that feeds upon itself (producing a rapid degradation), etc.” (Murail 2005). Murail is using the model of the tape recorder as an inspiration, and uses his imagination to build a composition with this sound based principle. The contrast with Lucier is quite clear: Lucier executes a process, clean and clear. As a result the room frequencies become gradually present while erasing the other frequencies. Lucier (2012) is fascinated by this process: “As the process continued more and more of the resonances of the room came forth; the intelligibility of the speech disappeared. Speech became music. It was magical.”

4. Audiation and Perception

How to understand these differences? The spectral composers take sound as their primary material, and so do the American experimental composers. They are all interested in perception, and integrate this knowledge in their compositions. Yet their compositions are very different. Audiation is not simply a matter of what aspect of sound the composer is focusing on – there is more. The philosophy of Michael Polanyi may offer some insight in what the differences are.

In *Knowing and Being* (1961/69) Polanyi writes: “But the impacts of a tool on our hands are integrated in a way similar to that by which internal stimuli are integrated to form our perceptions: the integrated stimuli are noticed at a distance removed outward from the point where they impinge on us. In this sense impacts of a tool on our hands function as internal stimuli, and a tool functions accordingly as an extension of our hands.” The clarifying example that Polanyi uses is that of a blind man using a stick. A blind man does not focus on how the stick feels but he has integrated the stimuli of the stick and ‘feels’ the surface of what the stick is touching. We – reading this – would not be able to do so, because the focus would be on the stick and how the stick feels in our hand.

Transferring this to music would be asking if we listen to the sound in itself (if the sound stimuli are not integrated), or do we hear the sound as a vehicle for something beyond the sound (if the sound stimuli are integrated). Murail (2005) is clear: “Composition starting from sound is not as one sometimes seems to think, to seek a beautiful sound, but it is an investigation of ways to communicate clearly through sound.” Regardless of what Murail wishes to communicate, his intention to go beyond the sound is obvious. Lucier (2012) on the other hand writes (on the making of *I am sitting in a room*): “While the procedure of the work was repetitive, the rate of change of the resonance went at its own speed. I was careful not to influence the results in any way. ... I wanted the room to do the work.” Lucier has the opposite position: he has no intention with the sound. Once the process has been determined, the only intention is to let the process unfold itself without any influences. Reich (1968) formulates it in this way: “Though I may have the pleasure of discovering musical processes and composing the musical material to run through them, once the process is set up and loaded it runs by itself.” And even clearer: “That area of every a gradual (completely controlled) musical process, where one hears the details of the sound moving out away from intentions, occurring for their own acoustic reasons, is it.” The opposition between the two attitudes is clear: Reich and Lucier want to eliminate intentions as much as possible, while Murail and Grisey intend through their focus on sound to establish communication.

Polanyi (1961/1969) elaborates on this difference and describes the perception for each case as follows: “The essential feature throughout is the fact that particulars can be noticed in two different ways. We can be aware of them uncomprehendingly, i.e. in themselves, or understandingly in their participation in a comprehensive entity. In the first case we focus our attention on the isolated particulars; in the second, our attention is directed beyond them to the entity to which they contribute. In the first case therefore we may say that we are aware of the particulars focally; in the second, that we notice them subsidiarily in terms of their participation in a whole.” Polanyi points out that we can focus on our perception – called uncomprehendingly; or we can focus on the meaning that is conveyed through the perception – called comprehendingly. Before continuing the comparison with music, it is good to be reminded that Polanyi was a scientist and philosopher, often writing with medicine in mind. It is beyond question that a medical doctor perceives symptoms of a patient comprehendingly or uncomprehendingly, and that this indeed includes a judgment on the doctor. While the idea of comprehendingly versus uncomprehendingly can be transferred to music, the aspect of judgment is not appropriate. Therefore, it seems more adequate to use the term focal attention. Focal attention seems correct for the American experimentalists such as Reich and Lucier. They are focused on the sound and how it is perceived; listening to the process unfolding itself is all they intend. For the spectralists, their focus on sound is not less, but points to something beyond the sound itself. This communication can be understood (or not), and in that sense it is appropriate to think of the perception as comprehendingly.

Continuing with the differences in perception, Polanyi (1961) remarks with great clarity: “We can formulate this difference in terms of meaning. When we focus on a set of particulars uncomprehendingly, they are relatively meaningless, compared with their significance when noticed subsidiarily within the comprehensive entity to which they contribute. ... In the first case, unспецифичность impedes the analysis of a given meaning; in the second case, it restricts the discovery of an unknown meaning.” It points to a valuable insight – especially in comparison with music: the meaning (the communication) that the spectralists want to establish builds on the expectations from traditional concert music. Spectral music creates a musical discourse: a discourse that is based on the accomplishments of previous generations, with new sounds, but a discourse nonetheless.

While we may be surprised **how** they realize their discourse, we know **what** to expect. The American experimentalists on the other hand have no intentional purpose beyond letting the process unfold. They do not create a discourse; they only focus on the sound and the perception of the sound. They are therefore open to discover anything that might happen.

The difference is therefore a difference of meaning: for the American experimentalists the meaning of sound is in the perception itself – whatever that brings, while for the spectralists the meaning of sound is in the communication – carefully crafted. Obviously the concept of meaning in music is a slippery slope. It is not the intention to clarify meaning or what the meaning is. What is meant by meaning is the fact that music is perceived as meaningful, and how we make sense out of the sounds we hear. How to make sense is to understand: which parameters clarify the stream of sounds, and where the meaning of these sounds lies: is it in the perception itself, or do we become aware of something beyond these sounds through the perception of them? To understand the connection between audiation and composition we need to understand how a composer builds his sound world and how we can make sense of it. The meaning of music – for our purposes – is to understand the intention of the composer.

5. Audiation, Meaning, and Notation

After having spent some thoughts on how sound can be used, it is time to bring notation back in the discussion. Earlier in this article, it was mentioned that: “The phenomenon of sound cannot be represented completely in one single notation.” However, there is a possibility: the waveform. While this is true, it also is useless for the simple reason that the waveform does not convey any meaning. We can see the waveform, but we cannot understand the waveform by looking at it. For notation to be useful, it has to convey meaning.

As a result, the meaning that the composer seeks in the sounds of his music is what he/she will try to convey through the notation. Because if he/she succeeds, the performer will know what to pay attention to in the performance, and as a result, will bring the musical message convincingly to the audience. Therefore the score is not a neutral document; it is loaded with intentions from the composer who will give hints small and large of how to listen to his/her music. This is why in the examples of the second part, the respective composers had to adjust the notation: their focus on new or different aspects of sound is important not only because it points to a new ways of listening as has been demonstrated, but it goes further because it points to how the composer creates meaning through sound. In order to make sense of this music, we have to focus on the aspects of sound the composer has chosen.

Even if the composer claims that there is no meaning in his/her music, the score will give an indication of the musical intention. To refer once again to Steve Reich – who does not intend anything subjective in his music – in his scores there are very few indications except the bare minimum, and the indications that remain are very clearly pointing to the process that Reich wants to unfold. His scores are exactly what they should be: a focus on the process without any distraction.

To conclude this exploration about audiation in relation to composition, it is important to understand how composers audiate, what they hear when they listen. This is inseparably connected to how a composer gives meaning to sound. This meaning can vary as we have seen: it can be a focus on a certain parameter of the sound; it also can be in the perception itself; or it can be pointing beyond the sound; and there are undoubtedly many more possibilities of how a composer can use his creativity. However each composer has an intention in creating sound, and how that is happening is precisely what is clarified in the score through notation. Therefore notation, meaning, and audiation are inextricably linked together; one cannot discuss one without touching the others. While this is true for any music, for new music it can be quite problematic as composers continue to reinvent new approaches to sound.

6. Audiation and Performance

With notation so prominently present in the discussion, the interpretation of music should be addressed as well, even if briefly. More specifically the question of what a good performance is, should be addressed. If the notation reflects the way how the composer creates meaning through sound, the performer should create such music that the particular way the composer listens to sound is respected. Is there an ideal performance that the composer has in mind? And is an actual performance an attempt to approach that ideal performance? It rather seems that a score gives guidelines that delineate a ‘playing field’ within which a performance can be realized. Assuming the performer understands the intentions of the composer, he/she can realize the composition in multiple ways that are all correct. Some might be unexpected to the composer, but nonetheless

valid interpretations. This happens every single day to the music of the composers of the standard repertoire, and it is widely accepted. Would it not be healthy if new music had enough performances so that we could experience this practice also for new music?

Naturally, it is possible for mistakes to happen. And if a performer is unfamiliar with the intentions of a composer, the music does not come through as intended. This is obvious and does not need clarification. What might need clarification is that some composers are extremely sensitive to how exactly their music is performed, or the instructions are so novel that it is necessary for the composer to be present during the rehearsals. This is not an indication of a poorly notated score (of course it could be, but let's assume it is not), it probably means the performers and listeners need time to become accustomed to the novelty of that music. At the other extreme, some composers create scores that give a lot of freedom to the performer, such as improvisation or graphic scores. These practices are far from random music that allows anything. As a matter of fact improvisation and performing graphic scores are practices that require a developed skill set and experience. This approach often encourages collaboration where the input of the performers can be valued highly in addition to the score from the composer². Between these extremes there exist a wide variety of ways how music is notated and how sound is approached. This variety is a testimony to the creativity of how composers audiate and communicate their ideas. And while recordings are useful, the aspect of a live performance is invaluable in establishing the repertoire of new music. This is not a quick addition to promote new music: audiation is an activity, and with every performance there is another audiation of the composition performed.

Epilogue

Finally, to conclude this article, let me go back to the beginning, to Luc Brewaeys' witty statement: A good composer hears what he writes, and an excellent composer writes what he hears. As silly as it sounds, it seems to reveal some truth. A composer who hears what he/she writes has good skills, but follows the paths of those who have gone before. A composer who writes what he/she hears has the ability to create meaning with sound, and the different notational approaches are the result of the need to clarify this specific way of audiation.

Therefore, it seems that the concept of what audiation is in an educational situation has been transformed. The goal is not to train aspiring musicians in an established style, but to use audiation in creating something new. From discussing score excerpts, and *Knowing and Being* by Polanyi, the concept of meaning has been crucial: how a composer creates meaning through sound determines how he/she listens and how he/she will use sound in his/her compositions. In this way audiation can be considered to be part of the creative process.

References

- Baillet, Jérôme (2000). *Gérard Grisey, Fondements d'une écriture* [Gérard Grisey, Foundations of a compositional style]. Paris – Montréal, L'Harmattan.
- Grisey, Gérard & Joshua Fineberg (2000). Did You Say Spectral? In: *Contemporary Music Review*, Vol. 19: 3, p. 1–3.
- Lucier, Alvin (2012). *Music 109: Notes on Experimental Music*. Middletown CT, Wesleyan University Press.
- Murail, Tristan (2005). The Revolution of Complex Sounds. In: *Contemporary Music Review*, Vol. 24: 2–3, p. 121–135, translated by Joshua Cody; originally published in 1980. *La révolution des sons complexes*. Darmstadt, Schott.
- Polanyi, Michael (1969). *Knowing and Being – Essays by Michael Polanyi*. Edited by Marjorie Grene. Chicago, The University of Chicago Press, p. 123–137. Originally published in 1961.
- Knowing and Being. In: *Mind*, Vol. 70, p. 458–470.
- Reich, Steve (1974). Music as a Gradual Process. In: *Writings on Music 1965–2000*, ed. Paul Hillier. New York, Oxford University Press, p. 34–36; originally published in *Anti-Illusion: Procedures/Materials*. New York, Whitney Museum of American Art, p. 56–57.
- Rose, François (1996). Introduction to the Pitch Organization of French Spectral Music. In: *Perspectives of New Music*, Vol. 34, No. 2, p. 6–39.

² The practice of improvisation and graphic scores deserves more attention than this brief mentioning. Fortunately, Roger Redgate elaborates elsewhere in this volume on this tradition.

Audiacija: ką siekiame išgirsti?

Santrauka

Jeigu audiacija yra įgūdis fiksuoti vidinės klausos garsinius vaizdinius, tuomet ji apima ir muzikos notaciją. Vadinasi, audiacija yra mokymosi proceso rezultatas. Šis pirmas pastebėjimas turi reikšmingų pasekmių, nes joks mokymas nėra neutralus. Jei kažkas lavina savo vidinę klausą, tai reiškia, kad edukacinė sistema (mokytojai ir kultūra apskritai) moko, kaip ir ką girdėti ir kaip analizuoti tai, ką girdime. Dar daugiau – nuo to priklauso, kokia prasmė bus priskirta skambesiu. Situacija gali būti probleminė, jei audiacija yra komponavimo proceso dalis. Komponuoti reiškia rasti naują priėjimą prie muzikos kūrimo, o audiacija remiasi jau žinomais muzikinių prasmų kūrimo būdais, ir tai prieštarauja naujų būdų išradinėjimui. Ši įtampa tarp audiacijos ir kompozicijos ir nagrinėjama straipsnyje.

Siekiant geriau atskleisti sąveiką tarp šių susijusių sričių, pasitelkti Steve'o Reicho ir Gérard'o Grisey muzikos pavyzdžiai. Abu kompozitoriai domisi nuoseklaus kismo koncepcija ir daug dėmesio skiria kaitos suvokimo specifikai, oponuodami iki tol dominavusios abstrakčios muzikos atstovams. Nepaisant akivaizdaus idėjinio giminingumo, jų muzika visgi labai skirtinga. Specifinė idėja – perrašytos magnetinės juostos iškraipymas – aptariama Tristano Murailio *Mémoire/Érosion* ir Alvinio Lucier *I am sitting in a room* kompozicijų atvejais. Šios idėjos dėl garsinio rezultato yra panašios, tačiau jų įgyvendinimo būdai gana skirtingi.

Lyginamieji panašumai ir skirtumai nagrinėjami iš Michaelio Polanyi filosofijos perspektyvos, ypač pasitelkiant jo kuriamos prasmės suvokimo konceptą. Remiantis šia Polanyi teorine koncepcija, išryškinamos skirtingos klausymo nuostatos: ar muzika yra pasitelkiama kuriant tam tikrą diskursą, ar ji yra paties garso išskleidimas – be diskurso kūrimo.

Grįžtant prie audiacijos konteksto, būtent prie audiacijos ir kompozicijos įtampos, atsiveria platesnis vaizdas. Koks yra garso / skambesio kontekstas? Kokiame koncepciniame kontekste operuoja kompozitorius? Kaip kompozitorius kuria prasmę? Visi šie klausimai rodo daugybę audiacijos ir komponavimo santykio traktavimo būdų. Iš tiesų, audiacijos konceptas padeda ne tik geriau suprasti aptartus Steve'o Reicho, Alvinio Lucier, Tristano Murailio ir Gérard'o Grisey kūrinius, bet ir geriau pažinti patį komponavimo procesą. Tai, kaip kompozitorius skambesiu kuria prasmę, yra ypač svarbus aspektas audiacijos ir komponavimo atžvilgiu. Galbūt tai praplės žinias apie turtingą prasmės kūrimo potencialą šiandienos muzikos kontekste.

Do You Hear What I Hear? Audiation and the Compositional Process

Abstract. When Igor Stravinsky was asked if he hears music when he composes, he replied it's sometimes more a question of knowing how it sounds. Alternatively, John Cage commented 'I don't hear music when I write it. I write in order to hear something I haven't yet heard. My writing is almost characterised by having something unusual in the notation. The notation is about something that is not familiar.' These comments by two leading 20th Century composers would seem to undermine the notion that music is initially 'heard' and subsequently transcribed, potentially challenging the popular view of the compositional process. Of course, both these composers employed significantly different compositional strategies. However, in each case there is arguably some kind of apprehension of sound in the mind of the composer to be translated through notation into performance. What is the relationship, therefore, between what is heard and what is written, and how much could notation be said to mediate this process? Further, what is the nature of what is heard and to what degree is this auditory musical image informed by its own possibility in notation, by a habit of thought? Can we imagine music that can't be notated, for example? If so how would we write it? Can notation itself create a useful distance between what is heard and how a score becomes manifest, with a view to finding new forms of expression?

The dialogue between the auditory and what is notated is clearly more complex than at first appears. The 20th Century saw a decline in a common musical language and an increase in the diversity of compositional techniques and new forms of generative processes/notational strategies, often raising doubt as to the role of audiation in the creative discourse. However, the use of such compositional processes can often lead to the discovery of new musical potential and material, beyond what might in the conventional sense be said to have an audiative origin, but which is nevertheless defined by an internal musical ear – an analytical audiative process.

This paper will examine these issues in relation to my own work as a composer, which seeks to explore the complex relationships obtaining between what might be said to exist in the mind of a composer – an initial apprehension of sound, and the development of meaningful compositional strategies aimed at capturing the reality of an auditory musical image through notation.

Keywords: notation, improvisation, audiation, grammatology, creative discourse, composition.

Do you hear what I hear? I could equally well ask the question do I hear what I originally heard when a work is finally realised. In this paper I want to examine the nature of the creative discourse seen as a complex process between what might be said to exist in the mind of a composer – what we assume is a kind audiative experience – leading to the final realisation in performance. This often involves the intervention of compositional processes and some form of notation.¹ Notating is in itself an audiative process, what Edwin Gordon, who coined the term audiation in 1975, called notational audiation (Gordon 1999), and as a work unfolds further audiative potential develops, either through notation, compositional processes or both. Initially I would like to examine the more general aspects of this discussion to situate the complexity of the audiative process, focusing later on my own work and experience as a composer and improviser, where the complex interaction between audiation, compositional processes and notation plays an essential role.

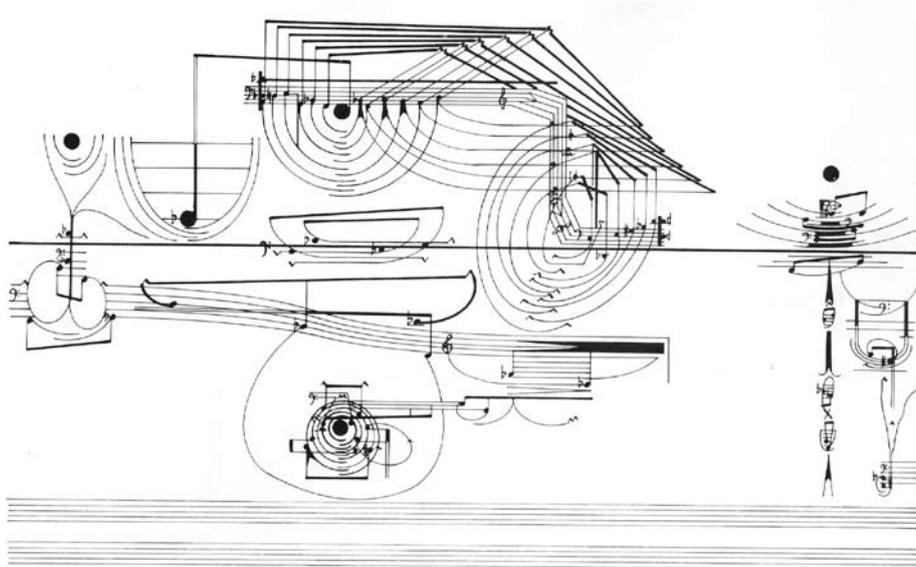
Interestingly, when asked if he could hear music when he composes, Igor Stravinsky suggested it's not always a question of hearing, but knowing how it sounds. Alternatively, John Cage commented 'I don't hear music when I write it. I write in order to hear something I haven't yet heard. My writing is almost characterised by having something unusual in the notation. The notation is about something that is not familiar' (Kostelanetz 2003). However, in both cases there is still arguably some kind of audiative impulse or a process relating to more or less specific material in terms of an audiative vision.

So what is the nature of this initial apprehension of sound or musical image in the mind of a composer, and further, to what degree might it be conditioned by its own possibility in notation, as something already given? Each stage of the creative discourse involves some element of audiation, from the initial concept in whatever form, to its setting down in notation and subsequent re-reading by a performer, or as an object of analysis by students and scholars in the form of a score. There is also then a reconstructive element as a listener. Even the more prescriptive scores of a composer such as Helmut Lachenmann stem from a detailed analysis of sonic criteria through a deconstruction of instrumental possibilities as a reservoir for the creative process of *audiative scanning*, a term I would like to introduce in addition to the various categories defined by Gordon.

¹ I'm leaving aspects of improvisation aside for the moment and the many areas of composition, which do not require notation *per se*, such as sonic art. However even in such instances recorded material could also be considered a kind of score.

To be clear, for the purpose of this discussion, I am thinking about notation in scores which bare some kind of representational relationship to a musical image, always assuming that graphic and indeterminate scores intentionally avoid such a direct relationship to the material; such works are realized *in* performance as opposed to being transmitted *through* performance. In which case, any examination of the scores would provide little in the way of audiative information for the composer or performer alike. However, they do involve an audiative element in performance, close to improvisation. It's a moot point perhaps, but I always question whether such scores actually invite improvisation, as opposed to some other kind of performative freedom.

I am thinking here of works such as Earle Brown's *December 1952* or Christian Wolff's *Edges* (1968) where there is still a strong audiative process when engaging with a score in performance, almost a kind of synesthesia, where graphic images evoke a strong sense of aural perception. I often ask the students in my improvisation class if they can hear a work such as Cornelius Cardew's *Treatise* (1963–67), for example, when observing the score.



Example 1. Page 183 from Cornelius Cardew's *Treatise*: What do you hear?

Gordon initially introduced the term audiation as an alternative to the more familiar concepts such as *aural perception* or *aural imagery*, the latter being considered as having strong associations with notation. However as this paper focuses specifically on composition, a notational context is presupposed, which Gordon refers to as *symbolic association* under the category of 'discrimination learning'; the ability to determine whether two elements are the same or not the same² (Gordon 2007). I will come back to this notion of representative similarity in more detail later. However, Gordon's research is significantly biased towards familiar tonal and rhythmic patterns as an educational tool, which already presupposes quite specific aspects in terms of material and notational potential – we could even say cliché.³ The audiative relationship to notation is revealed at a later stage of the learning process, almost like a kind of surprise secret. However, Gordon here is dealing with structures very clearly defined by notation such as familiar tonal sequences or regular pulse. The notion of whether something is 'the same' or 'not the same' therefore, would seem to suggest a process of transcription where there is a direct relationship between what is heard and what is notated – presumably always allowing for degrees of performative latitude. The composer Ferruccio Busoni also observed that notation relates to some kind of transcriptive process: 'Every notation is, in itself, the transcription of an abstract idea'; significantly, he goes on to say 'the instant the pen seizes it, the idea loses its original form' (Busoni 1911). This

² Gordon identifies two main learning categories: discrimination learning and inference learning. The five levels of discrimination learning are: aural/oral, verbal association, partial synthesis, symbolic association, and composite synthesis. Gordon, Edwin (2007), *Learning Sequences in Music: A Contemporary Learning Theory* (Chicago: GIA Publications, Inc, p. 101).

³ I will return to this notion of notational givens as a potential cliché later in relation to the work of Gilles Deleuze and figurative givens in painting.

already implies that the concept of the same or not the same is questionable in certain contexts. For me as a composer what might be perceived as ‘not the same’ has more potential as material, as a strategic distancing from an initial audiative impulse, which might nevertheless maintain an audiative stimulus – this is the stage when the real process of composition begins. Any attempt to trace an idea back to its fictive audiative origins, therefore, becomes rather speculative and redundant.

Gordon further proposed that audiation is to music what thought is to language or visualizing to imagery, although he was careful to stress that music is not a language, as it has no words or grammar, but rather a syntax. Such syntax today, however, is complex and rather relative since there is no common language as such and each composer arguably defines the functionality of their own syntax, within certain compositional tendencies – this distinctly moves away from Gordon’s processes. The role of audiation might vary quite considerably from one composer to another, depending on how the initial material is conceived. I often ask my composition class what the starting point for a composition would be, for example, if I proposed that we all now start to compose a string quartet. ‘We might take Messiaen’s *Mode de valeurs et d’intensités* (1949)⁴ as an example, where all the material, including dynamics, modes of attack and registeral distribution, is preformed and subject to various manipulations in order to articulate the work structure. What might have been the audiative impulse here? The fact that Messiaen then made various adjustments to the otherwise predetermined compositional design suggests that some degree of audiative scanning played a significant role in the compositional process.

But, of course, the relationship between language and thought is itself very complex, which is further compounded when we start to consider the relationship between thought and language, and speech and writing. The philosopher Jacques Derrida, for example, posited that writing is not simply a representation of speech, but that the process of recording or encoding thoughts in writing strongly affects the nature of knowledge. His adopted term *Grammatology* relates to a critique of the conceptual structure imposed on thought by Western Metaphysics, which identifies the exteriority of speech to writing, and similarly of speech to thought (Derrida 1976). Through grammatology Derrida seeks to articulate a form of writing which no longer functions as a representation of speech, but which subverts the hierarchy of thought, speech and writing. As Gregory Ulmer points out, ‘Grammatology cuts across the old divisions of knowledge, being concerned with all manner of inscription, with the question of how any form of knowledge relates to writing’ (Ulmer 1985). Ultimately writing here influences thought. For me, this has always had a strong resonance in relation to the functionality of notation in music, which draws on the interplay between audiation, structure, notation and performance. What is the actual origin of a musical idea? Notation seeks to capture a certain authenticity, which is mediated by the very act of inscription and any attempt through performance to directly restore that authenticity by a tracing back to some fictive origin defined by notational convention is necessarily impotent. Notation has an inherent structure whose potential evolution is not necessarily dependant on that of ‘material’; rather more the ‘material’ is a condition of its own possibility in notation.

However, any form of setting down inevitably references some kind of audiative image; I deliberately continue to use the term *image*, as I would argue, from a composer’s perspective, that there is in fact also a strong, almost visual imagery, associated with audiation. In my own work, for example, I have often spoken of capturing the reality of the musical image, which lies beyond the concept of simple or direct representation in the transcriptive sense, but nevertheless has a strong audiative element. We might agree that notation often falls short as a form of representation. As the composer Brian Ferneyhough commented, no notation ‘of whatever iconically representational status, can presume to record information encompassing all aspects of the sonic phenomenon for which it stands’ (Ferneyhough 2007). What happens when the musical image lies beyond its own immediate possibility in notation, for example? Can an audiative image have its origins in notation – which comes first? Interestingly, the musicologist Peter Kivy has suggested that ‘musical notation is not separable from the music it notates. There is not the music on the one hand and the notation on the other ... rather the two interpenetrate one another in such an intimate manner as to make them both parts of the work of art, rather than notation in service, so to speak, to the artwork.’ Kivy then further comments in relation to the work of the musicologist Leo Treitler, that in certain kinds of early music ‘writing down *was* a kind of performance’, concluding perhaps that all musical notation is a kind of performance and therefore must be part of the musical work (Kivy 2001).

⁴ Messiaen, Olivier, *Mode de valeurs et d’intensités* from *Quatre Études de rythme*, 1949–50, Editions Durand (HL.50564933).

In his 1961 article *Vers une musique informelle*, Theodor Adorno further commented on how the ‘qualitative change’ brought about by structural systematization ‘abandons the experience which gave rise to it’ (Adorno 1998). This seems equally appropriate to the notation of a musical idea, as posited by Busoni. Adorno then further focuses attention on notation’s functionality, emphasising the ‘contradiction between its congealed written state and the fluid state it signifies,’ discussing how recent developments in music ‘discard fictive dynamism ... to make itself as static in its acoustic form as it always was in its written form.’ How might we then reinvest music with that fictive dynamism? He further raises important issues concerning the nature of what could be said to ‘exist’ in the mind of a composer suggesting that ‘Highly complex or twelve note scores presumably always elude a fully adequate formulation in the imagination’ (Adorno 1998). According to Gordon, ‘A musician who can audiate is able to bring musical meaning to notation. A musician who cannot audiate can only take theoretical meaning from notation’ (Gordon 1999). The functionality of such a process, however, is evidently less direct than is often presumed to be the case. Adorno continues ‘The element of the unforeseen ... must not be allowed to escape. From this point of view *musique informelle* would be the idea (Vorstellung) of something not fully imagined (*vorgestellt*). It would be the integration by the composer’s subjective ear of what simply cannot be imagined at the level of each individual note...’ Perhaps it is notation itself, which forms an important frontier here between what Adorno calls ‘a meaningless objectification’ and the possibility of ‘a composition which fulfils the imagination by transcending it.’ As Adorno suggests the recognition of such a frontier implies the possibility of crossing it through a need to ‘think beyond its own limitations.’

It is perhaps significant that Gordon is also reputed to have likened audiation to music as visualizing to imagery (Azzara 1991). I mentioned earlier that music has a strong sense of an audiative image, and in this respect I have always been struck by the potential similarities between painting and musical composition, in the sense that there is often a potential given, a figurative image, for example. Gilles Deleuze has discussed this at length in his book *Francis Bacon: The Logic of Sensation* in relation to the work of Paul Cézanne and Francis Bacon (Deleuze 2003). Both artists were concerned with the problematic nature of figurative givens perceived as clichés, something already always there as an inherited image, and further redundant after the advent of photography. According to Deleuze, it is here that the process of painting begins. Representation is replaced by *sensation*, which acts on the nervous system in an immediate way, beyond a simple record of fact (cliché). Form related to sensation becomes something different to form related to an object. I have already mentioned the possible connection here with musical givens in the form of notational clichés, material that is necessarily mediated and ‘pre-formed’ by the gestural (historical) sedimentation of our notational system.⁵ Sensation in this respect is what I would call in music the ‘reality of the image’. The intervention of notation/compositional systems at a different level, a non-representative level, in the transcriptive sense, introduces traits of sensation – for me this would be Adorno’s fictive dynamism. The semiological structure of the notation, in terms of intention, functions on an altogether different level of signification. The score aims to affect an increased emphasis on the ‘often naively unquestioned link’ between the performer and the notation, which seeks to stress the ‘fictionality’ of the work as a graspable invariant entity, as something that can be *directly transmitted* (Ferneyhough 2007). The work therefore, takes less of a tangible form in its representation, but aims to ‘connect border areas of representation’ and is rather more posited to the degree that an attempt has been made to correlate the topologies of sound and notation. The role of the performer, therefore, becomes one of an important ‘secondary encoding’ through his own personal engagement with the notation, which in turn is designed to incorporate this possibility. To notate is already to surrender one’s ‘spontaneous reactions’ to the ‘principles of construction’ (Adorno 1998). Material which submits to its condition in notation responds to its own laws and constitutes itself in ‘an objectively compelling way, in the musical substance itself’, and any possibility of an ‘unrevised, unrestricted freedom’ will subsequently always be mediated by notation.

I would now like to turn to my own work to illustrate how some of the issues discussed above influence the process of composition in relation to what is heard. First I will examine a short work for solo piano, *Beuys*

⁵ Dalhaus has also observed how ‘The composer has the problem of changing the notational system or the reverse, namely, expressing phenomena in a notation which by virtue of the historical meaning it has acquired, contradicts that which is to be conveyed. One would have to be blind to history to see in our notation ... a neutral supply of signs, independent of style and capable of doing justice to any style. Dalhaus, Carl (1987), *Problems of Rhythm in the New Music*, in *Schoenberg and the New Music* (trans. Derrick Puffett and Alfred Clayton), Cambridge: Cambridge University Press.

(1992).⁶ Here I was interested in the relationships obtaining between notation and interpretation seen as potential material. The score has various built-in interpretative decisions, whereby the notated material at times appears contradictory, but which are necessary in order to execute a performance. Despite the very precise notation, potentially each performance could vary quite considerably from one performer to another. In one sense this score was *seen* rather than heard, almost as a graphic image, but with a strong audiative impulse. This was also informed by a clear intention to explore the relationship between notational potential and execution. The main issue here was how to go about writing such a work, which seemed to lie beyond its own possibility in notation. The work unfolded as the compositional process took shape as a generative aspect, which then further led to an audiative scanning of the notational and structural potential. On one level, there is no piece as such, since much of the generative material has been removed, to reveal a skeletal structure beneath the surface of the original structural intentions, which are here frequently defined by rests. Bar 7, for example, has an implied rhythmic structure, which is articulated by grace notes. There are further complexities of performance in the following bar, where arpeggiated chords are registerally spread too wide to fit under the hand or with too many notes, but nevertheless require a precise rhythmic articulation. This intentionally precise imprecision of the score makes a clear audiative image difficult to formulate as anything other than an approximation. Similarly, any performer faced with preparing a realization of the score has to create their own audiative vision of the work as a product of the gradual learning process, through engaging with the notation.

BEUYS (1992)
for Yvar Mikhashoff

Roger Redgate

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Example 2. *Beuys* for solo piano (1992)

I would further like to discuss an example from another work, *Feu la Cendre* for solo cello (1992).⁷ The title here, as with a number of my works from this period, derives directly from the writing of Jacques Derrida.⁸ I have chosen a section of the work, which developed from a very specific image in my mind. The stimulus for this was the physical nature of the actions executed by the performer. The notation here is rather complex, using two staves. The cellist's left hand is immobilized and pinned to the fingerboard by the thumb and another

⁶ Redgate, Roger, *Beuys* for solo piano, Editions Henri Lemoine, Paris 1992. Recorded by Nicolas Hodges on Coviello Contemporary, COV60806. The title pays homage to the work of the German artist Joseph Beuys, to whom Gregory Ulmer dedicates a chapter in this book *Applied Grammatology*.

⁷ Redgate, Roger, *Feu la Cendre*, Editions Henri Lemoine, Paris 1992. Recorded by Franklin Cox The New Cello, Vol. 2: Franklin Cox cello, Centaur, CRC 3390.

⁸ Derrida, Jacques (1982), *Feu la Cendre*, Paris: Editions des Femmes.

finger, which articulate glissandi, while the remaining fingers are employed with finger percussion. There is also a complex layering of desynchronized rhythmic activity, which separates both the left hand finger actions and the bow movement across the strings. Inevitably there is a certain degree of variation in terms of the audiative result, which again is intentionally built into the notation. There isn't space here to go into technical detail relating to compositional processes. However, suffice to say, these events come about through a symbiotic relationship between complex parametric layers of information (time signatures, time-lines, rhythmic cycles, pitches, playing techniques), all of which combine to generate potential for audiative scanning.

Example 3. *Feu la Cendre* for solo cello (1992)

A certain aspect of this approach to notation derives from my interest in free improvisation. As an improviser myself, I don't subscribe to the theory that improvised music can be notated, as the complexities of notation create a very different kind of psychological space. However, the kinds of techniques explored and developed by improvisers inform some aspects of my approach to material. A more recent work, my *Concerto for Improvising Soloist and Two Ensembles* (2009)⁹ was the first of my works to actually incorporate improvised elements. My concern here was to explore the boundaries of notation in terms of what can and can't be notated and how this affects the perceptual nature of material. This work explores material on two levels divided between the two ensembles: ensemble one uses various kinds of notation, some very precise, and some with various degrees of performative freedom. The musicians further have a reservoir of notated material from which to choose, or freedom in terms of how execute it. This ensemble consists of six players (flute, clarinet,

⁹ Redgate, Roger, *Concerto for Improvising Soloist and Two Ensembles*, United Music Publishing, Ltd, London. Recorded in two versions on Electrifying Oboe: Christopher Redgate, Metier msv 77204.

violin, viola, cello and piano), which are divided into solos, duos, trios and full ensemble at different stages. Ensemble two consists of four improvisers (any instruments) with no notated material.¹⁰ The material here is formed by various instructions for audiative responses relating to what is heard from the notated materials of ensemble one. The work has an overall mobile form consisting of a series of notated events (ensemble one), the order of which is determined in performance, which are brought in and out of focus as the material melds into freely improvised sections (ensemble two) which separate and join the events. Materials freely developed from the notated events define these improvisations. Finally there is the improvising soloist who is free to navigate a path through the various structures.

I will briefly consider a few examples in the score: Example 4 shows precise notation taken from Event B of the bass clarinet part. The Roman numerals identify individual sub-events the order of which is chosen by the player. Once all of these have been played, the performer can improvise developing any of the notated material.

The image displays a musical score for the Bass Clarinet part of Event B, divided into four sub-events labeled I, II, III, and IV. The score is written in bass clef with a 4/4 time signature. Sub-event I begins with a tempo marking of ♩=72 and includes dynamics such as *f*, *sf*, and *pp*. It features a 'slap' instruction and various rhythmic patterns. Sub-event II includes dynamics like *fp*, *sim.*, and *pp*, with performance instructions for 'flz.' (flute-like) and 'norm.' (normal). Sub-event III starts with a note marked '(1st note with or without flz ad-lib)' and includes dynamics *fp*, *ff*, *pp*, and *f*. Sub-event IV includes dynamics *ff*, *f*, *ff*, and *p*. The score uses various notations including slurs, ties, and specific performance markings like 'tr.' (trill) and 'sim.' (simultaneous).

Example 4. The bass clarinet part of Event B

Example 5 shows flexible notation from Event C3, using all six players from ensemble one. The material here is presented as a series of harmonic fields with instructions for possible textural realization defined by the players themselves. The conductor indicates the change of field, the rhythm of which might be quite fast, slow, or an irregular combination. Players have a choice of sustained notes (*ppp*), one short attack (*sfz*), repeated pitches or notes coloured by trills/alternative fingerings. The boxed fields are initially to be played staccato.

¹⁰ I make a distinction here between musicians who improvise, classically trained to work with new notations, and improvisers, some of whom might not read music or want to engage with notation.

Players also have the option not to play; in such cases a cue might consist of just one or two players or even be silent. The second half of the page starts to further develop this principle allowing the players to combine the above possibilities more freely, the boxed fields now being either staccato or sustained, for example.

Event C3

Sustained notes ppp:
Players may use multiphonics
alternative fingerings/trills
repeated notes

Short notes sf (one attack only)

"Staccato" boxes: Fragmented. Players may
play as many notes as desired including
repeated pitches. n short groups.

Vary dynamics between ppp - ff

The musical score for Event C3 consists of two systems of staves. Each system has a treble and bass staff. The notation includes various chords and melodic lines. Several measures are enclosed in boxes with the word "stacc." above them, indicating fragmented playing. Other measures are not boxed, representing sustained notes. The score is written in a key with one sharp (F#) and a common time signature.

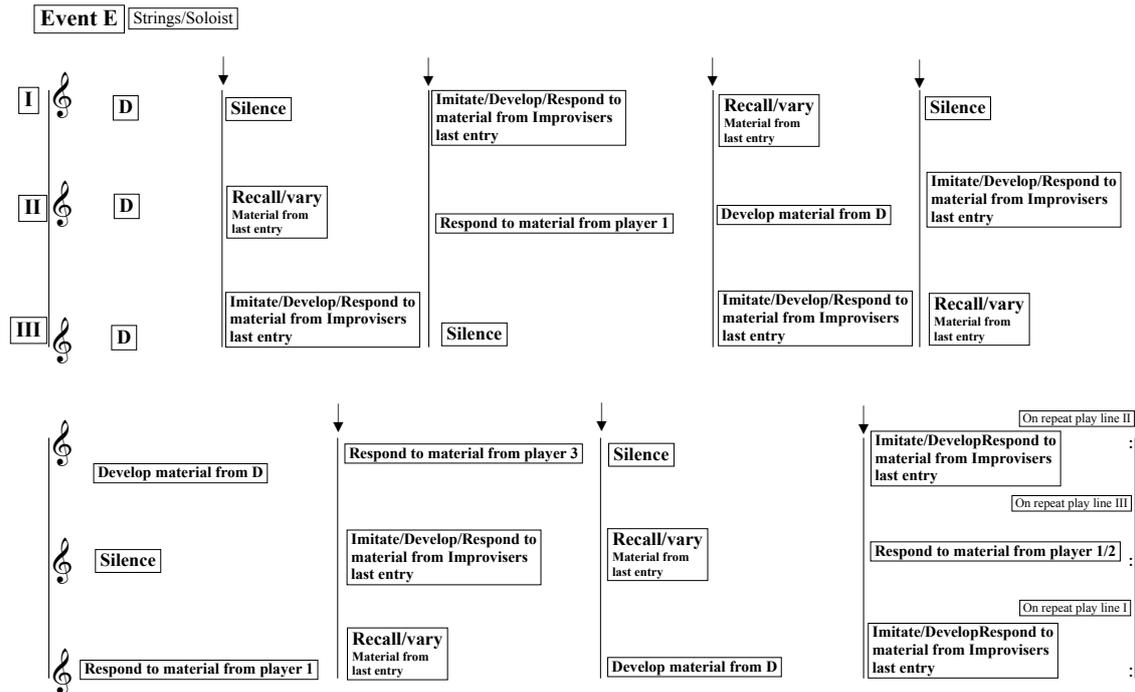
Staccato or sustained: Combination
of previous elements ad lib. More
embellishments (grace notes, mordents etc.)
may be added.

stacc.
or sustained

Example 5. Event C3: flexible notation texturally realized by the performers

Example 6 shows Event E where ensemble one is divided into two trios (wind/piano and strings). In this example the string parts are given. There is no specific notated material here, however the players are instructed to use materials derived from Event D as a source; precise material from the event should not be played. On each repeat, players rotate parts. In this instance ensemble one is also invited to improvise reacting (imitate/develop) to music from other players in the group or the music previously played by ensemble two (the improvisers), who are themselves improvising on what they hear. So there is an intricate network of related materials being developed on many different levels. Once again, changes of section are given by the conductor as indicated by the arrows; the two trios can be combined in any way desired (left/right hand cues). Ensemble two and the soloist are each associated with one of the trios, ensemble two with the wind/piano and the soloist with the strings.

Although each of these sections will intentionally never sound the same, they always sound as I expected, albeit with some creative surprises. The audiative impulse or image, which gave rise to them, is maintained in performance. However the matter of being the same or not the same is here very relative. It can be seen from these examples that that the piece articulates a range of audiative activity: there is the composer's intention



Example 6. The string parts of Event E where the ensemble is divided into two trios showing various instructions for performative freedom and interaction

in terms of the notated material and the structure of the various sections; the musicians reading information experience the audiative process of responding to notation, and the improvising musicians are audiatively responding to what is heard within certain defined guidelines; the conductor executes a constant process of audiative scanning.

References

- Adorno, Theodor (1998). Vers une musique informelle. In: *Quasi una Fantasia: Essays on Modern Music*. London and New York: Verso, p. 269–322.
- Azzara, Christopher (1991). Audiation, Improvisation, and Music Learning Theory. *The Quarterly*, 2 (1–2), p. 106–109.
- Busoni, Ferruccio (1911). Sketch of a New Esthetic of Music. Trans. T. H. Baker. In: *Three Classics in the Aesthetics of New Music*. New York: Dover Publications.
- Cardew, Cornelius (1963–1967). *Treatise*. Buffalo New York: The Gallery Upstairs Press.
- Dalhaus, Carl (1987). Problems of Rhythm in the New Music. In: *Schoenberg and the New Music* (trans. Derrick Puffett and Alfred Clayton). Cambridge: Cambridge University Press.
- Deleuze, Gilles (2003). *Francis Bacon: The Logic of Sensation*. Trans. Daniel W. Smith. London and New York: Continuum.
- Derrida, Jacques (1982). *Feu la Cendre*, Paris: Editions des Femmes.
- Derrida, Jacques (1976). *Of Grammatology*, trans. Gayatri Chakravorty Spivak. Baltimore & London: Johns Hopkins University Press.
- Ferneyhough, Brian (2007). *Brian Ferneyhough Collected Writings*. Ed. Richard Toop and James Boros. Amsterdam: Harwood Academic Publishers.
- Gordon, Edwin (2007). *Learning Sequences in Music: A Contemporary Learning Theory*. Chicago: GIA Publications, Inc.
- Gordon, Edwin (1999). All about Audiation and Music Aptitudes. In: *Music Educators Journal*, v. 86, no 2.
- Kivy, Peter (2001). Note for Note: Work, Performance and Early Notation. In: *New Essays on Musical Understanding*, OUP.
- Kostelanetz, Richard (2003). *Conversing with Cage*. New York: Routledge.
- Messiaen, Olivier (1949–1950). *Mode de valeurs et d'intensités* from *Quatre Études de rythme*. Editions Durand (HL.50564933).
- Redgate, Roger (1992). *Beuys* for solo piano. Paris: Editions Henri Lemoine. Recorded by Nicolas Hodges on Coviello Contemporary, COV60806.
- Redgate, Roger (2009). *Concerto for Improvising Soloist and Two Ensembles*. London: United Music Publishing Ltd. Recorded in two versions on Electrifying Oboe: Christopher Redgate, Metier msv 77204.
- Redgate, Roger (1992). *Feu la Cendre*. Paris: Editions Henri Lemoine. Recorded by Franklin Cox The New Cello Vol 2: Franklin Cox cello, Centaur, CRC 3390.
- Ulmer, Gregory (1985). *Applied Grammatology*. Baltimore and London: The John Hopkins University Press.

Ar tu girdi, ką aš girdžiu? Audiacija ir komponavimo procesas

Santrauka

Kai Igorio Stravinskio paklausė, ar jis girdi komponuojamą muziką, šis atsakė, kad kartais tai yra labiau žinojimo klausimas, kaip tai turėtų skambėti. Johnas Cage'as teigė: „Aš negirdžiu muzikos, kai ją rašau. Aš rašau ją tam, kad išgirsčiau tai, ko nesu prieš tai girdėjęs. Mano rašymas beveik tuo ir išsiskiria, kad yra neįprastas dėl savo notacijos. Notacija yra apie tai, kas nėra pažįstama.“ Šie dviejų reikšmingų XX a. kompozitorių komentarai tarsi kvestionuoja sampratą, kad muzika visų pirma išgirstama ir paskui užrašoma, keldami iššūkį populiariam kompozicinio proceso įsivaizdavimui. Žinoma, šie kompozitoriai pasitelkdavo labai skirtingas kompozicines strategijas. Vis dėlto bet kuriuo atveju kompozitorius numano tam tikrą garsinį rezultatą, kuris notacija turi būti „išverstas“ į atlikimą. Taigi, koks yra santykis tarp to, kas girdima, ir to, kas užrašoma, ir kiek notacija gali būti tarpininku šiame procese? Kaip apibūdinti girdimą reiškinį ir kiek šis garsinis muzikinis vaizdinys, esant tam tikriems mąstymo įpročiams, gali būti tiksliai perteikiamas notacijoje? Pavyzdžiui, ar galime įsivaizduoti muziką, kuri negali būti užrašyta? Jeigu taip, tai kaip ją galėtume užrašyti? Ar gali notacija suponuoti reikiamą distanciją tarp to, kas girdima, ir pačios partitūros kaip manifesto, ieškant naujų išraiškos formų?

Santykis tarp to, kas girdima, ir to, kas užrašoma, yra daug sudėtingesnis, nei iš pradžių gali pasirodyti. XX a. patyrė tradicinės muzikinės kalbos nuosmukį, tačiau išgyveno kompozicinių technikų ir naujų generatyvinių procesų formų / notacinių strategijų pakilimą, dažnai abejojant dėl audijavimo vaidmens kūrybiniame diskurse. Tokių komponavimo procesų atsiradimas dažnai gali sąlygoti naują muzikinį potencialą ir medžiagą, kurie yra tarsi už to, ką galima įvardyti audiacinės kilmės konvencionalia prasme, bet visgi yra nulemti vidinės muzikinės klausos – analitinio audiacinio proceso.

Šiame straipsnyje tokie klausimai nagrinėjami atsižvelgiant į mano paties, kaip kompozitoriaus, kūrybinę veiklą. Siekiama patyrinti kompleksinius santykius, atsirandančius tarp to, kas egzistuoja kompozitoriaus idėjiniu lygmeniu (t. y. kaip pirminis skambesio suvokimas), ir prasminių kompozicinių strategijų vystymo, pasitelkiamų notacija perteikti garsinio muzikinio įvaizdžio realybę.

Tunes of Today from the Island of the Day Before

Abstract. Audiation, the ability to internally represent sound that is not physically present is a human capacity indispensable for any meaningful engagement with music, including composing, performing, music pedagogy, and so on. It is related to certain music-theoretical concepts, notably prolongation, in the sense that the prolonged sound is active and somehow deemed present even when not actually sounding. This, in turn, can be connected with certain concepts of psychoanalysis. Drawing on our previous research in which we demonstrated isomorphism between musical structures and processes, and a process unfolding in the unconscious mind, in the present paper we emphasize anticipation as a crucial part of the listening experience. It is necessary for the object (in this case a musical event, typically a theme or motive) not only to be repeated, but to temporarily “disappear”, thereby creating expectation of its reappearance, and the tension thus produced is released by regaining the object. This psychic movement toward searching for the lost object and the resulting release of tension is only possible if the lost object exists in the listener’s unconscious mind. This is enabled by the fragmentation of the object (according to psychoanalytic terminology) into *partial objects*. The given object (musical event) is transformed so that it contains partial objects, which prevent the object from being irretrievably destroyed. While such transformations may appear to the conscious Ego as discontinuity, according to the logic of primary processes, the Id experiences them as identity. The constant presence of the object even when not physically sounding may be considered as a kind of unconscious audiation.

Keywords: primary process, audiation, prolongation.

Psychoanalytic explorations of music have a long history, and for a number of psychoanalysts music was an important means for their understanding of the unconscious processes. Julie Jaffe Nagel, for instance, formulated this very clearly: “If the verbal analysis of dreams paves a royal road to the unconscious, music provides an aural road to the same destination” (Nagel 2008: 526). There are momentous ramifications of the psychoanalytic approach to music. Many aspects of music can be better understood through the study of the unconscious mind, and conversely, the study of music can advance in many ways our understanding of psychic processes. The initial impulse for the ideas presented in this paper comes from the observation of the ability of the human mind to form an internal representation of sound which is not physically present; to put it simply: to hear something that is not actually sounding. This is largely derived from Edwin Gordon’s concept of audiation, and it is an indispensable tool for any meaningful engagement with music, including composing, performing, and music pedagogy. It can also be related to certain theoretical concepts, notably prolongation, which also talks about music events being active and controlling certain portions of music even when not actually present. Such theoretical concepts, in their turn, can be connected with processes unfolding in the unconscious mind, and the principal aim of this article is to shed more light on these connections.

We will begin with some fundamental principles of psychoanalysis. One of the milestones in the development of psychoanalytic thinking is the understanding that the obtaining of pleasure, while avoiding displeasure, is a powerful principle (*Lustprinzip*) and the basic motive of any psychic functioning. During the earliest part of our life, the Id as the representative of this principle is the predominant element of psychic structure. This idea, which lies at the core of Sigmund Freud’s theories, was elaborated later by his close collaborators such as Paul Federn (Federn 1915), and stands firmly even today. The Id seeks the fulfillment of wishes regardless of the constraints of reality. Although a rudimentary Ego is also present, it is too weak to engage in the significant interplay with its mighty counterpart, the Id. The pleasure, at this initial developmental phase, will be obtained by the discharge of tension, achieved, if possible, without any delay or, in other words, without prolonging the state of tension. However, according to Freud’s structural model of the mind, in the course of further development two psychic instances, namely the Ego and Superego, enter inevitably into the play.

It is important to investigate the destiny of the impulse to discharge (and the pleasure that follows it), leaving aside for the time being, the representation of the object that promises satisfaction. If satisfaction is not immediately achieved, the tension that seeks discharge may have a threefold destiny:

- a) The impulse is renounced or inhibited, and the further rise of the amount of tension is suppressed and blocked.
- b) The impulse is turned back to its original source, that is, to the subject.
- c) The discharge is postponed or withheld until the circumstances permit its discharge, and pleasure will be gained.

A brief explanation is due of how the powerful Id impulse can traverse the paths we have just described. In the option a), it is the task of the Superego to inhibit, in certain situations, the direct gratification or

pleasurable discharge. This inhibition can occur for various reasons. The most common one is that the instant gratification of the impulse – particularly when such an impulse is aggressive – may be dangerous for the person. Dangerous not only because of the possible retaliation on the part of the attacked object, but also because of the feeling of guilt that may arise, the feeling that arises as a product of early development and education. The task of the Ego in this case is to alarm that this instant satisfaction may lead not to pleasure, but yet to greater displeasure. One of the outcomes of such inhibition is the aggression that is now turned back towards the subject, which brings us to the outcome b). We do not consider either the outcome a) or b) as particularly relevant for music: we do not see (at least for now) how we could even recognize such situations in a piece of music.

Of pivotal interest is, therefore, the option c): the delay of the impulse to discharge. In order to elucidate this, we will briefly summarize certain points we have made in our previous collaborative research (Zatkalik & Kontić 2013, 2015, 2017). We have repeatedly emphasized isomorphism between musical structures and processes on the one hand, and the mental states pertaining to the earliest phases of individual development on the other. Having its roots in the archaic, unconscious mind, music incorporates the rules of unconscious, preverbal primary processes, no matter how sophisticated the given piece may be owing to the working of secondary processes. Thus, if condensation, as the representation of several chains of mental associations by a single idea, is one of the paramount primary mechanisms, we can also argue that it is of paramount importance in virtually any aspect of music. We find it in the polyphonic blending of many individual lines (think of György Ligeti’s micropolyphony!), or in seamlessly welding together musical motives or themes. Modulations involving a common chord momentarily condense different keys. In the analysis of form we come across situations when certain normative formal sections are fused (reprise and coda, for instance), and we have even identified situations in which several organizational principles, “musical languages” as they are sometimes called, are conflated in a single passage of music (Zatkalik and Kontić 2013, 2015; Zatkalik 2017).

At the same time, we have shown music’s extraordinary predilection for fragmentation, fragmentation also being one of the mechanisms used by the unconscious mind. Musical themes are fragmented (and usually reassembled at some point) almost as a matter of course; the integrity of harmonic progressions disrupted, and in extreme cases of pointillistic texture, such as associated with Anton Webern for instance, the very tissue of music disintegrates. One especially important feature of fragmentation is *pars pro toto* representation: a fragment – any fragment – of an object can stand for the object itself. The musical significance of it will be indicated later, but for the time being, we can think of an expression often encountered in music-analytical parlance, that, for instance, in the development section, the composer is working with the first theme, whereas in fact he or she uses fragments (motifs), often a single fragment from the theme. How unique music is in its capacities for fragmentation and condensation is best seen if we compare it to verbal discourse, in which secondary processes dominate by definition. We can break down sentences into syntagms and individual words, and individual words, in their turn, into syllables and phonemes, but it results in language ceasing to be a vehicle of meaningful communication and becoming something in the nature of acoustic material, hence closer to music. Likewise, to emulate polyphonic procedures in language would probably mean a reading of two or more texts simultaneously, the result being again a semantic breakdown. In addition, if we have mentioned the conflation of different “musical languages”, writing a novel or story in several (“natural”) languages at the same time is probably only possible if you are a James Joyce.¹

Yet another item that we wish to include in this survey of primary-process mechanisms is turning into the opposite. It is very aptly illustrated by enharmonic modulation, in which, typically, the leading tone of the chord is often subverted, and turned into the opposite direction. We can also view this as two contradictory tendencies contained within a single event, amounting to simultaneous opposites, in defiance of formal logic (which is again the realm of secondary processes). To reiterate, all these: fragmentation, condensation, turning into the opposite, and more, are characteristic of the earliest mental structures, ruled by primary processes.

Further, along these lines of thinking, we can account for certain typical procedures, associated especially with classical form, including its outgrowths in the twentieth century and up to now. Consider the following situation. A theme – or if a “theme” is too suggestive of the traditional formal types, we may use the broader term “musical event” – is stated, and at a certain point developed (accompanied by a rising of the feeling of

¹ Meaning, of course, *Finnegans’ Wake*. It is no accident that Joyce is universally acclaimed for the unique musicality of his prose, and arguably, it is not so much because of its acoustic qualities as because it pushes the limits of the application of primary-process mechanisms (Zatkalik 2002, 2014). For the discussion of the poor condensing capabilities of language, see Langer (1951) and Balkányi (1964).

tension). As discussed above, development will probably involve fragmentation and subsequent reintegration. The last thing we would expect is that this process will be abruptly inhibited, and the theme definitely abandoned, never to reappear: the situation corresponding to the item a) on our list. By no means do we intend to be prescriptive, or to use this as a value criterion: our claim is founded on the vast quantities of analytical data.² This can be subsumed under a general rule postulated by Boris Asaf'ev, whereby "the natural law governing musical motion [is that] each elision is filled up or balanced after a while..." (Asaf'ev 1962: 124), recognizing the pattern of "leap – filling in" (*скачок* and *заполнение*) as ubiquitous in music (Asaf'ev 1962: 63). "Leaps" and "elisions" can be taken in the broadest sense, to include, for instance, situation in which the music flow "jumps" from one fragment of the theme to another, eliding what was originally lying in-between. The tension thus created, however, will be released eventually. For this paper, of the utmost importance is to understand that "after a while" can mean quite a long while. A coda may tie loose ends left from the introduction; implications from the first movement are sometimes realized in the finale etc.

Assuming the aforementioned isomorphism between music and the earliest infantile mental organization, it would follow that in the medium of music no impulses are aroused that entail a conflict with the Superego. This does not preclude the possibility that certain occurrences in music can be taken to evoke interplay between the Id, Ego and Superego (see, for instance, Feder 1993). However, considered from the vantage of the listener's (or performer's) experience, we could hardly say that a given motif is *immoral*, or that a certain passage of music ought to be played *with shame*. These two notions, immorality and shame are basic contents of the Superego. We can indicate, therefore, a specific benefit from music, arising from one largely neglected source: it is free from conflicts between the Id and Superego. We say benefit, although we can with the freemason Settembrini from Thomas Mann's *Zauberberg*, accuse music of being politically suspect and morally dubious, or even insinuate that music can play a part in a murder, as in Tolstoy's *Kreutzer Sonata*.

The unfolding of a musical event entails a certain amount of tension that from the very beginning seeks discharge. Concerning the outcome of this process of discharge, the destiny of the tension, we have already indicated that the situations a) and b) from our list above are virtually irrelevant for music, and that our focus will be on the situation c), in which a path to the Id impulses is open. We have also described how the theme/object is transformed in the same way in which the psychoanalytic primary processes are described. However, if this is so, the question arises why music does not present the simplest imprint of the most archaic path: the model of immediate discharge, which would secure the shortest way of obtaining pleasure?

The answer is provided by a number of psychoanalytic authors (e.g. Jacobson 1953; Menninger 1954), who have long since emphasized *stimulation*, without discharge; seeking for excitation as a fundamental psychic force. Or, as William Needles says: "I would submit that there are innumerable situations in life in which a striving for stimulation, without concomitant discharge, is discernible and that the *seeking for excitation* is a fundamental property of the psychic apparatus, alongside the tendency, in different circumstances, to minimize excitation" (Needles 1969: 809) [author's italics]. This implies – and for our purpose, it is crucial – that the striving for the object that promises satisfaction is as important as actually gaining it. The following quotation from Umberto Eco's famous novel *L'isola del giorno prima* (The Island of the Day Before) presents this very vividly.

"So you love, and therefore you desire and do not desire. ... You fear that attaining your end will disappoint you. You have pleasure in limine, as the theologians put it, you enjoy delay."

"That's not so. I ... I want her at once!"

"If that were the case, you would be still only a rustic. But you have wit. If you wanted her, you would already have taken her—and you would be a beast. No, you want your desire to be set aflame, and you want hers to be stirred as well. If her desire were to blaze to such a degree that she was impelled to **surrender herself to you at once, probably you would no longer want her. Love flourishes in expectation. Expectation strolls through the spacious fields of Time towards Opportunity** [emphasis ours]."

How does this translate into music? Let us assume that the object in music is a theme, or any musical event that fulfills a similar function. This event, once stated (and possibly repeated) is subsequently very likely

² This "rule" obviously does not apply if music dispenses with such entities as themes or subjects. Gilbert Rose, a musically competent psychotherapist, suggests that much modern art highlights irreconcilability inherent in reality, and forces one to live with logical opposites and existential conflicts (Rose 2004: 160). This can be traced to Heinz Kohut's distinction between the Guilty and Tragic Man (Kohut 1977), its implications in music discussed in Zatkalik & Kontić (2017).

to be fragmented, disintegrated and/or replaced by a contrasting one. Ostensibly, the object is lost, temporarily at least. Psychoanalysis teaches that from the vantage of archaic mental functioning, the loss of the object or its permanent and irreparable destruction is intolerable. Freud famously described such a situation in his study *Beyond the Pleasure Principle*. A three-year old boy was dealing with the trauma of separation from his mother by deliberately hiding his toys, so that he could find them: the *fort-da* game as is known in psychoanalytic literature. It led Freud to his equally famous statement that “the finding of an object is in fact a refinding of it” (Freud 1905: 222). In a previous paper (Zatkalik & Kontić 2015) we pointed out the importance of this mechanism for the creation of formal types (rondo, sonata, variations...). Now, we argue that refinding, or finding again, implies the prolongation of striving for the object, meaning also the prolongation of tension.

Our psychoanalytical understanding offers a possibly surprising explanation: in music – especially in music, to be more accurate – the loss of the object, in other words the disappearance of the event that has once been stated, is illusory. By prolongation, the identity and presence of the object is constantly maintained. We owe this precisely to the ability of musical events to transform according to the laws of primary processes, which sometimes implies huge distortions. There are other instances in which these primary transformations are observable, namely, dreams. Think, on the one hand, of all weird shapes that familiar objects assume in dreams, including a recombination of fragments from various percepts or blending of several persons into one. On the other, let us recall the above indicated similarity between these transformations and musical structures and processes. In Zatkalik and Kontić (2013) we strived to demonstrate these dream/music parallels, drawing on the case study of Freud’s probably most famous patient known as Wolf Man (Freud 1918). In the briefest possible terms: the object – musical objects included – may be fragmented, but for the Id, *the part of the object is the object itself*, in accordance with the above-mentioned *pars pro toto* representation. Alternatively, it can undergo a striking level of condensation, blend with numerous other events, and still, the constancy is maintained at deeper mental strata.

The sound object is, therefore, not always literally present: “objectively” speaking, it may not be sounding at all. Yet, at a certain mental level, we can hear it vicariously, through primary-process transformations. We believe that this psychoanalytic explanation taps into the music-theoretical concept of prolongation both in its everyday usage (extend, lengthen, protract...), and in its more technical, chiefly Schenkerian sense, whereby the prolonged event is somehow deemed present and active even when not physically sounding. We will illustrate the parallel between music and the psyche with a concrete example: in Wolf Man’s dream, the image of the father is not literally present in his dream, nor is the wolf from his picture book that served to screen the former. Yet, these images are central to the dream, and in a very important sense, they are constantly present. Likewise, the deeper structural layers are not directly perceived, yet they govern the entire course of music.

We may add that the prolongation of Id impulses is the *conditio sine qua non* for the education of the immature psyche, and as the early psychic development progresses, the passage of time between the temporary object loss and the action to find it is increasingly *prolonged*. Moreover, it was also the cornerstone of human civilization, as our Eco quotation suggests.

The conclusion may be that prolongation is not only possible, it is necessary. It is a condition for obtaining pleasure from music. We will return to this losing/regaining game we mentioned earlier, the *fort-da* game, with its ingrained and induced tensions that are to be mastered. It demands that the resolution of these tensions should be prolonged. We can formulate it in the following way. It has been repeatedly argued that anticipation is a crucial part of the listening experience (Meyer 1956; Kramer 1988; Huron 2006 to name but a few authors). It is, accordingly, necessary for the object (in this case a musical event, typically a theme or motive) not only to be repeated, but to temporarily “disappear”, thereby creating expectation of its reappearance, and the tension thus produced is released by regaining the object. Yet, the quality of experience that something is prolonged is grounded in the fact that this “something” is omnipresent. This sounds contradictory, but we need to emphasize that we are not dealing with one, but with two areas of experience: one belonging to the unconscious Ego that something desired has disappeared, and is about to reappear. At the same time, from the point of view of the Id, the object is omnipresent for the primary process transformations of the object are equal to the object itself. This psychic movement toward searching for the lost object and the resulting release of tension is only possible if the lost object persists in the listener’s unconscious mind. We regard this situation as interplay between the Id and Ego. Transformations (motivic work, for instance) appear as such for the Ego. Insofar as the logic of primary processes applies, the Id experiences them as the same, as identity. Thus, while audiation – the internal realization of music, hearing or feeling sound that is not actually present – is a necessary practical tool for composing, and it exists on the conscious level, it also transpires that it is rooted

in the mental structures of both the creator and the listener, down to the deepest strata. Perhaps we need to introduce the concept of unconscious audiation.

There are several points that merit further discussion. The occurrence of a wish implies the anticipation of the wish-fulfilling object. The existence of the wish-fulfilling object is the outcome of experience, when the mental representation of the object is established. This requires the existence of the mental creation of the object, which is tantamount to hallucination, the state we usually associate with pathology. Yet, we integrate such an experience into not only the creation and reception of music, but even into theoretical models of music, however rational and subject to logic they are required to be. Furthermore, such a mental creation in itself does not produce the fulfillment and the discharge of tension. In order for that to happen, the Ego must be activated to search for the object in reality. In real life, therefore, the act of thinking is interpolated between the Id and the immediate satisfaction: this is what we meant by emphasizing the civilizational aspect. It is true that thinking, a rational attitude, can be part of any human experience, music included. Music, however, is also capable of prolonging the path to the object precisely in a “non-thinking mode.” Such immediacy of experience reveals its mentally archaic origin, and consequently its involvement with unconscious processes. It is obvious that within the present framework we can merely scratch the surface of these questions.

In the already quoted work by Umberto Eco, the protagonist is stranded on the Date Line, between the past and present, as it were; in addition, the future, since his love is attainable only in the future (if at all). The past is in a way solidified, materialized in the island he observes, but its “pastness” remains illusory, since it can be experienced only in the present. The categories of today and tomorrow, the past and present (and future) almost palpably dissolve. So do the boundaries between the real and imaginary, mental and material. The composer – and along with him the performer and the listener – is stranded in a similar way, prolonging the present in order to defer the future. However, the present is also a re-materialization of the past, whether the past phases of the composition itself or the past compositions, and that past is somehow always present in our minds.

References

- Асафьев, Борис [Asaf'ev, Boris] (1962/1930). *Музыкальная форма как процесс* [Musical form as a process]. Ленинград: Государственное музыкальное издательство.
- Balkány, Charlotte (1964). On Verbalization. In: *International Journal of Psycho-Analysis* 45: 64–74.
- Federn, Paul (1915). Some general remarks on the principles of pain-pleasure and of reality. In: *Psychoanalytic Review* 2(1): 1–11.
- Feder, Stuart (1993). ‘Promissory notes’: Method in music and applied psychoanalysis. In: Stuart Feder, Richard Karmel and George Pollock (eds.), *Psychoanalytic Explorations in Music*, second series. Madison: International Universities Press: 3–19.
- Freud, Sigmund (1955/1918). *From the history of an infantile neurosis*. In: *The standard edition of the complete psychological works of Sigmund Freud* Vol. XVII. London: Hogarth Press.
- Freud, Sigmund (1957/1915). *Beyond the pleasure principle*. In: *The standard edition of the complete psychological works* Vol. XVIII, London: Hogarth Press.
- Huron, David (2006). *Sweet anticipation: Music and the psychology of expectation*. Cambridge, MA: MIT Press.
- Jacobson, Edith (1953). The affects and their pleasure-unpleasure qualities in relation to the psychic discharge processes In: Rudolph M. Loewenstein (ed.), *Drives, affects, behavior*. New York: International Universities Press: 38–66.
- Kohut, Heinz (1977). *The restoration of the self*. New York: International Universities Press.
- Kramer, Jonathan (1988). *The time of music: New meanings, new temporalities, new listening strategies*. New York: Schirmer.
- Langer, Susanne (1951). *Philosophy in a new key*, New York: Mentor Books.
- Menninger, Karl (1954) Psychological aspects of the organism under stress: The homeostatic regulatory function of the ego. In: *Journal of the American Psychoanalytic Association* Vol. 2/1: 67–106.
- Meyer, Leonard (1956). *Emotion and meaning in music*. Chicago: University of Chicago Press.
- Nagel, Julie Jaffe (2008). Psychoanalytic Perspectives on Music: An Intersection on the Oral and Aural Road. In: *Psychoanalytic Quarterly* 77(2): 507–529.
- Needles, William (1969). The Pleasure Principle, The Constancy Principle, and The Primary Autonomous Ego. In: *Journal of the American Psychoanalytic Association* Vol. 17/3: 808–825.
- Rose, Gilbert (2004). *Between couch and piano: Psychoanalysis, music, art and neuroscience*. London, New York: Routledge.
- Zatkalik, Miloš (2002). Is There Music in Joyce and Where Do We Look for It? *Joyce Studies Annual*: 55–65.
- Zatkalik, Miloš (2014). “How Can Narrative Be Musical? How Musical Can a Narrative Be?” In: *Muzički Talas* No. 43: 44–64.
- Zatkalik, Miloš (2016). Obfuscation and clarification: Reflections on post-tonal teleology. In: *Principles of Music Composing* No. 16: 16–23.
- Zatkalik, Miloš and Aleksandar Kontić (2013). Is there a wolf lurking behind these notes: The unconscious code of music. In: Miloš Zatkalik, Denis Collins and Milena Medić (eds.), *Histories and Narratives of Music Analysis*. Newcastle: Cambridge Scholars Publishing: 628–644.

Zatkalik, Miloš and Aleksandar Kontić (2015). Psychoanalysis and music: discourse about the ineffable. In: *Muzikologija* No. 19: 127–146.

Zatkalik, Miloš and Aleksandar Kontić (2017). Čovek krivice, tragičan čovek i njihova muzika [The guilty man, the tragic man and their musics]. In: Sonja Marinković and Sanda Dodik (eds.), *Tradicija kao inspiracija: zbornik radova sa skupa „Dani Vlade Miloševića“* [Tradition as Inspiration: Proceedings from the conference “Days of Vlado Milošević”]. Banja Luka: Akademija umjetnosti: 82–92.

Šiandienos melodijos, ataidinčios iš vakar

Santrauka

Šenkerio teorijos terminas *prolongacija*, nors iš dalies gali būti paaiškinamas remiantis kasdiene jo reikšme (išstęsti, pratęsti), visų pirma yra sietinas su faktu, kad muzikinis įvykis, net ir nustojęs skambėti, išlieka aktyvus. Vadinasi, kad patirtume *prolongaciją*, turime išgirsti kažką, kas realiai neskamba. Objektų (akustinių ar kitokių) be išorinio stimulo patyrimas gali būti prilyginamas haliucinacijai – būsenai, kuri paprastai siejama su patologija. Vis dėlto mes integruojame tokią patirtį ne tik į muzikos kūrybą ar jos receptiją, bet ir į teorinius modelius. Straipsnio siekis yra nušviesti šį fenomeną iš psichoanalitinės perspektyvos.

Atsispiriami nuo prielaidos, kad *id* visada siekia troškimų išpildymo nepaisant realybės. Troškimo atsiradimas implikuoja jį išpildančio objekto numatymą. Vadinasi, būtinas mentalinio objekto sukūrimo aktas, kuris ir prilyginamas haliucinacijai. Tai savaime nepanaikina įtampos, neįgyvendina išpildymo. Kad tai įvyktų, *ego* turi aktyviai ieškoti objekto realybėje.

Dažnai kartojama, kad nuojauda, numatymas yra kartinė klausymo patirties dalis. Iš tiesų, objektas (šiuo atveju – muzikinis įvykis, paprastai tema ar motyvas) turi būti ne tik kartojamas, bet ir laikinai „išnykti“, – taip sukuriamas jo pasikartojimo lūkestis, o atsiradusi įtampa nuslūgsta vėl pasirodžius lauktam įvykiui. Tai sietina su žymia Freudo studija apie objekto praradimą / atgavimą, dar žinomą kaip *fort-da game*. Šis psichikos polinkis ieškoti pamesto objekto ir vėliau realizuojamas įtampos atpalaidavimas yra įmanomas tik tuo atveju, jei pamestas objektas iš tiesų egzistuoja klausytojo sąmonėje, kitaip tariant, jei sukuriamas tokia „haliucinacija“.

Akivaizdu, kad objekto praradimas yra negalutinis, o jo suradimas užtęstas. Tai galima realizuoti per objekto fragmentaciją (remiantis psichoanalitine terminologija) į dalinius objektus. Tam tikras objektas (muzikinis įvykis) yra transformuojamas skaidant į dalinius objektus, kad objektas nebūtų negrįžtamai sunaikintas.

Savo paskutiniuoju tyrimu atskleidėme glaudų ryšį tarp šių transformacijų ir mentalinio funkcionavimo pirminių procesų. Dabar šią situaciją traktuojame kaip žaismą tarp *id* ir *ego*. Transformacijos (pvz., motyvų vystymas) pasireiškia kaip klausytojo *ego*. Kol tai atitinka pirminių procesų logiką, *id* tai patiria kaip tą patį – vyksta atpažinimas (*identity*). Taigi, nors gebėjimas audijuoti yra suprantamas kaip būtina praktinė komponavimo priemonė, akivaizdu, kad tiek klausytojo, tiek kūrėjo atveju jo šaknys glūdi giliausių sluoksnių mentalinėse struktūrose.

The Archetype of Binary Modality and its Audiation in the Practice of Composing: Manifestations of Ethnic Patterns in the First Half of the 20th Century

Abstract. Audiation – a mental representation of sound – runs through all the actions of a composer. It allows us to assimilate music with our previous experiences and thus is an irreplaceable condition of composer’s growth and communication. This phenomenon evolves to the scale of a cultural tradition. Musical archetypes that accumulate the stimuli to develop national traits under new conditions are presumably the key factors that ensure the continuation of the musical tradition. The Archetype of Binary Modality is among the essential ones. Its audiation (by the aspects of pitches, intervals, directions and ambituses) beautifully materializes in creative works by the national composers of the first half of the last century, the prime examples being the oeuvre of Sergei Prokofiev, Bela Bartók, Charles Ives and Paul Hindemith.

Keywords: audiation, archetype, compositional relation, principle, Binary Modality, Binary Poles, friction, oppositional tones, intervals, directions, ambitus, diaphony, sutartinės, syncretism, Monary, 20th Century, structural tonality, modality.

Introduction

The notion of audiation (Gordon 1975, 1999), unlike any other (e.g. musical thinking, musical apprehension etc.), describes every single action of a composer – be it an act of composing, improvising, interpretation, score reading, or any other sound-related mental activity. Audiation might be continuous, or intermissive (with breaks between writing and revising), it can manifest as an image of the whole (as a compendium), or even as a visual representation of the score. What is more, mental representations of sounds may even trigger other senses such as vision. The prime example here would be the trans-sensory phenomenon known as synesthesia. It is peculiar that a pianist “hears” by touching the keyboard, while a singer also “hears” by silently straining his/her vocal cords. Musical scores and texts are not the only objects that are being audiated, this also applies to visually perceived colors, shapes, gestures, etc. Audiation enables us to familiarize with the music, to understand it, analyze it and control it. These are the essential facets of the activities that constitute the act of composing.

Audiation also has other important characteristics. Assimilation is a very important one (Gordon 2012: 3). It is responsible for integrating new musical experiences into our general musical knowledge. The phenomenon of assimilation is inseparable from the growth (development) of the composer. It determines a wider radius cultural engagement, including the communication of musical roots and traditions. It is a very intriguing topic, especially in this day and age when we are able to make comparisons to new technology-inspired alternatives, such as computer-assisted, generative methods of composition, which offers “audiation-less” and “association-less” approaches to musical creation.

We would like to think that the archetypes of ethnic music, which are being re-audiated and reevaluated over and over, remain the most promising models of cultural communication in music. Researching those archetypes might greatly contribute to the nurturance of contemporary iterations of national authenticity, as well as stimulate the search of Lithuanianness in music.

The hypothesis we express in this paper is that reaudiation of ethnic archetypes (those that were formed before the period of national differentiation and were once considered as general ones) might stimulate searches of national authenticity in contemporary music. There are two objects in our research – the Lithuanian dissonant diaphonic folk songs *sutartinės* and music by the composers of the first half of the 20th century. In order to achieve our goals we employ analytical, comparative, typological and introspective methods.

1. Audiation and compositional relation

According to Edwin Gordon, the founder of the theory of audiation, “music is the subject of audiation”. “Audiation is what is being communicated”, he adds (Gordon 2012: 5). Let us try to unravel the meaning behind these sentences.

If music happens to be the subject of audiation, then we can assume that being subjected to it presupposes our relation with sound. It seems that this relation can be different each time, depending on the nature of music. This variability stipulates a safe assumption that this relation is being programmed in advance by the composer himself. When a composer gets into a certain relation with sound, the process of audiation begins and thus music is being created, which is being transcribed into a musical score and then deciphered

later during the act of performance. The relation acts as a common denominator in this chain of audiation → materialization → deciphering.

“Relation is a mere trifle” in a philosophical sense, which according to Protagoras, is elusive and unthought-of (Šliogeris 1996). Despite that all human activities without an exception are filled with relations. In each field they are expressed via different categories. In mathematics and natural sciences relations are expressed via symbols – mathematical formulas, definitions of laws of nature; dogmas serve as expressions of relations in theology, while attitudes are their counterparts in psychology. In this paper we will examine what we call “compositional relations”, which are rendered via audiative attitudes.

What drives our curiosity is the underlying factors that determine the specifics of compositional relation (CR) and mark the audiative attitudes.

We can distinguish two main alternatives here: in the retrospective of cultural history it is, allegedly, a worldview, while in the anthropological (sensory) approach it is “psyche” (in a Jungian sense). We shall respectively call them “rational” (RCR) and “intuitive” (ICR) compositional relations.

Rational compositional relations reflect the relations of a typical man with the surrounding world (Janeliauskas 2001: 147). This type of CR is being dictated by the worldview, which is under the influence of the peculiarities of times (in the cultural sense). Things that coincide with the time-predetermined conditions of existential survival are no doubt rational. The influence of the worldview is very strong, it determines the nature and logic of all actions. For example, the principle of existential survival in the consciousness of an ancient hunter (or a gatherer) was probably embodied into the symbol of fire. If we look at the sound structures of ritual origin, we can correspondingly observe the diaphony of harsh dissonances, which resembles friction (a method to spark a fire). After the emergence of the mythical symbol of the Tree (a symbol of cycles in agriculture), we observe audiations of monodic materials that are notable for the cyclic interchanges of polar elements. After the establishment of theocentric worldview, we can find similarly-functioning audiative centers – a tenor tone (Romanic period), a tenor voice (Gothic period), *cantus firmus* (Renaissance). In the 17th century a new audiative approach emerged – synthesis that can be observed in an increasingly complicated harmonic structure, which eventually led to polytonality, atonality and serialism (the establishment of a scientific way of thinking).

On the contrary, intuitive compositional relations should be understood as a part man’s inner contact with himself. Audiation that is being stipulated by these relations is hardly based on any imperatives of logic. The intuitiveness of this type of relations is largely similar to instincts. ICR is bordering the space of aural intuition – the ability to intuitively grasp the patterns of musical teleology. Following the ideas of the famous Lithuanian philosopher Arvydas Šliogeris we can assert that the most important aspect of this space is the “experiencing of the eternal present, which is not connected with historical circumstances” (Šliogeris 1996: 166). This means that ICR are non-programmable, they can manifest themselves at any point of the space-time of “here and now”. The location of ICR is imperceptible, and they are of an undeterminable duration. ICR manifest themselves as a sudden “flash” and re-signify the routine of compositional practice by opening new levels of depth. In the moment of ICR the composer starts audiating things that are inherent to sound itself and do not solely depend on his/her will. Sound is being audiated on a subconscious level; it is being processed with all its unsignified meanings as an entirely different reality, which is experienced beyond a personal ego. A non-discreet totality of sound, which encompasses the sense of eternal time and universal acoustics, is very characteristic of this type of audiation. The transcendental revelation of the characteristics of sound and its first impression may be constantly accompanying a composer and direct his/hers creative drive toward unconventional directions. ICR initiate various audiative attitudes, e.g. the ones of intensity inversiveness kinship, resonance etc. This type of audiation paves ways to the rise of new musical styles and expansion of techniques (for more see Janeliauskas 2001: 122–123).

An intuitive compositional attitude orientates the composer to the audiation of deeper potencies of sound. It is not an acquirable skill, it exists on its own. A rational compositional attitude functions in an entirely opposite way. Its most remarkable feature is universality, which echoes the “trends” of a particular time. Here it is usual to audiate objects that constitute the vocabulary of every day, i.e. the sound material that is widely accepted and communicable. We can metaphorically say that in this situation the main object that is being audiated is the surface of sound. The surface of sound contains various communication devices that are based on the ongoing tradition, such as conventional instruments, conventional tuning systems and modes, rhythmic models, etc. It has a great communicative potential, however it admittedly makes it prone to resort to operate various stereotypes and *clichés*.

We can summarize the audiative space of compositional relations by the following scheme (Scheme 1):

	RCR	ICR
Origin	Worldview	Sensory
	Acquirable	Non-acquirable
Dimension of operations	The surface of sound	Depth of sound
Potencies	Use of conventional assets	Development of new styles and techniques
Functions	Communication	Assimilation

Scheme 1. Audiative space of compositional relations

The scheme reveals the controversy between RCR and ICR. They possess traits that make them incompatible with each other. If we look at their aspects of origin, dimension of operations, potencies and functions, we could make a statement that RCR and ICR are pure incompatibilities that tend to eliminate each other. However the coexistence of such incompatibilities creates a supplementarity (Боп 1978), which allows it to achieve a new quality of audiation. We shall define it as a reality, which ensures the vitality of audiation of the composer by making it open to both communication and discoveries.

2. Audiation and archetype

If we define audiation as communication, then we can define archetypes as the significands of what is being communicated. In the process of audiation, archetype supposedly transmits the semantics of myth. It is carried as potency and is enacted even with sound being physically absent. This kind of audiation ideally manifests a specific relation with sound that is needed for the process of composition. It is characteristic of this “mythic relation” to invoke a bipolar exemplar of the patterns of sound organization. It is largely similar to the mythological image of male and female sexes. Bipolar symbols in mythology are found all over the world and have various manifestations such as Yin-Yang in the Far East, or Apollo and Dionysus in Ancient Greece, etc.

The discussed bipolar symbolism materializes itself via binary sonic constructions. Materialization is a kinetic phenomenon, which turns the archetype into an audible moment of cultural present. According to Carl Jung, an archetype is a tendency to create expressions of the motive, which may differ in detail, but are not significantly derived from the main model (Jung 1999: 373). Archetypes affect almost every field of our actions, but they are especially significant in the artistic (and, of course, musical) space. According to Rastko Jakovljević, there are tight bonds between all kinds of different music, which leads to the presumption of the existence of archetypes similar to the visual psychological figures depicted by Jung (Jakovljević 2008: 10–17). Pavel Pušcaš has a similar opinion. Pušcaš analyzes the evolution of musical styles according to the archetypal patterns (archetype, an archetype, eschatype) and defines the archetype as a mental psychological structure, which governs mental processes and directs the development, “which guides, orientates and determines a pattern of the development of the discourse” (Pušcaš 2008: 30). It would be logical to assume that an archetype is an encoded potential from the past that affects the music of today.

We can determine two main manifestations of archetypes in the musical domain that are most important to the subject of our research. The initial one manifests itself in the process of audiation of the compositional relation. The concluding one is a binary type of sound inspired by audiation and a corresponding principle of composing (PC) (Scheme 2).

CR → Aud → PC

Scheme 2. Differentiated moments of manifestations:

CR – compositional relation, Aud – audiation (initial manifestation), PC – principle of composing (concluding manifestation)

The moments of manifestations differentiated in the scheme above (Scheme 2) are essentially inseparable, as an archetype by its essence can only produce an uninterrupted and syncretic continuum, which would be segmented by the means typical to our period of time. It is worth mentioning that this syncretism has a tendency to disperse over time (from a perspective of centuries), as we observe a clearer separation of these manifestations in more recent cultural phenomena and audiative incarnations.

3. Audiation of binary friction

In this chapter we shall take a look at one of the means of audiation triggered by the mythical catalyst, which carries strong potencies of bipolarity – binary friction.

The notion of binary friction is derived from the mythic relation with the environment, when the consciousness is primarily focused on the procreational matters. The myths that feed this type of imagery utilize such images as fire, sun, house and home, and, of course, friction, which is the primary thought pattern here (Janeliauskas 2001: 91). Friction manifests as an instinct thanks to which we can light up fire, polish stone and, most importantly, procreate. According to the famous French philosopher Gaston Bachelard, friction has an immediate relation with the instincts (Bachelard 1993: 40–52). Here we have to take a look back at the theory of Jung himself, and his notion of *archetypus per se*, which is largely close to the notion of instinct, as it defines the potential propensity to manifest itself (Jung 1999: 373).

One would ask, how does friction, which is perceived via visual or touch domains, is being transformed into the domain of audiation? To answer this question we resort to psychoacoustic research of *Schwebungsdiaphonie* (“beat diaphony”). This term refers to two-part musical (usually vocal) styles with a lot of dissonant (beating) intervals such as seconds (Ambrazevičius 2016: 39). Various iterations of *Schwebungsdiaphonie* are scattered all over the world, among which are the Lithuanian polyphonic songs *sutartinės*¹. It is particularly striking that in contrast to Western tonal music, the dissonant sonorities in *Schwebungsdiaphonie* lie at the core of their tonal structures (ibid.). According to the research of Ambrazevičius and his colleagues, in the act of performance of *sutartinės*, singers intuitively seek to produce the maximum roughness². “The results reveal a distinct equitonic structure of scale steps with roughly 180 cents in between. That means, two simultaneously sounding modi show two trichords displaced by 1.8 semitones and comprised of neutral thirds (sized approx. 3.6 semitones each). ... The two steps are intoned very steadily in the course of the entire performance thus forming the nucleus of the scale.”

We would like to assert that this intuitive aspiration of roughness is one of manifestations of friction, as an instinctive behavior. What is interesting is that the dissonant clash of a non-tempered second has quite a few different denominations in Lithuanian folklore. There are ones that imply on clashing (*sudaužtinės*), chopping (*kapotinės*) or even rubbing (*trininės*). The latter one is particularly interesting. It is thought that *trininės* means a “unique way of performance” (Račiūnaitė-Vyčinienė 2003: 15) and the name comes from Lithuanian words *trinti*, *trynėti*, *trynioti* (to rub), *trintis* (friction). This is perhaps the most accurate word used to describe the archaic nature of sound and audiation of the binary mode. It is also worth noting the parallels between the meanings of “friction” and “clashing”. The term “friction” is particularly handy to describe the processual aspects of audiation, while “clash” is more suitable for describing the momentary events that occur in the process of friction. This kind of subdivision leads us into a series of questions, such as “what, actually, is friction?”, “how does it manifest” and “what is its origin?”

When we listen to *sutartinės* (beat diaphony), we hear a string of “vibrating” (beating) seconds. These vibrations are nothing else but an outpouring of clashes, the inertia of which is constantly being reduced by other non-clashing intervals. That is to say, the dissonant inertia of tension is being constantly rebalanced by consonant disturbances, or pulsating reductions and discharges. This is what makes the process of audiation of friction possible.

4. Audiation of the archetype of binary modality. A comparison with the modes of a monary origin

The contours of a binary mode depend on how we perceive and audiate the binary material³. The binary method of composing, as an archetype, manifests itself by employing oppositions between two polar elements that constitute the core of the musical material. We will refer to the latter as a “binary core” and the former ones as “binary poles”.

The key feature of the sound of each pole is its syncretism. One of the main characteristics of the syncretic structure of a binary pole is that none of the aspects of its sound is able to take a dominant position, they all form a single “organic” entity. Thus the pole cannot be subdivided or separated without breaking its main essence. A good example would be the Lithuanian *sutartinės*, where binary poles are being embodied by many

¹ See more: Račiūnaitė-Vyčinienė 2003; Ambrazevičius 2014; 2016.

² Maximum roughness, according to Ambrazevičius, equals the interval between pitches of 170–180 cents, or roughly 1.8 semitone. This is a slightly larger interval than maximum sensory dissonance, which is around 70–100 cents (Ambrazevičius 2014: 61).

³ We use the term “binary” in a sense of duality (Latin *binarius* – twofold, dual) and it should not be confused with binary numbers and other mathematical meanings of the term.

different sound aspects, such as a bichord of a third, syncopated rhythm, onomatopoeic (imitative) words, antiphonal resounds, etc. Binary poles are molded into spontaneous syncretism of audiation of *sutartinės* and syncretic continuity is one of their main traits. Admittedly, in some specific research it becomes unavoidable to prescind certain aspects of a pole, although it should be acknowledged as a proviso and not as a general rule. The selection of these aspects depends on goals of particular research and features of the research object. In this paper we examine binary cores in terms that are the most relevant for the audiation of a mode, i.e. pitch, intervals, ascending and descending directionalities and positions of the ambitus.

Another key feature of binary poles is their functional and structural polarity. Being of a syncretic nature, a single binary pole stands out in the audiative environment due to being contradictory to the other pole. The nature of polarity requires a presence of a contradicting element, as the teleology of sound is based on the relations between those two elements. The main essence of this teleology is breaking the syncretism of both poles via their own interactions. It is worth noting that it is crucial for both poles to be of equal value. The term “pole” here also carries a slight sexual connotation, as the binary method of composing, as an archetype, comes from the archaic era. According to the famous Lithuanian anthropologist Marija Gimbutienė, there is a prominence of two poles in the archaic symbolic system – the masculine and the feminine (Gimbutienė 1994: 100). Therefore, the teleological functions of binary poles, audiated on the basis of parity and polarity, constitute the main systemic trait of binary compositional archetype. The polarity of these functions equals to audiation of complementarity and inversiveness of the sound structures. A good example would be Lithuanian *sutartinės*, where audiation of teleological functions of binary poles is carried via clashes of two bichords of thirds, which are separated by a second and have no mutual pitches, as well as inversions of rhythmical figures, pronunciations of onomatopoeic words, stereo-antiphonal resounds, etc. This leads to a conclusion, that functional polarity aside, the structural complementarity is one of the denominators of binary poles.

While speaking of binary poles and binary compositional archetype we often use the term “sound” (sound structures, nature of sound, surface of sound, etc.). We purposefully avoid overly musical connotations of such terms, as “tone”, “pitch” etc., because under previously discussed conditions of deep syncretism sound becomes self-contained. It is neither being produced in any special manner, nor being purposefully tuned or intoned. This somewhat contradicts the famous theory of Boris Asafiev (Асафьев 1971)⁴. Therefore, it is not the intonation but the self-containment of sound that molds itself to the continuum of all primeval essence. Thus the processes of audiation of this sound and its transformation into a mode are explained by the principle of composing.

To sum up all the aforementioned aspects of definition, we can define the binary compositional archetype as a functional and structural polarity and complementarity of audiated and materialized syncretic binary poles.

In turn, the definition of the archetype of binary modality is largely similar, however it features a few provisos regarding the syncretism, as the audiative aspects of a mode, as we noticed, are conditionally differentiated. Therefore, the archetype of binary modality could be defined as a functional and structural audiation of polarity and complementarity of differentiated binary poles. This definition significantly differs from the common knowledge regarding the modes, which are regarded as hierarchies of pitches. The latter comes from the audiation of monary modes, which emerges from different cultural premises. The first one is the establishment of theocentric worldview as Christianity started to pave the way to becoming the most dominant religion in Europe (Romanesque art style), followed by the rise of symbolism (Gothic and Renaissance periods). Later, in the age of Enlightenment, we can see the shift from symbolic to scientific (causal) way of thinking. Priorities of the symbol are substituted with priorities of the function. Changes in the worldview imply mutations of compositional relations. We can also observe changes in audiation of modes that happen in parallel with that. The main feature of monary modes is the audiation monary priorities, such as *repercusa* of tenor (*canticum romanum*), tenor part (parallel organum), *cantus firmus* (pan-consonant isomelodies of the late Renaissance), as well as the dominance of the tonal center in tonal music (modal-functional tonality in the age of enlightenment. The legacy of monary worldview is inherited by dodecacordial (decentralized) modes (starting with Joseph-Matthias Hauer and Arnold Schoenberg) (Кудряшов 2001: 90–164). Monary audiation is alternative to the binary one due to the differences of their inner codes, which dwells in the contents

⁴ As Ildar Khannanov states, “The term ‘intonatsia’ has been used ubiquitously in Russian and Soviet music analysis and pedagogy since Boleslaw Yavorsky introduced it in 1908 and Boris Asafiev developed it into a universally applicable concept. It proved to be rather vague and complex because of the overwhelming range of meanings and polysemic etymology, considering that one may identify ‘intonatsia’ not as a term but as a category”. See more: Khannanov 2018.

of communication. If the contents of the binary archetype was determined by the bipolar image of the myth, then in the case of monary modality the communication is based on the idea of Oneness. It transfuses the way of life of that era, giving birth to such concepts as “primary source”, “centrality” and “subordination”, which thereby transforms common audiative patterns.

Hereby we can define two alternative types of audiation – the binary and the monary. We present their distinct features in the following scheme (Scheme 3):

Binary type of audiation	Monary type of audiation
Bipolar mental image	Mental image of oneness
Friction	Tension
Displacement	Subordination
Opositional poles	Central tone, structure
Modal archetype	Modality, tonality
Binary principle of composing	Monary principle of composing

Scheme 3. Feature comparison between binary and monary type of audiations

5. Archetypical variations of the binary modality (archetypes of binary poles)

Manifestations of the archetype of binary modality may vary depending on the type of audiation of binary friction. Binary friction is an exquisite trait of an archaic mode; for this reason we are going to define the archetypical variations judging by their relation to it. We can distinguish four types of audiation of binary friction:

- I. Binary friction audiated via neighboring pitches (bisonoric poles).
- II. A “clash” audiated via consonant horizontal lines (constant model of the poles).
- III. Friction of polar groups audiated via oppositional directionalities (poles consisting of groups of pitches or intervals).
- IV. Binary friction audiated via strings of polar ambituses (poles consisting of strings of identical intervals).

Respectively, we can define the sub archetypes of manifestations of binary poles:

- I. Archetype of bisonoric poles.
- II. Archetype of fixed polar models.
- III. Archetype of grouped poles.
- IV. Archetype of polar strings.

Now we shall discuss each of these types in greater detail.

I. Archetype of bisonoric poles. This variation of modality (and a subtype of the Binary archetype) materializes, as already mentioned, out of the audiation of dissonant friction of neighboring pitches. As an outcome of this audiation, we can see the materialization of a thick, sonorous field of polarized modal elements. We refer to it as a “bisonoric field” (Ex. 1). Oppositional sonoricity might be softened by omitting the neighboring pitch (Ex. 2), or reduced by concurrent vertical unisons (Ex. 3). The more concurrent vertical unisons appear in the musical material, the weaker the perception of friction becomes, while the perception of tonal quality increases (Ex. 4). Another possible alternative is a dynamic interaction between tonal quality and sonorousness (Ex. 5).

Example 1
(ZS 175, *Skurdutė*)

Example 2
(SP 56, *Tutučio šokis*)

Example 3
(ZS 99, *trejinė*)

99 $\text{♩} = 96$

Example 4
(ZS 137, *trejinė*)

137

Example 5
(ZS 41, *keturinė*)

41

It is also notable that binary poles are being audiated in a structurally unrestricted environment as are the intervallic structure of vertical and horizontal domains.

II. Archetype of fixed polar models. This subtype materializes via harsh dissonant collisions between two consonant horizontal lines. Archetypical iterations of vertical and horizontal relations are materialized in the process of audiation of this diametrical contrast between dissonant and consonant intervals. As we can see in the example below (Ex. 6), horizontal lines, based on bichords of the third are being “clashed” into each other via vertical seconds. We deem this iteration of intervallic relations to be archetypical, as it is the most common manifestation. An opposite iteration is also possible, however its manifestations are substantially less frequent (Ex. 7). Here horizontal intervallic movement of the seconds are being held together by a consonant blend of unisons and thirds in the vertical domain. This opposite iteration obviously eliminates the modal friction.

Example 6
(ZS 136, *trejinė*)

136 $\text{♩} = 56$

Example 7
(ZS 131, *trejinė*)

1. Sar_bin_čiu_la o_gė_la, o kas ta_vi au_gi_no? Sor_bin_to,
Sor_bin_čiu_la
sor_bin_to, sor_bin_to, sor_bin_to.
o_gė_la, o kas ta_vi au_gi_no?

Perhaps the most effective way of audiating the archetype of polar models is in the hybrid one, i.e. reducing the friction intermittently (Ex. 8). This way the harmonically audiated horizontal lines are regularly “clashed” or blended by vertical seconds and thirds. An analogous iteration featuring a different horizontal construction of the intervals is presented in the following example (Ex. 9). What is more, different intervallic models might be audiated in the form of rotation (Ex. 10). Here the parallel thirds are regularly substituted with a “clash” of the seconds. Last, but not least, the audiated seconds in the archetype of polar models can be substituted by parallel fourths (Ex. 11). This movement of fourths could be interpreted as a movement of seconds with an omitted third (a second + a third = a fourth).

Example 8
(ZS 31, *dvejinė*)

Ėis_me bris_ti dau_na, do_bi_le, eis_me bris_ti,
Eis_me bris_ti, dau_na,
dau_na. do_bi_le čiu_ta.
do_bi_le, eis_me bris_ti,

Example 9
(ZS 148, *trejinė*)

Kā tu bi_te_te, kā tu bi_te_le, čiu_ta?
Kā tu bi_te_te,

Example 10
(ZS 107, *dvejinė*)

Svi_ro, lin_go mer_ge_lių suo_las,
Svi_ro lin_go, liaj,

Example 11
(ZS 142, *keturinė*)

142
Ai_na, te_ka se_siu_fė,
Liaj se_sia, liaj pa_na,

III. Archetype of grouped poles. Here the modal friction, audiated via oppositionally ascending and descending directionalities, is being materialized as groups that feature a miscellaneous content of pitches and intervals. Iterations lacking the sense of friction are also possible here. Groups under the influence of polar directionalities are clearly perceived even when they coincide via harmonic unison, or possess the same pitches and/or intervallic structure (Ex. 12).

Example 12
(ZS 92, *trejinė*)

The inertia of the audiative directionality becomes the unifying factor for the formation of the groups (Ex. 13). Here the descending tones in the span of an octave (c^2-c^1) counter the analogously ascending tones of the oppositional pole (Bar 7). What is more, oppositions of directionalities can enhance other already known models of binary poles (Ex. 14). Here we can see tones moving in opposite directions in the exact inversion. This sharpens the perception of the intervallic oppositions in the given model. Similarly, we can see oppositional voices reveal a further independent plan of oppositional development – the separation and the re-approaching (Ex. 15, bars 1–2, 3–4).

Example 13
(ZS 127, *trejinė*)

Example 14
(ZS 79, *trejinė*)

Example 15
(SP 14, *Šalavijas*)

Oppositional audiation of directionalities is weakened when a burthen (drone) gets employed (Ex. 16, bars 1–2). The three-bar motif of the upper voice (Ex. 17) starts the ascension towards the end, while the two-bar motif of the lower voice starts at the beginning. Additionally, the system of isorhythmic repetitions unfolds the combinatory process of intonation for both directionalities: movement to the opposing directions → sustained drone → parallel movement.

Example 16
(ZS 160, *keturinė*)

Example 17
(ZS 108, *keturinė*)

IV. Archetype of polar strings. Binary friction here can be audiated via two or even three bichords of the third. As these bichords are connected via mutual pitches, they are able to materialize the strings of thirds. The outside tones (the highest and the lowest ones) of the polar strings form a central binary core, which is materialized in the form of ambitus (Ex. 18). Each string is formed from two bichords of the third. The upper tone of the ambitus embodies the tonal center of the upper pole (Bar 2, e^5). The lowest tone and the tonal center of the lower pole appears shortly (Bar 4, g^4). It is followed by a reverse process (bars 5–8). This produces a beautiful equilibrium in the oppositional relations between the two outside tones of the ambitus. This equilibrium is further strengthened by a gradual establishment of both strings.

Example 18
(ZS 158, *keturinė*)

The oppositions of the ambitus can also be materialized by unexpectedly lowering all voices at the same time (Ex. 19) or at least one of them (Ex. 20). Another method to unfold the oppositional process of ambituses is to develop the strings in a parallel manner (Ex. 21). Here we can see the high point of the ambitus (Bar 2), followed by the reduced high point (Bar 3), ending at the low point of ambitus (Bar 4). The parallelism of ambituses creates an ambiguity of the binary tonal centers. Ambiguities can similarly arise when only one of the strings is being developed (Ex. 22). Here we should pay a closer attention to the syncopated rhythmic figures. They help to discriminate the tonal center of the lower string, while non-syncopated rhythms are attributable to the central tone of the upper pole.

Example 19
(SP 46, *Skurdutė*)

Musical score for Example 19, showing vocal lines and piano accompaniment. The lyrics are: "Tū - tū - ti - tūt. Ut, ut un - ti - ti - tūt, ut un - ti - ti."

Example 20
(SP 68, *Skurdutė*)

Musical score for Example 20, showing vocal lines and piano accompaniment. The lyrics are: "Tu - tu - tū u - tu - a, tū - tu - tu u - tu - a."

Example 21
(ZS 6, *keturinė*)

Musical score for Example 21, showing vocal lines and piano accompaniment. The lyrics are: "Kal - nu - ti, ri - ta - ta, kal - nu - ti, ta - ta - to. Kal - nu - tē - li, ri - ta - to, kal - nu - tē - li, ta - ta - to."

Example 22
(ZS 91, *keturinė*)

Musical score for Example 22, showing vocal lines and piano accompaniment. The lyrics are: "Kū - po - li - jė - le, lioj le - li - je - le. Kū - po - lio ro - žė, kur bu - vai, Jo - nai?"

6. Audiation of the archetype of binary modality in the first half of the 20th century

We can define the archetype of binary modality as a spontaneous and primeval audiation of sound and its materialization. Modern audiation of the archetype has slight qualitative differences compared with its early manifestations. There are, of course, structural differences, as well as the fact that friction here is being materialized under a heavy influence of tonality, not to mention the new stylistic discoveries, which dictate new, unexplored paths for manifestations of the archetype. This research is focused on the music of the first half of the 20th century, which could be loosely called a reaudiation of binary friction. We will occasionally use this term as a synonym to audiation.

This research is aimed to answer the question what the stimuli were which prompted the composers to look back at the heritage of archaic music and initiated this kind of audiation. The Ukrainian philosopher Sergei Krymskij makes a remark in his work about the category of absolutism in culture (1981) that the further the mind of man reaches into the future, the deeper his sight dives into the past. In the center of this pendulum are the middle ages, while modern and archaic times are at its edges (Крымский 1981: 247).

The communicational core of archetypical modality remains unchanged; what it does change is its styling and materialization. This becomes evident in our studies of the works by Nationalist composers of the first half of the 20th century – Sergey Prokofiev, Béla Bartók, Charles Ives and Paul Hindemith. It is peculiar that most of the aforementioned composers are known to have studied their ethnic music, which presumably enabled them to reaudiate its communicatory potential in a deeper sense than the composers of the romantic period were able to achieve. It is safe to say that these composers had grasped a whiff of pagan music in their present times and successfully managed to transform it into contemporary musical language.

We will now discuss the manifestations of each archetype of binary poles (discussed in Chapter 5) in the works of the aforementioned composers. We will look into the aspects that indicate the presence of binary friction and means of its audiation. We will also discuss the strategies that are used to integrate binary modality into modern iterations of tonal traditions and the influence of the archetypes on the formation of the stylistic traits.

In the first of our discussed examples (Ex. 23, *Мимолетности (Visions fugitives)* Op. 22 No 14 by Sergey Prokofiev) the archetypical friction is expressed through the dissonant “clashes” of the seconds, and (especially) by the presence of trichords: A^3/B^3-D^4 , $C^{\sharp 4}-E^4/D^{\sharp 4}$, $C^{\sharp 4}/B^3-D^4$ (bars 1–6, 7, 9). The reaudiation of friction unrolls when the altered pitches are being hammered into the diatonic environment, e.g. $G^{\sharp 5}$ (bars 3–4), or $C^{\sharp 5}$ (Bar 5). This allows to produce a harsher and a more intense opposition, which would be appropriate to refer to using the same term as the acting archetype – the bisonoric poles. These bisonoric poles are in constant mutation due to the *ostinato* in the middle voice until the eventual exchange of the textural material (bars 3–4, 7–8, 9–10). Here the binary friction is integrated into a tonal system, in which the influence of the subdominant is outweighing (we can compare the points of emphasis in the falling fifths – $G^{\sharp 5}-C^{\sharp 5}-F^{\sharp 3}$ (bars 3, 5, 7) or d_1-g_1 in the middle voices). Another conducive aspect for developing the constructive patterns in the binary manner is audiation of the inverted tonal functionality, e.g. G functions as a subdominant, while F^{\sharp} as a dominant. We can also observe a prototypic harmonic movement $F^{\sharp}-E-Dm-C$, which coincides with reductive moments of this frictional process (bars 7, 9, 10).

Example 23. *Мимолетности (Visions fugitives)* Op. 22 No 14 by Sergey Prokofiev

Binary friction, audiated via neighboring pitches, enables the composer to *diatonize* the temperate scale and consequently avoid the effects imposed by the chromatic system. We would like to stress that the oppositional chromatic movements (bars 7–8, 9–10) do not produce the usual chromatic effect, as they create harsh, non-resonant dissonances (sevenths, ninths, etc.). One should think of it as of one of the main stilemi of the composer.

In our next example (Ex. 24, *Interludium* between the 8th and the 9th fugues from *Ludus tonalis* by Paul Hindemith) we can observe the reaudiation of the archetype of fixed polar models. In contrast to the previously discussed archetypal variation, which operated no “clashes” between consonant horizontal lines, we now have an opposite process – displacement of two consonant horizontal lines via the interval of second. It is worth noting that due to the laws of acoustics, separating similar musical material by an interval of second prevents it from blending together, as they tend to lack common harmonics. Thus, it creates a very “bouncy”, non-resonant impression.

Example 24. *Interludium* between 8th and 9th fugues from *Ludus tonalis* by Paul Hindemith

The audiation of displacement allows the composer to create strings of seconds, which are similar to the binary ornaments found in the archaic monodies. The audiated vertical constructions possess a fair degree of difference (some of them consist of fourths and fifths, some of major chords); thus, the amount of displacements at the same time also varies (either 2, or 3 displacements at the same time). Even though the displacements do not create friction between the poles, they are large in numbers and the rapid sequences of the eighth notes can stimulate the illusion of it. The repetition the pedal tones (A^4 at the top of texture, bars 1–3) adds to the impression of modal friction. The migration of the pedal tone (bars 5–7, now the A^4 is relocated to the bottom of the texture), as well the summing of the factors (bar 8 – E_b^4 , E_b^5 , where the pedal appears in both top and bottom of the texture) helps to create the continuity of this impression. The intervals of third and fourth (which constitute the modal poles) are later hybridized, thus the vertical constructions begin to include seconds. Due to this unification, the contrast between consonance and friction fades (bars 15–16). This marks the end of the archetypal pattern, which should be followed by some entirely different material. And that is exactly what happens next. The composition continues with the audiation of melodic horizontal lines (bars 19–24), which were prepared by the oppositional antiphons (bars 4–5, 9, etc.).

The audiation of displacement of the poles is tightly integrated into the structural tonality. In the first vertical displacements we can hear the main pitches (D and $D^\#$ (E_b)), which represent the tonal centers of the composition. If we look at the position of this interlude in the grand scheme of *Ludus tonalis*, we can see that it is positioned between the fugue in D and B_b , therefore the tonal centers D and E_b in this interlude serves as a transition from the old tonal center D to B_b via E_b – the new subdominant.

On the other hand, the series of displacements are tend to be audiated similarly to tonal sequences, just on a small-scale level. These micro-sequences followed by micro-cadences are spread throughout the composition. We will take a brief look at the first two bars: in the first bar chords of the lower voice produce an upward micro-sequence, while the fourths of the upper voice surround the center (A-D). In the second bar the functions of sequencing and surrounding are flipped between the voices and later start to be audiated in separate directions. Now we have a falling sequence in the upper voice and the surrounding, which starts in an inverted direction, in the lower voice (Scheme 4).

Audiated voices	I	Surrounding ↓	Sequence ↓	Cadence in D
	II	Sequence ↑	Surrounding ↑	
Bars	1		2	

Scheme 4. Micro-sequences and surroundings in the first two bars of *Interludium* between the 8th and the 9th fugues of *Ludus tonalis* by Paul Hindemith

It seems that micro-sequential, or micro-modulatory audiation is in the intuitive space of compositional relations. We can find stylistic parallels with the sources of the western culture, such as gothic paraphonia, or the High Baroque and its astonishing finesse of sequences.

We will discuss the significance of intervallic movements to the audiation of friction while discussing our next example (Ex. 25, *Mikrokosmos* 129 by Béla Bartók). We chose the most archetypical structure of this composition as a starting point of our analysis, we can find it in the Bar 15. Here we can see a connection between two polar vertical structures that move in separate directions. The lower pole B-D descends to A-C, while the upper pole D-F ascends to E-G. The first two vertical thirds sound homogenously, while the last one (E-G/A-C) creates a dissonant “clash”, or putting it in other words, a binary friction. A “broken” consonant verticality moves horizontally in different directions in order to produce a dissonant “clash”. This model of “movement–friction” late is being repeated in various proportions (in extent from 1 to 5 bars) and sequentially repeated (downwards by fourths or fifths and upwards by thirds (bars 13–18 etc.). What is more, this model is also audiated in cadences (bars 3, 6). The movements of the first cadence separate and thus expand the field of consonance between the poles. Meanwhile, the movements of the second cadence contract, thus intensifying the binary friction.

Shortly after (Bar 40) we can see the audiation of a different modification of the “movement–friction”. Here the diatonic thirds move in the separate directions, embodying the poles of diatonic groups with individualized tectonics of the friction. The initial dissonant “clash” is repeated at the end of the movement in an inverted way (vertical location between the thirds F-A and B-D being flipped). Incidentally, the aforementioned “clashes” also act as tonal dominant and subdominant functions at the same time.

Another version of this “movement–friction” acts as a pedal of the subdominant (bars 37–40). A repetition of the third (F-A) in this canonic exchange of the voices is constantly polarized against the group of moving thirds. The outpouring of vertical friction here is regularly reduced. The canonic pedal is followed by an episode of oppositional parallels of thirds (bars 41–54). If we look at these two episodes from a broader perspective, we can notice that their interactions comply with the same patterns as “movement–friction”, just on the larger scale of the composition.

Lastly, we take a look at the concluding “clashing” parallels at the end of the composition (bars 55–60). We can see a long ascending movement that simultaneously decreases the level of friction, which (with the help of ever increasing rhythmic durations) slowly transforms into homogenous verticality. The last vertical construction is attributable to the tonal center of the composition – E, which is also found at the very beginning of the piece.

The archetypical model of “movement–friction” is stylistically transformed by the composer, employing different registers and altering the charge of the friction. Here we would like to compare two separated episodes – bars 1–6 and bars 31–36. In the former one we can see the friction being audiated via dissonances of major seconds and their transpositions. However, in the latter we face a different charge of the friction. Here it is created by the dissonances of minor seconds and their transpositions. What is more, the diatonic scale here is being enriched with three alterations: C#, D# and F#. The way that the contrasting charges of the

129 *f* *sempre simile*

7

13 15 *mf* *mp*

20 *p* *cresc.* <...>

31 *poco rallent.* *più f*

37 *quasi a tempo* (♩ = 146-150) *p, leggero* *p*

42

48 *tornando* *al*

54 *Tempo I.* ♩ = 160 *dim.* *pp*

Example 25. *Mikrokosmos* 129 by Béla Bartók

friction function in this composition might remind us of substituting the major mode with a minor mode in purely tonal music.

The charge of the friction is clearly matched with the expansion of the register. The first episode (bars 1–6) begins with two widely (by nearly two and a half octaves) separated poles, which gradually get close together. While the second one (bars 31–36) operates in an inverse manner. This episode begins with two poles being close together and gradually expanding in the opposite directions to reach the maximum distance in Bar 34. These two episodes in sense of both, registers and contrasting charges of friction, are sort of “epigraphs”, which separate the crucial parts of the musical form and infuse concentric patterns into them, which is one of the Bartók’s most important stilemi.

We choose an excerpt from the “Set of five Take-Offs” by Charles Ives (Ex. 26) as our last example, in order to illustrate the manifestations of the archetype of polar strings. This is perhaps the most spontaneous type of audiation of archetypal patterns, which depends on discovering the edge of an ambitus (Ex. 26, bars 1–5). The more the musical material transitions into one of the extremes of the ambitus, the more evident the modal pole becomes. In this example we can see this transitioning reaching its lowest point in Bar 3 (F^{#1}) and its highest point in Bar 4 (G^{#6}). We will refer to these points as binary tonal centers of the ambitus. These tonal centers allow us to find the pole of the ambitus – a certain tendency to move towards one or the other tonal center. This kind of movement typically creates a wave-like pattern. We can see that before reaching the high tonal center there is a temporary peak, which happens at Bar 3 (B⁵). We can also observe a similar pattern in the movement towards the low tonal center, where the temporary peak happens in Bar 2 (F²). The contour of these movements depicts the polarization or the approach of the poles of the ambitus. The latter one is especially evident at the end of this section (Bar 5).

Example 26. *Rough and Ready et al* by Charles Ives

The question arises here, what is the role of the string of ambitus' pole in this context? We could assume that it generates modal friction. We can find evidence of this when analyzing the verticality of this quasi-archetype. The friction here is tied to the minor second and its transpositions. It is worth noting that it is perceived not only in the places of collisions of narrowed down ambituses, but also inside each pole. Therefore, the friction and strings are not clearly differentiated. Here we discover the most archaic (the most syncretic) state of polarity that the pole of the ambitus represents.

While reaudiating the archetypical essentials of the ambitus, the composer employs purposive constructions for the strings of the ambitus (bars 8–10). For the sake of clearness, we will illustrate it in the following scheme (Scheme 5):

Bar No.		8		9		10	
TH	Polarity	–	+	–	+		–
	Pitch	C	D \sharp	B \flat	C \sharp		G \sharp
	Rhythmic group	1234	5 123	45 12	345 1	2345	1234
TL	Rhythmic group	12345	12345	12345	12345	12345	12345
	Polarity	+	–	+	–	+	–
	Pitch	E \flat	E	F	F \sharp	G	G \sharp

Scheme 5

Here (Scheme 5) we can see oppositional whole-tone strings (C-B \flat -G \sharp and E \flat -F-G). This sequential whole-tone movement is a materialized audiation of strings of the ambitus. Each of these strings contain oppositional functions within itself (+ –). It is also notable that thanks to the asynchronous rhythmic figuration (see the slurs in the upper voice), both layers of strings enable a systemic audiation of friction caused by minor seconds and their transpositions. One could say that the strings of a whole-tone scale and the friction initiated by a minor second are the most impellent surprise of the composer's creative flow.

In the final episode of the composition the composer chooses an unexpected teleological continuation for the strings of the ambitus – a mirrored melodic canon (bars 32–33). This canon is audiated in octaves, at the edges of the ambitus. The rhythmic figuration here remains frictional (polyrhythmic), however the new ratios produce a much more powerful charge. It seems that in the process of audiation of musical form, the composer relies on the intuition of dissonant tension, which is complemented by rhythmic intensity. The peak of intensity is reached at the end of the *coda* (Bar 40: *ffff*), which not only corresponds with the natural separation of the poles, but also with the transformation of the parity of poles into a tonal center (D).

Conclusions

The completed analysis of the key notions (audiation, archetype) and compositional patterns (ethnic diaphony, music of the first half of the 20th century) brings us to the following conclusions:

- The binary archetype is being distinctively reaudiated by the nationalist composers of the first half of the 20th century.
- It is characteristic of this reaudiation to bare a complementarity between rational and intuitive compositional attitudes, as well as synthesis between binary and tonal structural patterns.
- The key object of reaudiation here is the archetype of ethnic binary modality. Its main characteristic is functional and structural polarity within the parity of modal poles. This is a completely different set of audiative (structural) patterns than the one encoded in the monary modes, which branch out of the priority of the tonal center.
- Dissonant binary friction (or a “clash”) is an idiosyncratic trait of the audiation of binary modal poles.

We have distinguished four types of audiation of binary friction that are connected with four archetypes of manifestations of binary poles:

- Friction being audiated via “clashes” of neighboring pitches, which indicates the archetype of bisonoric poles.
- “Clash” audiated via consonant horizontal lines, which indicates the archetype of fixed polar models.

- Friction of polar groups, audiated via oppositional movements (directionalities), which indicates the archetype of grouped poles.
- Friction, audiated via polar strings (TH, TL) of ambituses, which indicates the archetype of polar strings.

We discover unique reaudiations of these ancient manifestations of binary modality by four different composers:

- Binary poles, audiated via neighboring pitches serves a total diatonization of the scale (Prokofiev).
- A displacement of consonant verticalities (contrary to the patterns of the active archetype), allows us to subordinate a unified tonal modality, employing a micro-sequential technique (Hindemith).
- Reaudiation of the “movement-friction” leads to a discovery of an inverse teleology of registers and alterations of the charge of the friction. This leads to a concentric interpretation of musical form (Bartók).
- Reaudiation of the polar strings of the ambitus leads to discoveries of new stimuli, which enables the composer to intensify tonal processes (Ives).

We would like to think that the most valuable aspect of this research is the discovery of the two-level nature in which audiation tends to manifest itself – as compositional relation and as materialization via sound. In conclusion it would be appropriate to add that audiation is a means of communication. This communication (at least in the scope of this research) happens via archetypes, which are being reaudiated in modern times.

*Translated by
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References

- Ambrazevičius, Rytis (2014). Psychoacoustical Issues of Dissonance in Lithuanian *Sutartinės*. In: *Muzikos komponavimo principai*, XIV, Vilnius, p. 54–61.
- Ambrazevičius, Rytis (2016). Dissonance/roughness and tonality perception in Lithuanian traditional Schwebungsdiaphonie. In: *Journal of Interdisciplinary Music Studies*, 2014–2016, Vol. 8, Iss. 1 & 2, Art. #16081202, p. 39–53.
- Bachelard, Gaston (1993). Ugnies psichoanalizė. *Svajonių džiaugsmas*. Vilnius, p. 40–52.
- Gimbutienė, Marija (1994). *Senovinė simbolika lietuvių liaudies mense*. Vilnius, p. 100.
- Gordon, Edwin (1999). All about Audiation and Music Aptitudes. In: *Music Educators Journal*, Vol. 86, No 2.
- Gordon, Edwin (2012). *Learning Sequences in Music: Skill, content, and patterns*. Chicago: GIA, p. 3, 5.
- Jakovljević, Rastko (2008). Encoding the Archetype: The Caces of Repetition and Contrast in Music. In: *Muzikos komponavimo principai*, VIII, Vilnius, p. 10–17.
- Janeliauskas, Rimantas (2001). Binarika kaip komponavimo bendrybė. In: *Lietuvos muzikologija*, II, Vilnius: LMA, p. 6–21.
- Janeliauskas, Rimantas (2003). Teoriniai muzikos komponavimo technikos metmenys. In: *Muzikos komponavimo principai*, II, Vilnius, p. 105–176.
- Janeliauskas, Rimantas (2010). *Neatpažinti Mikalojaus Konstantino Čiurlionio muzikos ciklai*. Vilnius: LKS, LMTA, p. 44–65.
- Jung, Carl Gustav (1999). *Psichoanalizė ir filosofija* (rinktinė; sud. Antanas Andrijauskas, Antanas Rybelis). Vilnius, p. 373.
- Khannanov, Ildar (2018). Boris Asafiev's *Intonatsia* in the Context of Music Theory of the 21st Century. *Rasprave* 44/2, p. 485–501; <https://hrcak.srce.hr/file/318273>
- Puščas, Pavel (2008). Archetype, Anarchetype and Eschatype in the Dynamics of Musical Style. In: *Muzikos komponavimo principai*, VIII, Vilnius, p. 27–34.
- Račiūnaitė-Vyčiniienė, Daiva (2003). *Sutartinės*. Vilnius: Vaga.
- Šliogeris, Arvydas (1996). *Transcendencijos tyla*. Vilnius, p. 166.
- Асафьев, Борис (1971). *Музыкальная форма как процесс*. Л., с. 38.
- Бор, Нильс (1978). *Избранные научные труды*, т. 11. Москва, с. 204–212, 391–398.
- Крымский, С. Б. (1981). Формы функционирования категории абсолютного в системе культуры. In: *Мировоззренческое содержание категорий и законов материалистической диалектики*. Киев: Наук. думка, 1981, с. 247.
- Кудряшов, Ю. В. (2001). *Ладовые системы Европейской музыки XX века*. Москва, с. 40–164.

Abbreviations

- SP – Paliulis, Stasys. *Lietuvių instrumentinė muzika*. Vilnius (1959).
- ZS – Славюнас, Зенонас. *Сутартинес*. Ленинград (1972).

Binarinės dermės archetipas ir jo audijavimas šiuolaikinėje komponavimo praktikoje

Santrauka

Sparčiai plėtojantis naujosioms technologijoms kartais manoma, kad kompozitoriui audiacijos gali nebeprireikti. Anaipol. Audiacija persmelkia kiekvieną kompozitoriaus judesį ir yra tokia pat nepakeičiama kaip kodas kompozitoriui būti ir būti savimi. Straipsnio autoriui audiacija pirmiausia yra komunikacija, panašiai kaip kalba. O komunikavimo objektas – nuo amžių kultūriškai įsišaknijęs archetipas, laiduojantis Didžiosios muzikinės tradicijos tęstinumą. Archetipų yra pačių įvairiausių. Čia sustota ties etniškai atsekamu binarinės dermės archetipu. Skirtingai nuo centralizuojančių monarinės dermės prioritetų, binarinei dermei yra būdingas opozicijuojančių lyčių paritetas. Šios lytys materializuojasi audijuojant binarinę trintį, t. y. šiurkštų disonavimą, tipiską etninei diafonijai ir lietuviškoms sutartinėms.

Minėta trintis audijuojama pirmapradiškai, spontaniškai ir ne vienu būdu. Čia išskiriame keturis binarinės trinties audijavimo atvejus ir su jais susijusius lyčių archetipus:

1. Gretimais tonais audijuojama trintis materializuojasi bisonoriniu lyčių archetipu.
2. Horizontalių konsonansų „sumušimas“ atliepia modelinį lyčių archetipą.
3. Trintis, audijuojama priešpriešinėmis slinktimis bei kryptimis, ikūnija lyčių kaip grupių archetipą.
4. Audijuojant trintį poliariais ambito vėriniais sukuriama ambito vėrinų archetipas.

Kiekvienas iš šių archetipinių variantų yra savitai peraudijuojamas XX a. I pusės kompozitorių. Šis peraudijavimas labai skiriasi nuo pirmapradijo archetipinio audijavimo. Genialūs kompozitoriai paprastai vadovaujami nesuderinamomis audijavimo nuostatomis – racionaliomis (išmokstamomis) ir intuityviomis (savaiminėmis). Toks papildomumas lemia audijavimo kokybę (t. y. tradicijos tęstinumą ir naujo atradimą).

Gretimais tonais peraudijuojama trintis pagrindžia totalaus diatonizavimo stilių (Prokofjevas). Kitaip, ne archetipine maniera, audijuojami konsonuojančių vertikalių „išstūmimai“ stimuliuoja tonalinį mikrosekvencijavimą (Hindemithas). Registriškai bei trinties tonuso atžvilgiais peraudijavus slinkčių modelį sprendžiami koncentrinės formos rebusai (Bartókas). Savo ruožtu peraudijuoti binarinių vėrinų trinties stimulai padeda pasiekti aukštesnį tonalinio proceso intensyvumą (Ivesas).

Galiausiai apibendrinant galima teigti, kad audiacija – tai komunikacija, o komunikuojama archetipu, kuris šiandien yra peraudijuojamas. Ši „teorema“ kreipia į pirmaprades muzikos šaknis, iš kurių išaugo kiekviena tautinė dabarties muzika.

Targeting the Three Dimensions of Auditory Imagery in the Creative Process of Composing: Models of Rhythmic Expression

Abstract. This article centres on auditory imagery from two perspectives. From the first one, imagery as an experience is analyzed. Drawing on the theories of music psychology and experimental evidence the analytical principle was derived linking perceptual dimension of audiation to cognition of physical movement and its reflection in musical gestuality. This leads to the second perspective of analysis – representations of three-dimensional imagery’s experience in music composition based on conceptual models of periodicity perception – *regularity*, *differentiation* and *cyclicity*.

Drawing upon general humanistic and specific creativity researches the multisystemic framework of parametrical contexts in music was formulated, defining the grammar of *compositional gestures* – the means for modelling of 3D changes in sonic expression of music. The capability of the framework is exemplified by diagrams of so-called (gestural) acts of rhythmical expression – *rhythm*, *metro-rhythm* and *meter*, which are considered morphological constituents of *rhythmical contour*. The audiation of the latter is made possible to envisage by qualifying *implicit grammar* of listening. An example of the practical application of the analytical framework is given (analysis of a composition), showing auditory possibilities of explicit (compositional) grammar thus disclosing the personal attitude to music writing of the composer in question.

Keywords: auditory imagery, perpetual dimensions, conceptual models of perception, implicit grammar of auditory perception, explicit grammar of composition.

Introduction

As can be discovered from the sources at Stanford University (Thomas 2014), “in the philosophical and scientific literature (as well as in everyday discourse), the expression of ‘mental imagery’ (or ‘mental images’) may be used in **any** or **all of** at least three different senses:

1. Quasi-perceptual conscious experience *per se*;
2. Hypothetical picture-like representations in the mind and/or brain that give rise to 1;
3. Hypothetical inner representations of any sort (picture-like or otherwise) that directly give rise to 1.”

Consequently, auditory imagery is a quasi-perceptual experience of sound or its mental representation. As Nigel J.T. Thomas emphasized (*ibid.*), the distinction of whether mental imagery is an experience or a representation is one of the crucial ones in both theoretical and practical discourses. We can hypothesize that the answer depends on the inquiry which is being sought. However, when speaking about the phenomenon of mental imagery in the context of audiation (which, according to the premises of this conference, is “an aptitude to hear and comprehend music even when the real sound is not present”) – the experience part should be emphasized. Nonetheless, it could prove to be very helpful to analyze the implications (i.e. representations) of audiation on the process of composing; however, due to the extent of this paper, we will primarily focus on the side of the musical experience.

Composing in the academic field very often, though not necessary, refers to “writing notes on the staves”. Considerations of audiation in this scoring environment can rely, among other aspects, on a phenomenon called “notational audiation”, which is a “sense of an auditory image that is being created in the process of reading musical scores”. In this paper, we are going to take a closer look at how the imagery as a quasi-perceptual experience can take place in the process of “hearing while reading”.

1. Auditory imagery

1.1. Cognitive foundations of audiative dimensionality

Our auditory apparatus is apt to process the information of a three-dimensional kind – we can easily distinguish whether the sound comes from above or below, from the left or right, as well as to whether the sound object is in front of us or far in the background. However, that is not the case when it comes to reading the scores, which are almost exclusively a two-dimensional medium. Thus, our imagination makes an attempt to invent the missing third dimension, creating a consciously perceived quasi-perceptual experience. The word “consciously” in the latter statement means that the “reading listener” must understand the described process. Let us take a deeper look into cognitive theories (explaining human understanding) that can help us to expand on our concept of “notational audiation” in a 3D style.

William F. Thompson (Thompson 2008: 227–228) has summarized the evidence supporting the existence of a phenomenon called *perceptual dimensions*. According to Thompson, research on humans with neurological lesions suggests that **separate** features of the auditory stream are being processed independently and are

later reintegrated into the sensory system. Isabelle Peretz and her associates (Peretz 1989) cite a double dissociation between the pitch pattern and rhythm as evidence for a neural dissociation between these dimensions. One patient with a lesion in the left temporal lobe could not discriminate different rhythmic patterns but could discriminate sequences differing in the patterns of pitch. Another patient with damage to the right hemisphere showed the opposite effect: discrimination based on patterns of the pitch was impaired, whereas discrimination on the basis of rhythm was normal. Such research illustrates that temporal and pitch information is being separated at some stages of mental processing.

Research with musicians provides us with additional evidence of perceptual analysis of music being separated into different dimensions or features. Peretz and Myriam Babai (Peretz & Babai 1992) found the advantage of the left ear for contour discrimination and the advantage of the right ear for pitch-interval discrimination. This asymmetry implies that the contour is being processed in the right hemisphere and pitch interval is being processed in the left hemisphere. **“Overall, it appears that melodies are neurally separated into components such as rhythm, intervallic pattern and contour”** (Thompson 2008: 228).

The aforementioned evidence gives us an idea about the mechanism of a three-dimensional experience and orients the search for its representations within the categories of rhythm, intervals and contour. For our research to be properly grounded and trusted we need to deconstruct these well-known definitions in the light of contemporary cognitive research. For the complex contour definition let us consider for a moment it can be perceived (as one of the possibilities) as harmony. Later in the article, we will widen this quite narrow explanation.

Rhythm, pitches and harmony are the only **primary parameters** in music perception (according to Bob Snyder; Snyder 2001: 195). Primary parameters are categorized as particular scalar values, thus consciously remembered and compared. Categories for such memorability are **time-intervals** (IOI) for rhythm, **pitch-intervals** for pitches and **scale** for harmony. All these categories have one aspect in common, which could be considered the main feature of musical perception – that is **periodicity**. That way the metro-rhythmic pulsation can be distinguished from the periodical one (which in some instances could be perceived as being close to “noise”), a pitched tone from a percussive one (i.e. a short blast of noise), as well as tonal music from atonal, a glissando from a passage etc. Lawrence Zbikowski has a beautiful idea about how the aforementioned facts of perception can be beneficial in conceptualizing and re-thinking what counts as knowledge about music (Zbikowski 2004: 273). Zbikowski relies on anthropological assumptions rather than on music theory. He delivers the notion of so-called *conceptual models*, which are derived from proprioception, i.e. knowledge about how parts of our body move. *Periodicity* in that sense is perceived as three related concepts of *regularity*, *differentiation* and *cyclicity*. As Zbikowski explains (Zbikowski 2004: 278), **“regularity is the periodic recurrence of some event; ... our knowledge of such regularity comes first from proprioception during the first months of life and is only subsequently applied to the musical experience. Differentiation involves simultaneous non-identical regularities, such as what occurs when different limbs are engaged in regular but independent motions. Cyclicity involves composite regularities made up of coordinated differentiated regularities; most forms of human locomotion (including infants’ creeping and crawling) involve cyclicity.”**

One may ask how it all is related to audiation. Basically, this conceptual modelling shows the way how experiences of perceptual dimensions can be represented during the processes of cognition. These are like certain kinds of spatial movements linked to certain features of perceptions. Lawrence Barsalou (Barsalou 1999) provides an elegant solution for such linking with the notion of *perceptual symbol systems*. He claims that “the neural basis of perceptual symbols is a ‘simulation’ of the brain processes that would be involved in the actual perception of whatever it is that is being symbolized” (Thomas 2014). “The neural states associated with perceptions are recorded in the brain” (Zbikowski 2004: 277) and can operate either in a conscious or unconscious (intuitive) way. According to him, brain maps of such neural activations can operate even in the absence of auditory sensory stimulation (as when we read score; Zbikowski *ibid.*). Thus, three conceptual models of periodicity come into power every time, when we are exposed either to an actual movement of the body, or a movement of music (when there is no physical movement, our brain tends to simulate it). Cognitive musicologists refer to the latter as musical *gestures*.

With the presented theoretical knowledge in mind, we can assert that the composer has an ability to shape the expression of rhythm, tone or timbre by applying regularity, differentiation or cyclicity to the structure of these parameters. In order for this process to become more explicit, we need to establish connections between the perceptual dimensions and models of perceptual conceptions by explaining the principles according to which the aforementioned dimensions can be represented by individual conceptions of periodicity.

1.2. Linking conceptual gestures to the dimensions of auditory imagery

In the previous chapter, we discussed the phenomenon of quasi-perception of auditory streams that could allow us to link these theoretical conceptions to the mechanics of perceptual dimensions of sensory input. This raises a series of questions. First of all, “what kind of periodicity is it, when we refer to it as ‘rhythm’”? Snyder (Snyder 2001: 196) defines rhythm “as the perception of accents and proportional intervals of time between sounds”. As we mentioned previously, these time-intervals should be of multiple duration in order to be perceived “musical” in a pure acousmatic sense (i.e. without any influence of the context of perception). So “the rhythm” is a kind of an implied **regularity** that is perceived in the horizontal axis of time and of auditory imagery.

Next, we can ask the same question regarding “pitch”. Once again relying on Snyder, “we can proportionally categorize pitches into tuning systems and scales and construct many different melodic patterns that can be recognized when repeated. The parameter of pitch can be further divided into pitch interval and direction of pitch motion” (Snyder 2001: 196). From this, we can conclude that all these aspects can be generalized by the notion of “differentiation”. We can see another vital question emerge here: Which dimension of auditory imagery these parametrical gestures (sound changes) could be attached to?

One may recall that the perception of periodicity’s conceptions happens in a consistent way. That means differentiation can be accepted only when regularity in the horizontal axis of auditory imagery is already realized. Without any occurring changes (e.g. pulse of *tactus* events) horizontality starts being imagined as a one-dimensional line, which only has the quality of *length*. If there is a change in duration between sound events (be it a change in rhythmic values or pitch), it forces changes in the dimensionality of perception. The two dimensions are commonly perceived as “length and height” (as a non-perspective drawing on paper), thus from now on let us consider pitch differentiation to be attached by imagery to the vertical dimension.

The last category – “contour” – is a little bit complicated. For the sake of simplicity, we can think of it as “the contour of melody”, which is a kind of derivation from the simultaneous exposition of rhythm and pitch in the sensory input. Intuitively such perception can be represented in the auditory imagery as *spacious*. But the notion of *cyclicity* remains undisclosed with that explanation. As we discussed earlier, cyclicity is formed of “coordinated differentiation of regularities”. With that in mind, let us rely on the beautiful notion presented by Karlheinz Stockhausen – the *formant-rhythm*.

To begin, we have to refer to the idea that rhythmic expression is a simultaneous application of meter and rhythm (London 2001: chapter 1). This assumption serves as a starting point to explain Stockhausen’s ideas (Stockhausen 1959: 19): “The difference between *meter* and *rhythm* is exactly that which we discern between the ‘fundamental tone’ and the ‘tone-colour’ of sound-spectra. The fundamental phase (metric fundamental) is defined by the periodic main intensity-maxima (the heaviest accents), and these results shape the formant-structure. The relationships of the subsidiary to the main maxima (subsidiary to main accents) define the ‘tone-colour’, i.e. the rhythm. ‘Tone-color’ is a confusing idea that could well be replaced by ‘sound-rhythm’, and one should use the general term ‘formant-rhythm’”.

One may ask how this described analogy can help to relate melody contour and cyclicity. Snyder defines melody “as any sequence of acoustical events that contains recognizable patterns of *contour* (its “highness” or “lowness”) in the time dimension...” (Snyder 2001: 135). Recognizability depends on *salience* (as defined by Richard Parncutt; Parncutt 1994). Saliency is implied for rhythmic contour by the metric events, while space between is “filled” with occasional rhythmic gestures. In the next chapter, we will more deeply inspect this interaction between different gestures of rhythmical expression. Now let us conclude with an implication of spaciousness within such perception.

In the domain of aural perception, “space” is just a way to name the cognition of simultaneous differences. Slower “salient fundamentals” of the contour tend to be referred to as being “below” in the vertical axis of differences and thus “closer” in the space of auditory imagery. At the same time, quicker fillings tend to be interpreted as being “higher”, thus “further” into the background of auditory imagery. It is also worth noting, that levels of saliency are in no way limited to those two (thus, deeper space of expression can be achieved). Let us examine how such space can be audiated while reading a notated rhythm. First, we need to understand how gestural movements in space can be notated, i.e. to define the three composing gestures, which can be linked to the three-dimensional perception of rhythmic expression.

2. Modelling the experience of auditory imagery in music composition

2.1. Conceptualizing 3D expression in rhythm creation

The term of conceptualizing is used to define the devices the composer employs to create rhythm, which can be perceived as a three-dimensional expression. Rhythm, as already mentioned, is defined as a sequence of events' durations, or more technically, as time distances between succeeding sound events (changes of volume), so-called IOI (inter-outer-interval). These chained experiences of changes in volume are perceived in auditory imagery as movements of musical expression or *gestures*. Unlike the perception of physical gestures¹, gestures of the imagery can be recognized in two ways.

The first type of perception is identical to both physical and mental gestures – changes occur one after another (with or without pauses in between). As Snyder pointed out (Snyder 2001: 55) this experience is called **hierarchical** – suggesting that the perceiver can deduce the difference in the action of direct comparing (e.g. “the new sound event is louder”). The second way of gesture processing is unique to mental gestures alone. Here changes can be perceived as related while being detached in time by in-between unrelated events. This experience is defined by Snyder as **associative** (Snyder 2001: 56) that matches through knowledge, experience and memory, not through direct comparison of sensory inputs (as in the case of hierarchical gestures)². Many devices used for composing a musical form are based on this second principle of gesturing – like leit-motivs, themes, rhythmic conventions for certain musical genres (e.g. march, waltz). All such gestures can be composed only through changes of expression in the primary parameters – rhythm, pitches and category of timbre (e.g. flute solo in several places of the piece). These changes of primary parameters are recognized by the mechanism of perceptual dimension (i.e. memorable timbre is perceived as “the contour”). Thus, for now, we have the first important classification factor of a composer's decision-making in the process of creating rhythm – it is possible to act either in a hierarchical (or syntactic) or an associative (or paradigmatic) way.

The second important factor was formulated by David Huron (Huron 2006: 11), who noticed that in psychology any new action, which can be taken in an already present context (as an intention to improve the context in question) can only be of three kinds. Applying this notion to music creation, we can deduce that firstly, the composer has a possibility *to develop the current quality of musical expression* (e.g. to increase the tempo of current rhythmical formula) – i.e. to **process** the gesture of expression. Secondly, in the process of modelling the expression, the composer *can reject an already achieved sonic quality* or make a **reversal**³ of the gesture (e.g. end current rhythmic formula). And finally, there is an option to “freeze” *current expression* – put it into the background and begin to work with other primary parameters left, e.g. change melody or harmony while maintaining stable rhythmic repetition. This third type of musical movement can be defined as a **neutral**⁴ (or **relief**) gesture.

With the presented knowledge in mind, we can determine whether these three types of *compositional gestures* (*process*, *reversal* and *relief*) are hierarchical or associative. One of the reasons for musical complexity is an enormous number of contexts to which the gestures can be applied. We will deal with the structure and guidelines for mastering contexts of composition in the next chapter. For now let us consider how gestures can be realized in rhythmic expression, i.e. in changing durations in an aural-friendly way. Relying on Narmour's treatise of I-R model we can distinguish that the changes of event length can happen either in a counter-cumulative (♩♩♩♩) or cumulative (♩ ♩ ♩) manner. As it can clearly be seen both gestures are hierarchical (unbroken). The first one (counter-cumulative) is suitable for the *process* type of gesture to build up the tension of duration changes. Cumulative rhythm can model the *reversal* type releasing expressional strength up to the stop on a very long duration.

How can the *relief* type of gesture in this context be composed? Because no other possibilities are available for this modelling (next duration should be either shorter or longer if a *change* is desired), the third gesture can be achieved through an associative combination of the first two types in a periodical rhythm – ♩ ♩ ♩ ♩ ♩ ♩. As can be seen in the example the *process* and *reversal* types of gestures happen in pairs and thus a sonic association between those pairs can be perceived. These associations are periodical ones, thus Zbikowski's *cyclicality* conception can be directly created with a *relief* gesture. Such cyclic gestural neutrality, according to the definition, “freezes” the current state of rhythmic expression and reveals composing pos-

¹ A gesture in the physical context is defined as a movement with certain intention, e.g. handshaking, toasting etc.

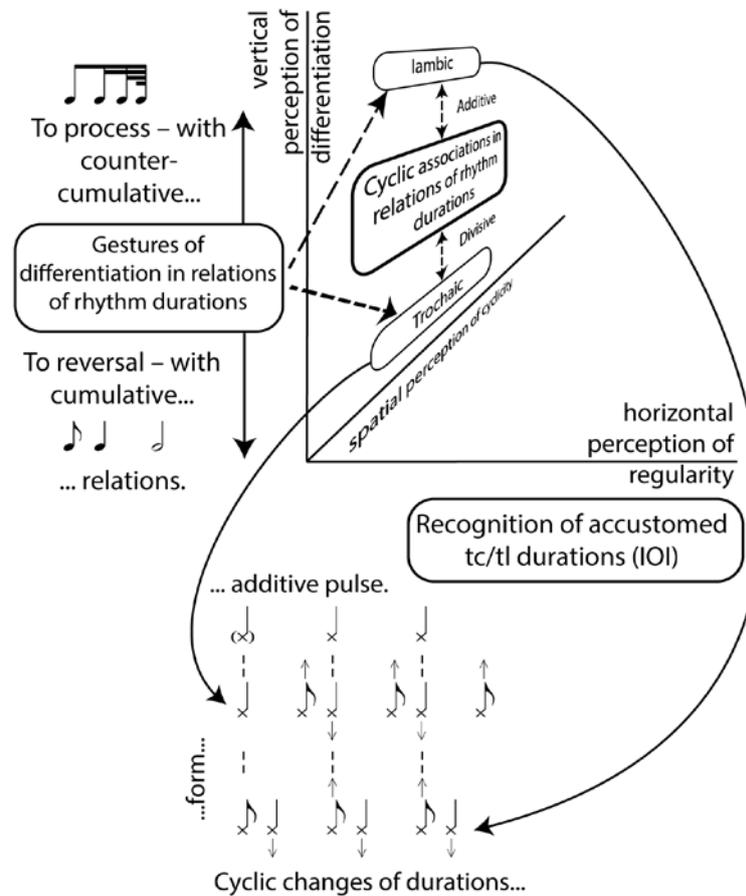
² Associative experience can be recognized in many well know metal phenomena, e.g. *déjà vu*.

³ This term is borrowed from Eugene Narmour (Narmour 1990).

⁴ Neutral movement of expression is a part of Narmour's I-R analysis model.

sibilities for other parameters (i.e. there is a change of *expressional dominance* in musical movement). What otherness could start to dominate in the expression of durational changes?

Let us look at the generalized diagram of all gestural possibilities in the rhythmic domain:



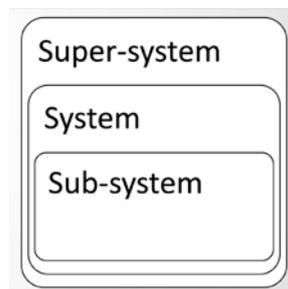
Picture 1. Composition gestures of rhythm expression

As shown in Picture 1, the horizontal perceptual dimension of composing rhythm is modelled of relatively ordinary (i.e. recognized “regularly”) short/long durations. Paul Fraisse (Fraisse 1992: 167) defines them as *tc* (or *temp court*) about 400 ms; *tl* (*temp long*) about 800 ms. Vertical perceptual dimension can be modelled in auditory imagery by differentiating between the *process* and *reversal* types of gestures in rhythmic structure, multiplying *tc/tl* to both ends of absolute durations (e.g. next value of *process* gesture would be about 200 ms). In order to model a *relief* type of gesture, a periodical rhythm must be applied, which can be realized by either an *additive* or a *divisive* manner (through associations of iambic or trochaic metrical feet). This distinction in composing of rhythmic *relief* creates variations in the quality of expression in the background. **Divisive** quality has a clearly perceived pulse (emerging on “heavier” *tl* events, as shown in the notated example in the lower part of Picture 1), the *relief* type of structure thus is well “divided”. **Additive** iamb, on the other hand, gives the *relief* structure a kind of displacement of *tl* suspending the heavier duration in a certain expressive tension. In every cycle of perception (created by *reversal/process* pair), this tension forces anticipation of the next associable aural pair. Such anticipation forms a chain of combined differentiated gestures in periodic rhythm, still expanding by *addition* of yet another similar iambic rhythmical cell.

Either divisive or additive model in relief structure gives rise to the **pulse** (duration of which equals the sum of lengths of hierarchical gestures, as shown in the notated example of Picture 1). Thus, the dominance of expression is being transferred to another parameter – namely, pulsation, its models and tempo – which has nothing to do with the changes of rhythmic durations. Having defined such “change-of-dominance-in-expression” mechanism we come to an even more important concept supporting the usage of compositional gestures – a multileveled contextuality.

2.2. Multileveled contexts of compositional gestures

As it was already mentioned, there is a vast array of contexts in which the knowledge of gestural application in composing can be beneficial. Leonard B. Meyer gives the first hint on how to deal with this broad scope. Meyer (Meyer 1974: 191), advocating a scientific approach to the artistic research, distinguishes “three kinds of hypotheses, used to explain the works of art ... : a) **general laws**, which are presumed to be constant over time and space; b) **restricted principles**, derived from and applicable to the norms and procedures of a specific style; and c) **ad hoc reasons** which ... are the necessary adjuncts to the first two types...” in artistic research. Meyer’s primary concern was the legitimacy of critical inquiry. Concerning the creative action itself (like compositional gestures under discussion) another scholar Genrikh Altshuler, a creator of the famous mathematically driven TRIZ theory for creative problem-solving, defined an analogous multisystemic approach to the definition of creativity contexts by introducing the so-called Nine-screen model of system evolution⁵. Altshuler divided the levels of inquiry for creative action planning into *super-system*, *system* and *sub-system* (as shown in Picture 2) and additionally added *past–presence–future* axis for inspection of problem-solving stages.



Picture 2. A multileveled system of compositional contexts

Now we can fuse this highly technical approach with a more art-friendly conception by Meyer in order to define the multileveled contexts of music writing. The easiest way to do it is by relying on the structure of musical grammar, whereas in this way the compositional gestures could serve as rule-devices for structuring the grammatical items.

Just as in linguistics of spoken language, there are syntactic, morphologic and phonetic levels of contexts (corresponding to systemic levels in Picture 2), for which certain rules can be described. These rules could subordinate a functional unit of musical grammar – a *change of expression* (forced by sound-volume event). It is worth noting that despite the small number of possible compositional gestures, their effect in every level is different. A previously discussed example of rhythmic gesturing (see Picture 1) represents the context of a subsystem, where ad hoc reasons for musicking⁶ (in case of a rhythmic act – the production of durational changes) are projected. These acts can be thought as “syllables” in musical grammar, while conceptual models of periodicity (Zbikowski’s version) – as “phonetics” of those “syllables”.

Because of the three-dimensional nature of our aural perception, there is a need for a fusion of three different acts, in order to fulfil the morphology of a contour (i.e. “word-phrase”) on a system level, where restricted norms of styles are considered⁷. Additional support for the combinational “holy trinity” requirement comes from Snyder’s explanation about the structure of working memory (Snyder 2001: 48–50). This kind of memory is responsible for the perception of any movement and research has shown that only three concurrently running processes can be distinguished with a high level of confidence. Thus, even in the exploration of rhythmical domain only, two additional acts for expression should be defined⁸.

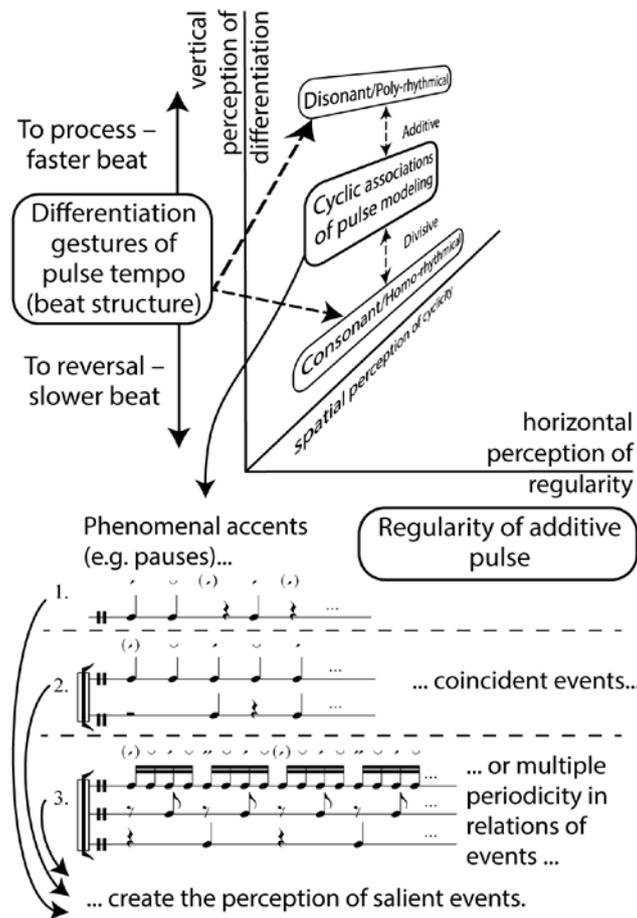
⁵ English version of this approach is delivered by (Orloff 2017: 221).

⁶ *Musicking* is the term coined in (Small 1998). It embraces any physical act necessary for generation of acoustical sound (e. g., not only instrument playing, but also instrument’s logistics etc.).

⁷ These norms are described through the interaction of implicit and explicit grammars, which are not covered in this article. As well as grammar on the super-system level where general laws of the contours’ syntax are considered for creation of a musical form. Exploration of these levels in English is pending in forthcoming publications from the author of this article.

⁸ The morphology of contour is no way limited to these rhythmical acts (as parts of general musical skills). Non-musical modeling can be applied (e.g. serial technique), also acts can be borrowed from other primary parameters (i. e. tones and timbre).

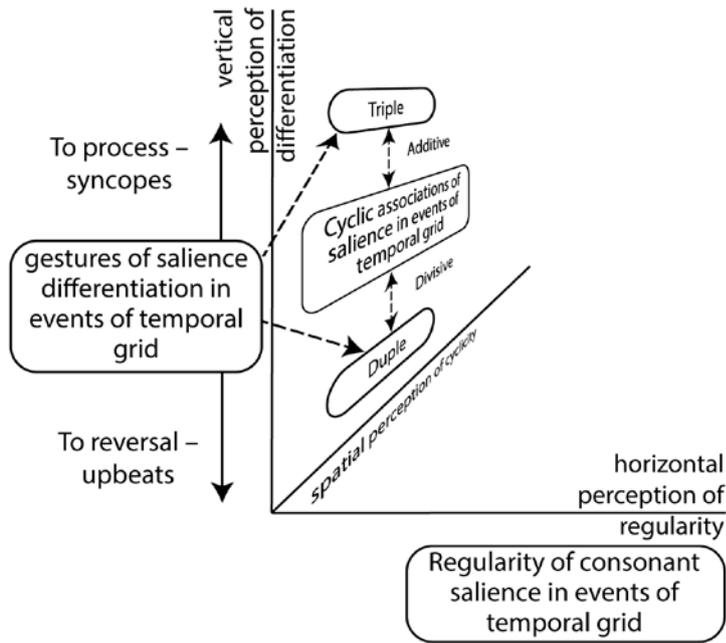
The premises for the second act were already distilled – it should encompass the act of tempo and models of the pulse and allow gesturing the vertical dimension of differentiation in an implicit rhythmical grammar. This could be called a **metro-rhythm** and encompass the following possibilities:



Picture 3. Compositional gestures of a metro-rhythmical act

The cognitive premises for compositional gestures of a metro-rhythmical act are analogous to the act of rhythm (reflected in Picture 1). Definitions here are quite self-explanatory, only a few remarks could be added in order to make the conception even clearer. The regularity of metro-rhythm starts from an additive rhythm (i.e. a row of sound-events that features inter-outer intervals of the same duration), which can be generated by the 3D expression of the act of rhythm (see Picture 1), or simply by adding the same durations one after another (in this case the expression for the act of rhythm is skipped in the morphology of the contour). Vertical hierarchy of metro-rhythm is triggered by manipulating the tempo of the beat – that way the nuances of time-expression in music can be added to an otherwise very strict *tu/tl* ratio of the act of rhythm (e.g. 3 or 5 tuplets can be modelled). Associativity of metro-rhythmical modelling in the *relief* type of gesturing defines its function in the expressional background. If an **additive** structure becomes a dominating one, its functionality then gains poly-rhythmical traits. If a **divisive** consonance is modelled (as shown in notated examples at the bottom of Picture 3), then the events of various saliences of the rhythmic pulse are perceived and implicit power of expression is delegated to the metric act⁹ (Picture 4).

⁹ This implicit mechanism of dimensional change of expression defines **implicit grammar**, which is based on the ability to recognize conceptual models during perception. But the composer does not have to follow the structure of listening habits. He can create his/her own **explicit grammar** (by fusing acts of different parameters or change the order of parameter's acts in perceptual dimensions). Acoustic interaction between both grammars create *poetic function* of composer's **model of expression** reflected in the latter's parameter of **cognitive strength**. Such functionality is important in form of creativity, as it assists in modelling tension and release processes on a super-system level of expression.



Picture 4. Compositional gestures of the metric act

Compositional gestures of the metric act are based on the models of the temporal grid in the auditory imagery. A 1D regularity starts in a consonant relief of the metro-rhythmical act (see Picture 3). A 2D expression is recognized, when there is a categorical shift (i.e. bigger than perceptual tolerance for nuances of performance) from an implied grid position (modelled by the usage of syncopation or upbeat devices). Relief type of gesture of the metric act (i.e. a 3D expression) supports very common associations between triple (additive) and duple (divisive) cyclicity, which can further be combined into complex associations (e.g. 5/4 or 6/8 time signatures, the former being of an additive and the latter – of a divisive

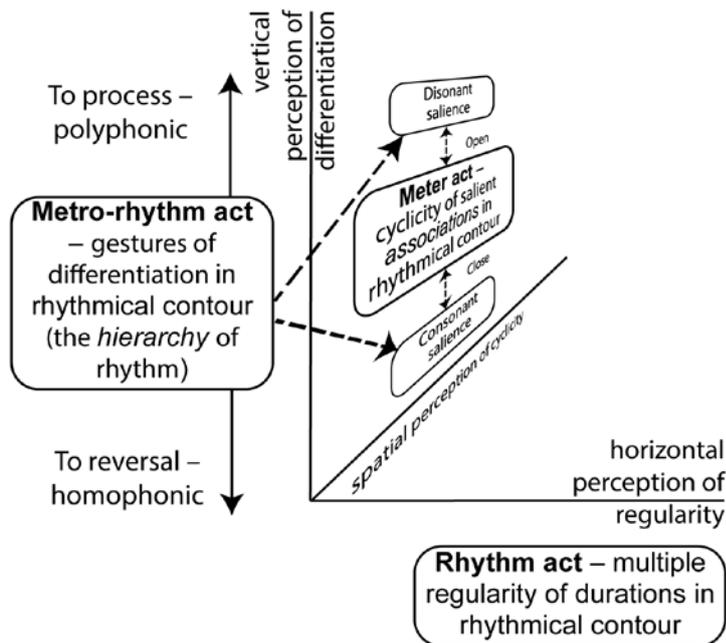
quality). Compositional gestures of the metric act complete the morphology of **implicit grammar**, which defines how the contour of rhythmic expression is recognized in auditioning (through the mechanism of perceptual dimensions).

2.3. The implicit grammar of contour recognition while auditioning vs explicit grammar while composing.

Case study

Term **implicit** here refers to being based on our acquired skills and habits of listening, not on thinking or musical practice, while the latter support **explicit** (that is, “explainable”) actions. As mentioned earlier, the contour is to be recognized as a functional unit, while listening should trigger all three dimensions of our perception (as Snyder puts it, the change must be of multiparametric nature, in order to form “sectional boundaries”; Snyder 2001: 194). Furthermore, parametrical changes in this multi-array should follow a particular order

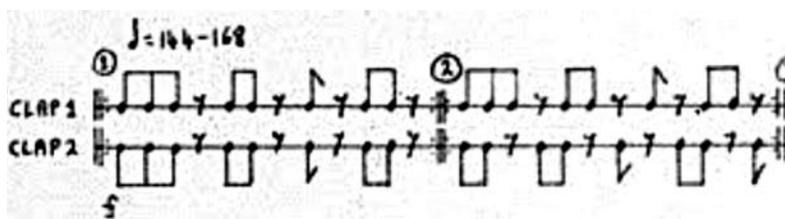
which conforms to the logic of relations of conceptual models. Differentiation can only be perceived, when two different regularities are discernible, while cyclicity encompasses a new order of interrelations between both differentiation and regularity. Also, for rhythmical contour, the relief type of structures of both rhythmic and metro-rhythmical expression acts, points to the dimension of regularity of “the next” act (as explained in pictures 1 and 3). All defined conditions lead to an implicit “inevitability” of contour recognition (Picture 5).



Picture 5. Recognition of rhythmical contour in auditioning (implicit grammar)

The perceptual “rhythm” in the dimension of the rhythmical contour is rendered via rhythmic act (i.e. regular changes of durations of time intervals). The fewer multiple durations are recognized, the “noisier” (and less periodical) the contour becomes in our audiative perception. An equivalent of “pitch” for rhythmic contour is created by a change of the tempo of the beat and can be modelled in either polyphonic or homophonic manner (i.e. can have more dissonant or more consonant quality). The salience of metric events defines the points from which either closure or opening (i.e. perception of “the contour” dimension) can be deduced while audiating.

The crucial point here is to remember that rhythmic, metro-rhythmic and metric dimensions in the described context of implicit grammar define morphological elements of audiating and should in no way be confused with the categories of musical parameters used while composing. The composer has the power to combine any acts in new creative ways and thus create his/her own explicit grammar of expression (which nevertheless will be perceived by the listener in an implicit order of audible dimensions). Let us make a short example of how presented knowledge of implicit *versus* explicit grammars can help in the case of notational audiation (i.e. “listening while reading”). Steve Reich’s “Clapping music” suits this purpose very well, because there are no changes in either pitch or timbre.



Picture 6. Steve Reich. “Clapping music” (1972). Excerpt of m. 1–2

As can be seen in Picture 6, Reich starts from the pulse (a metro-rhythmical gesture). Two equal time intervals between first three notes form an additive pulse¹⁰, thus the beat is a start of the musical movement and not of the changes of duration (i.e. the rhythmic act). On the other hand, multiple regularity of durations is maintained, so the horizontal dimension of implicit grammar (according to the definition of Picture 5) is recognized securely. By inserting a rest in the position of the 4th eighth note, Reich makes an expressional difference (or a vertical gesture of expression) by using a twice longer rhythmic value (because for percussive sound only the onset matters), which perfectly conforms to the horizontal dimension of the rhythmic act (see Picture 1). The positions of the next three eighth notes (5–6–7) maintain the pulse, but the change of duration happens a one-eighth earlier, so the differentiation of rhythmic durations in a steady beat background occurs with a *process* type of gesture (the rhythm becomes 2D, while metro-rhythm remains one-dimensional). The same is true for the eighth notes in the 8th and the 9th positions of the first measure (a change of duration happens only after a one beat-pulse), while the last three positions are affected by the *reversal* type of rhythmic gesture (the 4th change of duration once again occurs after a time interval longer than the 3rd one). When a repetition of the 1st measure comes, the expression of the rhythmic act becomes 3D, because of a clear cyclic appearance of interactions between *process/reversal* types of interactions – it produces a *relief* type of rhythmic expression.

The salience of the pulse occurs exactly at the beginning of the measure, where three onsets are exposed in a rhythmical unison by both parts. Thus, the gesture of the metric act is started, maintaining a regular temporal grid throughout all repetitions of the 1st measure (i.e. expression of the meter is also 1D). The provided analysis shows that Reich has created a model of expression (his explicit grammar) starting from the beat (a metro-rhythmical act) and putting emphasis on the rhythmic expression (as a device for verticalization of the expression), while the unfolding of repetitions brings the regularity of temporal grid to the highest dimension of the three-dimensional experience. Because all three perceptual dimensions are modelled, the contour of the 1st bar is clearly audible on the systemic level.

The situation in expressional gesturing changes in the second measure where the composer applies the modelling of the pulse (*relief* type of gesture of the metro-rhythmical act). A full scale of the three-dimensional

¹⁰ According to Narmour’s I-R theory, the first time interval creates aural anticipation, the second one – fulfilment of that anticipation (realization of implication).

expression of metro-rhythm starts to dominate on a sub-system level of audiation, thus almost covering the other two morphological constituents of the structure of the contour. A 3D *relief* of the rhythmic act partly survives because of the associative memory and prolonged demonstration of the formula at the beginning and continuation in Clap 1 part throughout Bar 2. On the other hand, there are no conditions for the salience of pulse to emerge (which are exemplified at the bottom of Picture 3) and the dimension of the contour of the metric act is dropped completely so the boundaries of the contour are blurred in Bar 2. The expression on the systemic level becomes two-dimensional and is kept that way for the next 11 measures, eliminating the possibility to audiate the changes of the contour. Thus, only the hierarchical syntax is being expressed on a super-system level (i.e. the creation of musical form). Only when the 1st measure reappears at the end of the piece, associations and full-scale dimensionality come back, thus ending the piece with proper contouring on the level of musical form. At this point, the gestural expression of the metro-rhythmical act conforms (on the contour-level) to the direction of the *reversal* (from the modelled poly-rhythm of bars 2–12 to homo-rhythm of the 1st bar; see Picture 5 for the differentiation gesture of implicit grammar), while from Bar 2 to Bar 12 we find the polyphonic differentiation, i.e. the *process* type of gesture is retained, thus pushing forward the expression of musical form.

As we see, the gestural analysis is capable of explaining the perception of expression in a 3D domain of the auditory imagery. It as well possesses the ability to explain the quality of creativity in the composition. Creative action (according to Oxford/Cambridge version; Kaufman & Sternberg 2007) is defined as a *novel, structural* and *contextual*. In the case of Steve Reich's *Clapping music*, the **novelty** lies in "jumping" between 2D and 3D expressions at the systemic (contour) level as a result of recombination of expressional acts. Identifying gestural decisions on every level of expression of the composition helps to maintain the **structural** unity of grammatical endeavour, while the 3D metaphor of auditory imagery allows us to **contextualize** our audiative experience, qualifying the effect of changes into changes of musical expression. Etymologically words "create" and "creativity" are pretty close to each other and so are the results from both gestural and creativity analysis.

Conclusion

Cognitive foundations for the three-dimensional experience being backed by the phenomenon of auditory imagery it is just the beginning of the audiative story. By searching for compositional devices, which can represent every perceptual dimension in an enormous number of musical contexts, the composer can unleash his/her creative and expressive power. Gestural analysis offers sophisticated guidelines in the explication of such acknowledgement by introducing a method for linking conceptual models of regularity, differentiation and cyclicity with the multisystemic properties of expressive parameters. Due to the fact that the structure of those parameters is directly derived from the structure of the perceptual dimension, compositional gestures (devices intended for modelling the changes of parameters within musical movement) are likely enough to conform to the possibilities of our perceptual nature for capturing those modelled changes. Acoustical interaction between composer's intentions (expressed as an explicit grammar) and listener's abilities (defined as an implicit grammar) thus are unified in one convenient framework, which is open to include every possible context of expression – be it a variety of parameters or any level of compositional stages (from sub-motive to form scale). By defining the clear relations between both grammars, the suggested gestural method of analysis offers psychologically backed guidelines for improving the ability to audiate while writing music.

References

- Barsalou, Lawrence W. (1999). Perceptual symbol systems. In: *Behavioral and Brain Sciences*, 22(4): 577–660.
- Fraisse, Paul (1992). Rhythm and Tempo. In: Diana Deutsch (Ed.), *Psychology of Music* (pp. 149–177). Elsevier.
- Huron, David Brian (2006). *Sweet Anticipation: Music and the Psychology of Expectation*. MIT Press.
- Kaufman, James C., & Sternberg, Robert J. (2007). Resource review: Creativity. In: *Change*, 39, 55–58.
- London, Justin (2001). Rhythm. In: Stanley Sadie (Ed.), *The New Grove Dictionary of Music and Musicians*.
- Meyer, Leonard B. (1974). Concerning the Sciences, the Arts: And the Humanities. In: *Critical Inquiry*, 1(1): 163–217.
- Narmour, Eugene (1990). *The Analysis and Cognition of Basic Melodic Structures: The Implication-Realization Model*. Chicago: University of Chicago Press.
- Orloff, Michael A. (2017). *ABC-TRIZ: Introduction to Creative Design Thinking with Modern TRIZ Modeling*. Springer International Publishing.
- Parncutt, Richard (1994). A perceptual model of pulse salience and metrical accent in musical rhythms. In: *Music Perception*, 11(4): 409–464.
- Peretz, Isabelle (1989). Clustering in music: an appraisal of task factors. In: *International Journal of Psychology*, 24(1–5): 157–178.

- Peretz, Isabelle, & Babai, Myriam (1992). *The role of contour and intervals in the recognition of melody parts: Evidence from cerebral asymmetries in musicians* (Vol. 30).
- Small, Christopher (1998). *Musicking: The Meanings of Performing and Listening* (1st edition.). Hanover: Wesleyan.
- Snyder, Bob (2001). *Music and Memory: An Introduction*. Cambridge, Mass: MIT Press.
- Stockhausen, Karlheinz (1959). How time passes by. In: *Die Reihe*, 3: 10–40.
- Thomas, Nigel J.T. (2014). Mental Imagery. In: *Stanford Encyclopedia of Philosophy*. Stanford University: Metaphysics Research Lab.
- Thompson, William Forde (2008). *Music, Thought, and Feeling: Understanding the Psychology of Music* (1 edition.). Oxford; New York: Oxford University Press.
- Zbikowski, Lawrence M. (2004). Modelling the Groove: Conceptual Structure and Popular Music. In: *Journal of the Royal Musical Association*, 129(2): 272–297.

Trijų klausos vaizduotės dimensijų vaidmuo kūrybiniame komponavimo procese: ritminiai išraiškos modeliai

Santrauka

Klausos vaizduotė straipsnyje apibrėžiama kaip gebėjimas audijuojant „simuliuoti“ trūkstamas garsines dimensijas. Tai gali nutikti esant restriktyviam muzikiniam dimensiškumui, pavyzdžiui, bandant užrašyti muziką ant dvi dimensijas reprezentuojančio popieriaus lapo arba klausant geometriškai apibrėžto (pvz., akustinių sistemų) garsinio lauko. Garso suvokimas yra kognityvinis mechanizmas, susidedantis iš trijų dimensijų, todėl komponavimo praktikoje mums dažniausiai prireikia vaizduotėje sumodeliuoti bent vieną trūkstamą garso dimensiją.

Ritmo komponavimas – daugialygmenis procesas, priklausantis nuo ritminio kontūro gramatikos. Tokios gramatikos sintaksė (ryšiai tarp kelių kontūrų) gali paskatinti inovatyvius kūrybinius formos sprendimus, o jos morfologija (kontūro formavimas) gali būti suprantama kaip sintaksinė *muzikavimo aktų* kombinacija. Išskirti trys ritminės ekspresijos aktai – ritmas, metroritmas (pulso modeliavimo aktą) ir metras. Remiantis kognityviniu percepcinių dimensijų modeliu (apibendrintu Williamo Forde'o Thompsono), straipsnyje atskleista, kaip ritminės išraiškos *muzikavimo aktai* gali būti panaudojami *horizontalios*, *vertikalios* ir *erdvinės* garsinės vaizduotės dimensijų modeliavimui.

Trijų dimensijų išraiškos modeliavimo kompozicijoje principas pagrįstas Lawrence'o Zibkowskio pristatytais nuo propriocepsijos (t. y. savo kūno padėties, jėgos ir judėjimo suvokimo) priklausomais koncepciniais modeliais. Šie modeliai yra projektuojami kaip tam tikri muzikinės ekspresijos gestai (garsinio judėjimo pokyčiai). Taigi *horizontalioji* dimensija gali būti audijuojama kaip muzikinės išraiškos pokyčių *reguliarumas*, *vertikalioji* dimensija – kaip *skirtumai* tarp įvairių reguliarių percepcijos pokyčių versijų, o *erdvinė* dimensija – kaip pasikartojančių modelių *cikliškumas* skirtingose muzikinės išraiškos plotmėse.

Percepcinių dimensijų potencialas kartu su koncepcinių modelių percepcija sukuria *implicitinę* (nulemtą natūralių klausymo proceso ypatybių) *ritminio kontūro gramatiką*. *Horizontalus regularumas* šioje gramatikoje (suprantamas kaip „ritmas“) yra atpažįstamas kaip *ritmo aktas*, kurį galima įgyvendinti naudojant kartotines (reguliaras) ritmines vertes. *Vertikalūs skirtumai* (atpažįstami kaip implicitinės gramatikos *tonai*) sukuriama *metroritminio akto* metu, kuris gali būti įgyvendintas pasitelkiant tiek imitacines, tiek ne imitacines poliritmines figūras. *Erdvinis cikliškumas* (atpažįstamas kaip *kontūras*, *frazė*) implicitinėje gramatikoje yra suvokiamas kaip *metro aktas*, utilizuojantis *reljefo* (pagal Richardą Parncuttą) pokyčius ritminiame audinyje. Straipsnyje atskleidžiama, kaip, pasitelkęs skirtingų percepcinių dimensijų modeliavimo strategijų audijavimą, kompozitorius gali sukurti explicitinę (t. y. sąmoningo pasirinkimo būdu atsiradusią) gramatiką, apibūdinančią jo muzikinės ekspresijos individualias ypatybes.

2

AUDIACINĖS AUDIATION
TENDENCIJOS TENDENCES AND THEIR
IR JŲ RAIŠKA MANIFESTATION
ŠIUOLAIKINĖJE IN CONTEMPORARY
MUZIKOJE MUSIC

Prohibition *versus* Apotheosis of the Tritone: A Historical Perspective

Abstract. This paper explores the change of the concept of the tritone – from its prohibition to tritonic apotheosis as well as draws attention to the acoustic peculiarities of the “devil’s interval” (*diabolus in musica*¹). The tritone is a very small object but features a portentous and unique sound as well as problematic intensity. The peculiarity of the discussed interval has evoked multifarious creative expressions and has also provoked controversial theoretical speculations throughout music history. This paper aims to draw a historical perspective providing a comprehensive representation of both theoretical and practical approach to the tritone in relation to its acoustic intensity. Critical consideration of the most remarkable theoretical declarations and analytical inquiry into particular musical examples reveal the significance and functionality of a tritone in different historical contexts. The paper shows the constant change of conceptions, canons of usage, composition techniques and harmonic systems although referring to the same object on discourse.

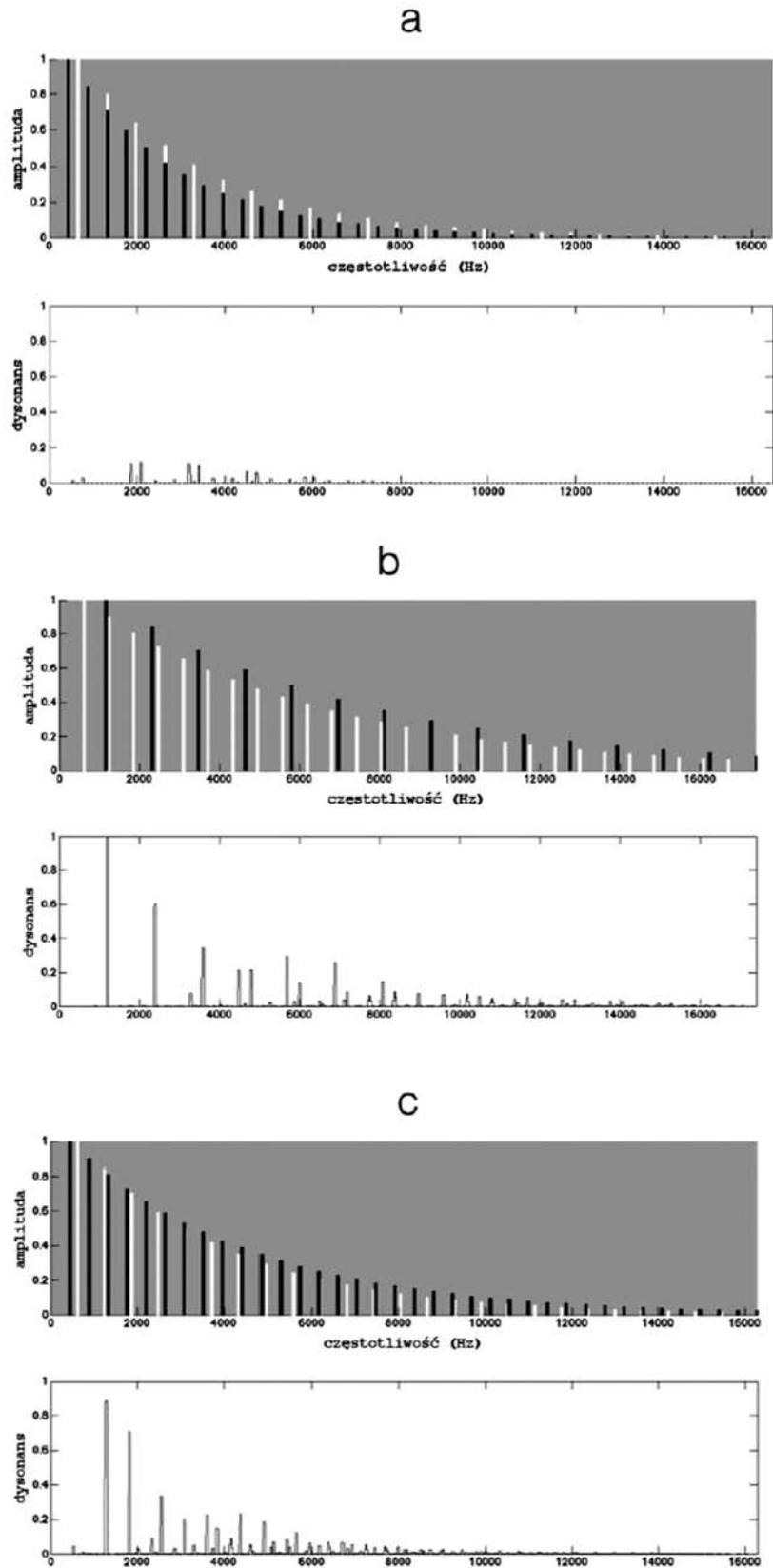
Keywords: tritone, dissonance, *diabolus in musica*, compositional process, musical symmetry, contemporary music.

Introduction: psychoacoustic peculiarities of the tritone and its musical perception

The uniqueness of the tritone, in terms of both theory and practice of composition, can be explained by its physical acoustic features. Such descriptions as rough, harsh etc. can be easily explained by the results of the cognitive music psychology of the 20th century. Tritone’s physical parameters vary in different harmonies: in the Pythagorean theory, increased fourth is 729:512, reduced fifth is 1024:729, and in the tempered combination is $\sqrt{2} = 1.414$. Roger Shepard (b. 1929) discovered that the tritone has unique acoustic parameters that determine its duality (Shepard, 1963). What does this mean? Research by Diane Deutsch (1986) showed that the perception of a tritone may vary: “One listener will perceive the sequence of sounds *C–F#* as an augmented interval, and *G–C#* – as a diminished interval, while the other listener will perceive a similar sequence of sounds *C–F#* as a diminished intonation, and *G–C#* – as an augmented one” (Deutsch 1986: 2). This psychologist argues that the perception of the tritone is dependent on the listener’s speech and dialect. David Butler assumes that a tritone is a necessary component for identifying a modal center, and after conducting a study (Butler 1989) he found that it was much easier for listeners who heard the tritone and tonic to set the tonality than for those to whom one triad was played after another. This allows us to conclude that the tritone, due to its acoustic characteristics such as volatility, stridency, uncertainty, has a traction to stable intervals, which allows us to set the modal center. In other words, it can be generalized by the principle from chaos to order. Speaking of the music of the 20th century, composer and theorist Ton de Leeuw characterized the tritone as enigmatic (mysterious, puzzling) interval (Leeuw 2005: 92).

One of the most important shifts relevant in tritone’s research can be found in works on acoustics of Herman von Helmholtz (1877) and Carl Stumpf (1898). Due to their research we have a new notion of acoustics as well as rise of music psychology based upon empirical data research. Their methods led to fundamental research of tone interactions. Tones ceased to be one dimensional, they were started to be treated from the perspectives of physics and psychology which revealed a new range of problems. Due to research in acoustics we are able to analyze and ground tritone’s sensory dissonance (it is important to make a distinction between sensory and cultural dissonance). According to Marcin Strzelecki (2014), tritone and major seventh have the least coincidence of partial tone pairs while the perfect fifth’s consonance is due to the merge of partial tones into one entity. Tritone’s and major seventh’s partial tones don’t coincide but are close to each other which raise local dissonances producing harsh and dissonant sound. According to the Example 1, we can conclude that tritone’s dissonance is described not only by abstract epithets such as sharp, harsh, unpleasant, and distant to nature but also by facts established by research in physics.

¹ Tritone as *Diabolus in Musica* was first mentioned by Johann Joseph Fux in his treatise *Gradus ad Parnassum* (Fux 1725: 51). Also, an epithet *Mi contra Fa est Diabolus in Musica* is dedicated to August W. Ambros and mentioned in his work *Geschichte der Musik* (Ambros 1880: 180, Band II).



Example 1. Sensory dissonance: (a) perfect fifth, (b) tritone, (c) major seventh (Strzelecki 2014: 9)

1. Theoretical and practical approach to the tritone before the 20th century

The culturally dependent notion of dissonance can evolve and frequent use of it can make tritone's dissonance perception less harsh. On the other hand, the sensory dissonance of the tritone will always remain the same. Much research was carried out into human hearing and music perception in the 20th century. However, the results still are not final as together with changes in music (across the vertical, horizontal and diagonal dimensions) there are also changes in cultural hearing. This article will continue to discuss the change of the concept of the tritone in different historical times, from the Middle Ages (prohibition of the tritone) to the 20th century (apotheosis of the tritone).

1.1. *Diabolus in musica*: the tritone in the theory of the Middle Ages and the Renaissance

Etymologically, “*tritonus* – three tones, derived from the Greek *τρίτονον* from *τρίς* – three times and *τόνος* – tension, tone raising. Italian – *tritone*; English *tritone*” (Troschke 1989: 1). *Τρίτονον* or *τριτης* can already be found in the writings of Euclid, Aristotle as well as the Aristoxenus of Tarentum (375–335 BC) treatise *Principles of Harmony (Elementa harmonica)*, written c. 300 years BC. In the article *Tritonus* (1989) by Michael von Troschke, it is noted that the Greek form was replaced by Latin *tritonus* in medieval writings, and the first written sources mentioning this form of the word are found in the treatise *Micrologus* (1025/26) by Guido Aretinus (991–1033), and in the treatise *Opuscula Musica* (c. 1030) by Hermanus Contractus (1013–1054).

In the Middle Ages, the tritone is often referred to as a problematic interval: in pitch organizing systems it is called *confusio* (“confusion, confounding”), in compositional practice – *non multum in usu* (“use a small amount”), in the systems of pitch relationship it is described as *asper* (“rough”). In the Middle Ages and the Renaissance, the tritone – *diabolus in musica* – was treated as an unwanted interval both vertically and horizontally. The use of the tritone (as an augmented fourth or a diminished fifth) in ecclesiastical music was strictly forbidden, and in strict style it was forbidden to follow the sequence of two major thirds one by one (*f–a, g–b*), because of the tritone which turns up between the encompassing pitches of the sequence.

The name *Diabolus in musica* (the devil in music) was applied to the interval of the tritone, which theorists and composers considered most dangerous. The rule *mi contra fa* in the medieval hexachord theory was the main warning of possible sequences including the dangerous interval. The rule *mi contra fa* forbade the use of the whole tone between the third and fourth degree of hexachord in the system of pitch organization, as the tritone was formed by the intersection of two hexachords, namely between *Hexachordum durum* and *Hexachordum naturale*. This interval also occurred between *e* of the natural hexachord (*Hexachordum naturale*) (syllable *mi*) and *b_b* of the minor hexachord (*Hexachordum molle*), which equals the syllable *fa* in the Guido system. Guido Aretinus refers to the tritone (*tritonus*) in his treatise *Micrologus* (1025/26), where he describes the relation between *b_b* and *b_♯* and the possibility of the formation of a tritone in the harmony of concords. He suggests systematizing the use of *b quadratum* (*b_♯*) and *b rotundum* (*b_b*) vertically and horizontally to avoid confusion. The system of alternative variants of *si* was founded to eliminate the tritone.

In order to avoid the tritone in music, medieval theorists created rules that had to be followed by music makers. By the end of the 13th century, a strict rule of pitch organization prevailed: “After the first (*a*), fourth (*g*) and seventh (*e*) tone of the scale, the whole tone had to follow; the second (*e*) and the fifth (*a*) tones were supposed to be surrounded by the whole tone from the bottom and the semitone from the top; the third (*f*) and the sixth (*b*) tones had to be surrounded by a semitone from the bottom and a whole tone from the top” (Troschke 1989: 6). It was this rule that eliminated the possibility of the tritone formation in music and allowed to avoid “rough” dissonances. It's important to mention that the music of the 13th century was mainly vocal and all the rules (how to avoid the tritone) were created naturally because of the problems of the tritone intonation.



Example 2. The rule of organizing pitches (*Regula*)

In the 14th century, the concept of the tritone began to change gradually. Hugo Spechtshart from Reutlingen, Baden-Württemberg, noticed that the rare use of the tritone in music could enrich it, bringing in a “sweet resonance” (*dulcis resonantia*) (Troschke 1989: 6). Tritone was started to be used in weak parts of the measure, syncope or cadence. On the contrary, in *Liber de arte contrapuncti* (1477), Johannes Tinctoris

(1435–1511) named a tritone to be an enemy of nature/naturalness, which is not only unpleasant to the ear, but which is impossible to be sung in tune for the human voice in both ascending or descending direction: “The nature of a tritone as a dissonance is hostile to nature, it is annoying and irritating to human hearing” (Troschke 1989: 6).

In the 16th century, the theoretician Gioseffo Zarlino (1517–1590) in his treatise *Le institutioni harmoniche* (1558) argues that the sequence of two major thirds or minor sixth is an unacceptable conduct of voices because there are no harmoniously related intervals as their sequences create distant intervals in the tritone ratio.



Example 3. Sequences of the thirds

In the Renaissance, the concept of composing music changed dramatically. Zarlino (1558/1976) emphasizes the increasing importance of the tritone in the vertical, and especially in the cadences. The theorist points out that music begins to break, with special changes in the composite vertical and horizontal.

Nicola Vicentino (1555), before Artusi’s criticism of Monteverdi, suggested using a tritone not only when it accidentally appears as hexachords are overlapping on the diagonal or as a random phenomenon in the vertical, but also to enter the tritone jumps in the melodic line. He also discusses the problems associated with tritone intonation, but states that these properties of the interval are irreplaceable to produce a “magic” effect. It is emphasized that the tritone interval used in the ascending direction (e.g. *c-fis*) causes the effect of joy, while its appearance in the descending direction (e.g. *fis-c*) evokes the effect of a great sadness. Vicentino argues that there are more and more singers who practice tritone intonation and are not “ashamed” of this interval at all. He points out that if we can accurately intonate a tritone, when it is filled with other intervals (e.g. *f-g-a-b*), then why cannot we get used to the intonation of the tritone jump? In his opinion, everything depended on practice: “Many times repeating the same, though the heaviest task, over time, it becomes easy to overcome in all professions” (Vicentino 1996: 77). Nowadays, however, it is easy to check on a computer that even those singers who intonate other intervals with great precision will always raise or lower the tritone. In other words, there is a natural traction towards constant intervals, or a tritone deactivation.

In the work *Mannerism in Italian Music and Culture, 1530–1630* by Maria Rika Maniates (1979), Vincenzo Galilei (1520–1591) and Claudio Monteverdi (1567–1643) are distinguished as the main innovators of music. In his compositional practice, Galilei has distinguished such dissonances as semitone, whole tone and the seventh. Galilei named the tritone as “intermediate” dissonance. Maniates (1979) points out that these intervals are distinguished by Galilei as being less harsh and indicates that they can be used in music under less stringent rules as attributable to semitone, whole tone and the seventh. Monteverdi called this method *seconda prattica* in order to emphasize the difference between the new and the old traditions (the latter greatly supported by Zarlino and Giovanni M. Artusi). Meanwhile, Vicentino named the tritone as the most undervalued interval in compositional practice, and the effect it produced was named as amazing or heavenly. Artusi condemns Monteverdi for the inappropriate use of the tritone in music in his treatise *Delle imperfezioni della moderna musica* (1600–1603) and emphasizes that the rules of strict counterpoint provided by authoritative theorists should be followed. The limits of diatonic become ineffective as even greater stylistic innovations appear in music, and they begin to deform to increasingly complex, complicated structures in case of mannerism.

Despite the fact that the tonal-functional system was finally formed in the 18th–19th century, and, at the end of the epoch, it was already affected by various deformation processes, until the 18th century the tritone was called cunning, unnecessary, imperfect – *quarta falsa* and *quarta superflua*, *quinta deficiens* (Troschke 1989: 1). Artusi became a great critic of Monteverdi, and responded about the tritone in his music as follows: “The singer, who has performed the work, has not understood whether he has sung correctly or incorrectly” (Artusi 1600: 43). Regardless of the rules, Monteverdi uses two tritones sequentially without any solution. In the examples from the *Litany of Loretto* (17th century), you will see that the tritone in the seventh chord of the dominant is introduced from the fourth degree (*d-f-a*) and solved into tonic A minor.

Example 4. Claudio Monteverdi. *Litany of Loretto* (1620), mm. 261–265

The philosopher, scientist, musician of the 17th century Marin Mersenne emphasizes the importance of intervals to carry out expression in his treatise *Harmonie Universelle contenant la theorie et la pratique de la musique* (1636/37). He suggests using the tritone² in music to trigger a tension, energy effect, or convey a mood of war.

1.2. The tritone in the musical rhetoric of the Baroque

René Descartes (1649) distinguishes six affections: admiration, love, hatred, craving, joy, and sadness (*Admiration, Amour, Haine, Désir, Joie, Tristesse*). A deeper look into the theory of affects has revealed that it was precisely with regard to the affect of love that the tritone was forbidden. Here the nature of the word harmony should be addressed and its link with Greek mythology. Harmony, the daughter of Aries and Aphrodite, is directly related to the nature of love and unity. Here the link between the affect of love and harmony is drawn, which is directly related to the tritone. In Rolf Dammann's theoretical work *Der Musikbegriff im deutschen Barock* (1984), the affect of love (in which the tritone was forbidden to use) is compared to the affect of sadness (according to the text), but here, on the contrary, dissonances were desirable.

In the music of Renaissance or Baroque, it is common to use musical rhetoric or otherwise called *musica poetica*³, which defined the connection between music and poetic text. Tritone in this theory is associated with tragic, sad death, and is used to enhance the psychophysical effect by invoking emotions, conveying meaning to the listener.

The second part of Johann S. Bach's cantata *Sehet, wir gehn hinauf gen Jerusalem* (1729) BWV 159 begins with the words *O harter Gang! hinauf? O ungeheurer Berg, den meine Sünden zeigen!*, and in order to strengthen the meaning of the text, the composer uses the tools of the theory of affects: *O harter Gang* is enhanced by MRF (musical rhetorical figure) *multiplicatio* and *saltus duriusculus* as well as *O ungeheurer Berg* is enhanced by *parrhesia*⁴, *saltus duriusculus*⁵; in both cases, the tritone becomes the main intonational element.

² "The upper voice lines (*chant*) moves in a half-tone causing emotion of sadness, while the major thirds in the melody cause the emotion of joy... The emotion of sadness and love can best be expressed in major half-tone and minor half-tone (*demi-ton majeurs, moyens at mineurs*). In order to convey an energetic or war mood, the composer must use full tone sequences (*presentees par les tons*), major thirds and sixths (*et par les Tercies et les Sixtes majeures*) as well as tritones (*ou par la Quarte juste juste ou superflue*)". Mersenne, 1636, "La Voix" 1636: 41; "Les Consonances" 1636: 360 (rev. Ranum 2001: 385).

³ More about *musica poetica* in Eggebrecht, Hans Heinrich [Hrsg.]: *Handwörterbuch der musikalischen Terminologie*, internet access: <http://daten.digitale-sammlungen.de/~db/0007/bsb00070512/images/>

⁴ More about *parrhesia* in Bartel, Dietrich *Musica Poetica: Musical-Rhetorical Figures in German Baroque Music*: "The insertion of a dissonance such as cross relation or tritone on a weak beat" (Bartel 1997: 352).

⁵ More about *saltus duriusculus* in Bartel, Dietrich *Musica Poetica: Musical-Rhetorical Figures in German Baroque Music*: "The harshness of the leaps is conveyed through the word *durus*, meaning not only "hard, harsh" but also "rough, brazen". This negative connotation is particularly well suited to express a text..." (Bartel 1997: 381).

The image shows a musical score for a recitative piece. The top system features a vocal line with the lyrics "O harter Gang! Hin - auf? O un - ge - heurer Berg, den meine Sün - den" and a piano accompaniment. The bottom system continues the vocal line with "zeigen! Wie sau - er wirst du müs - sen steigen!". Several tritone intervals are highlighted with boxes and lines connecting them across the vocal and piano staves.

Example 5. Johann S. Bach. *Sehet, wir gehn hinauf gen Jerusalem* (1729) BWV 159, mm. 10–14

In Bach's works there are many rhetorical figures that help to give a sense to music or emphasize the meaning of the text. Aleksandra Pister (2005) defines *saltus duriusculus* as a "disposable jump that is used in the melody" (Pister 2005: 31). In Bach's cantata *The Passion according to Saint Matthew* BWV 244, the tritone is used when it comes to lies, death and murder to emphasize the tragedy of the situation: "... droht den Pfleger zu ermorden; denn es ist zur Schlange worden" (Bach 1736: 53). Three tritones are played in the word *Schlange* (snake) vertically (*e-a#*) horizontally and diagonally (*e-a#*). Due to the acoustic properties of the tritone, tension is created.

The image shows a musical score for an aria from a cantata. It includes staves for Flute (Fl.), Violin (Vl.), Viola (Vla.), Soprano (S.), and Contralto (Cnt.). The lyrics are "droht den Pflieger zu ermorden, denn es ist zur Schlange worden,". The score features complex rhythmic patterns and several tritone intervals highlighted with boxes and lines, particularly in the vocal lines.

Example 6. Johann S. Bach. *The Saint Matthew Passion* BWV 244, Aria Coro II, mm. 40–44

The analysis of the compositions revealed that the tritone acted not only as a composite element coordinating horizontal, vertical and diagonal, but was also part of the rhetoric. In many cases, it is associated with the symbolism of numbers or is intended to enhance the meaning of the text.

2. Evolution of the concept of a tritone in theory and practice of the 20th century

It can be said that there was a real breakthrough in the approach to the tritone: from the hard-to-explain, unused and banned interval, the tritone became the inevitable interval in music of the 20th century, based on many composing systems. As we examine the evolution of the concept of the tritone in the context of theoretical systems of the 20th century, we note that the most intense debate arises from the approach to the interval.

2.1. Theoretical insights into the intensity of the harmonic tritone

In theoretical and practical systems, the tritone is increasingly associated with harmonic/melodic intensity or tension. Arnold Schönberg (1874–1951) introduces the term *vertical tension* (Ger. *Intensität*), Józef Kon (Юзеф Гейманович Кон, 1920–1996) – *vertical density* (Кон 1973: 299), and Paul Hindemith (1895–1963) – *harmonic intensity* (Hindemith 1945: 219), or more specifically “beating” (Ger. *Gefälle*). Thus the relatively new conception of sound intensity and tension, which has been generalized and “scanned” from the most important tritone acoustic features, comes into the view of composers and theorists.

Such theorists as Herbert Eimert (1897–1972), Vincent Persichetti (1915–1987), Ernst Křenek (1900–1991), Rimantas Janeliauskas (b. 1947) do not only relate the tritone to tension in their research, but also take the next step trying to mathematically calculate and theoretically justify the intensity of chords. Howard Hanson (1896–1981) joined in the discussion and talking about the tension in consonances in his book *Harmonic materials in modern music: resources of the tempered scale* (1960), faces the problem of determining the degree of consonance and dissonance. Hanson argues that the concentration of several dissonances and consonances in one compound makes it difficult to judge the level of tension in the consonance (Hanson 1960: 2–4).

The tension and intensity of the consonances also became the basis of the theory of Ernst Terhardt (b. 1934). The scientist explains in detail the concepts of chords, intervals, consonance/dissonance and harmony. This theory speaks about human hearing and its different levels when trying to identify the main tone of the consonance. Here is an allusion to Paul Hindemith’s *Die Reihe 2*. Hindemith also supports Terhardt, who points out that the better the key tone is determined, the brighter consonant or dissonant sensation is. It should be emphasized that tritonic dissonance and instability are very pronounced, because the tritone does not have a basic tone, in other words, neither the upper nor the lower tones have any preconditions for the combination tone. The volatility of the tritone causes a psychophysiological effect of agitation and tension.

In the book *Twentieth-Century Harmony: Creative Aspects and Practice* (1961), Persichetti distinguishes open consonances, soft consonances, soft dissonances, sharp dissonances. In this system, like in Hindemith’s theory, the tritone is called a neutral interval. The system presented by Persichetti clearly correlates with the Hindemith’s system. By consistently compiling Persichetti’s (1961) sequence from open consonances to sharp dissonances and tritone, we obtain Hindemith’s *Reihe 2*. In the Persichetti’s sequence (Ex. 7), the tritone is the last interval, and the position of the other intervals is also identical to the Hindemith’s *Reihe 2*.



Example 7. The sequence from open consonances to sharp dissonances (Persichetti 1961: 15)

Arnold Schönberg (1874–1951), contrary to Hindemith’s theory, characterizes dissonances as remote consonances. In the chapter *Konsonanz und Dissonanz* of *Harmonielehre* (1911/1922), he distinguishes only prima and octave as perfect intervals. Using the harmonic overtone spectrum, he scales all intervals, starting with octave according to the degree of consonance. The further the interval from the octave, the lower its consonance index. The tritone follows seconds and sevenths on his scale, as the theorist names dissonant intervals (the most distant consonances): “Semitone and major seventh, full tone and minor seventh, as well as all reduced and increased intervals” (Schönberg 1922: 18). For Schönberg, the consonance-dissonance ratio is not particularly significant as its composition system emphasizes the equivalence of intervals.

Kon (1971) accurately named the degree of tritonic dissonance, which he measured according to his own scale of interval dissonance. Consonances include the lowest while a tritone the highest degree of dissonance (i. e., 13) in this system. The theorist bases the chord dissonance and consonance on the property of vertical density (Кон 1971: 299). His method of analysis consists of mathematical actions: mathematically calculated chord density using interval indices. Kon claims that “chord density depends on interval composition, layout, and register” (Кон 1973: 303–304). The line made by Kon closely correlates with Hindemith and Persichetti, but this sequence is complemented by degrees of dissonance.



Example 8. The number index system provided by Kon (Kon 1971: 306)

Vincent Persichetti (1915–1987) attributes the concept of *neutral* to the tritone, while Kon, on the contrary, assigns the index of the maximum dissonant interval. So how can we measure the vertical density under Kon’s system? This theorist introduces a rule to measure the composite intervals: if the interval exceeds one octave, the index must be subtracted from 1, if two octaves – 0.5, if three – 0.25, if four – 0.125. In this way, Kon introduces different coefficients for all octaves: 3 – for sub-contra octave and contra octave, 4 to C–c, 5 to c–c', 6 – c'–c'', 7 – c''–c''', 8 – c'''–c''''', 9 – c''''–c''''', 10 to c''''.

The tritone index in the system is 13 if we expand it to an increased eleventh (*undecima*), we will have to subtract 1 (13 – 1), and thus we will get an increased eleventh (*undecimal*) density of 12, which is identical to the density of the semitone. Here we find an inaccuracy, because the chord intervals are formed not only from the lowest tone, but also from the other tones, however, it remains not calculated. Indeed, in Kon’s theoretical works, we see the beginning of the calculations of vertical density and rhythm intensity, but this idea is not systematized. Rimantas Janeliauskas (1983) argues that the determination of acoustic intensity is very complicated, and it is not enough to use only the structural characteristics of the chord, but attention should also be paid to chord function, context: dynamics, register, layout, texture, rhythm. The theorist assigns mathematical indices to intervals, but unlike Kon, in the system of Janeliauskas, indices end with a tritone. Milton Babbitt assigns a central position to the tritone in the sequence of twelve tones in his article *Twelve-Tone Invariants As Compositional Determinants* (1960). By operating that the tritone symmetrically divides the octave into two parts (12/2), the theorist assigned it Index 6 (Babbitt 1960: 254). All broader than tritone intervals, analogously to Janeliauskas, are considered by the theorist as inversions of the former. Janeliauskas proposes to sum up the structural degrees of all intervals and divide the result by the number of tones. The tritone in this system is between the third and the second, which happens because the theorist uses the spectrum of overtones ($C - c - g - c^1 - e^1 - g^1 - b^1 - c^2 - d^2 - e^2 - fis^2 - g^2$), where there is no exact place of the tritone between adjacent overtones and it is formed between the edge tones of reduced triads. However, tritones are also formed between $b^1 - e^2$ or $c^2 - fis^2$, then it remains unclear why the tritone is not at the end but in the middle of the sequence.

As we examine the evolution of the concept of the tritone in the context of the theoretical systems of the 20th century, we note that the most heated debate arises from the position of the interval in theoretical systems.

Persichetti and Křenek call the tritone a neutral, restless interval, Hindemith – extreme dissonance, Kon attributes the highest dissonance index to the tritone, Javorski calls it the most volatile interval, and Cope attributes the description of the “extremely unpredictable” interval to the tritone (Cope 1977: 15).

The absolute majority of the discussed theories are created using the spectrum of overtones. The tritone interval does not form in the natural sequence of sounds; therefore we assume that this leads to a complicated classification of the tritone and the formation of different approaches to this interval in the theories of the 20th century. Comparing the change of the concept of the tritone with the assumptions of earlier theorists, analogies can be distinguished: Schönberg – Vicentino; Cope – Aretinus and Contractus; Hindemith, Javorski, Kon, Hanson – Tinctoris, Mersenne, Zarlino; Persichetti; Křenek – Aaron, Coclino.

	Neutral	Unstable	Dissonance	Very unpredictable	Consonance
In the 20th century	Persichetti (1961); Křenek (1940)	Javorski (1972)	Hindemith (1945); Hanson (1960)	Cope (1977)	Schönberg (1922)
Before the 20th century	Must be resolved or avoided.	Creates a tension, energy effect, suitable for conveying the mood of the war; it is hateful to nature; it is annoying and irritating to human hearing.		Sly, needless, imperfect.	Wonderful, heavenly.
	Aaron (1976); Coclico (1552)	Tinctoris (1447); Mersenne (1636–1637/2001); Zarlino (1558)		Aretinus (1876); Contractus (2015)	Vicentino (1996)

Table 1. Parallels between theories of the 20th century and earlier historical periods (Middle Ages and the Renaissance)

In the 20th century, the tritone began to be called a neutral interval, possibly related to the autonomy of all intervals in composite systems as well as the ever-decreasing boundary between consonances and dissonances.

2.2. Symmetrical sequences of tritones as a manifestation of systemic constructivism

In the composition of the 20th century, the changes in the harmonic structure of the work were especially highlighted. Not only the elements of chord structure have changed cardinally, but also the concept of the vertical itself – from the particular chord (function) to the consonance. The vertical (consonance) has acquired many recognizable and characteristic qualities. It was in the composition of the 20th century that the characteristic and independence of the vertical became apparent, i.e. the chord relations no longer have a center of tonal attraction. Verticals are increasingly characterized by concepts such as intensity. Conceptualizing these innovations, Janeliauskas (2002) clearly differentiates the concept of intervals between traditional functional/modal perception and the concept of *structural interval tonality*.⁶

In the series of Anton Webern's (1883–1945) Symphony Op. 21 (1927–1928), we observe the tritones emanating from the central tritone, but also the tritones in the vertical in the form of a series (P, I, R, IR). It is important that the initial twelve-tone series form (P) and its retrograde (R) interval structure are identical. Investigating the principles of the tritone operation further, we found that it forms symmetrical structures in the vertical, horizontal and diagonal. The tritone divides the series (P0) in half, and the fact that the tritone reversal is equal to itself, creates the conditions for an identical series cut at the tritone interval in all its forms.

	I ₀	I ₉	I ₁₀	I ₁₁	I ₇	I ₈	I ₂	I ₁	I ₅	I ₄	I ₃	I ₆	
P ₀	A	G _b	G	A _b	E	F	B	B _b	D	D _b	C	E _b	R ₀
P ₃	C	A	B _b	B	G	A _b	D	D _b	F	E	E _b	G _b	R ₃
P ₂	B	A _b	A	B _b	G _b	G	D _b	C	E	E _b	D	F	R ₂
P ₁	B _b	G	A _b	A	F	G _b	C	B	E _b	D	D _b	E	R ₁
P ₅	D	B	C	D _b	A	B _b	E	E _b	G	G _b	F	A _b	R ₅
P ₄	D _b	B _b	B	C	A _b	A	E _b	D	G _b	F	E	G	R ₄
P ₁₀	G	E	F	G _b	D	E _b	A	A _b	C	B	B _b	D _b	R ₁₀
P ₁₁	A _b	F	G _b	G	E _b	E	B _b	A	D _b	C	B	D	R ₁₁
P ₇	E	D _b	D	E _b	B	C	G _b	F	A	A _b	G	B _b	R ₇
P ₈	F	D	E _b	E	C	D _b	G	G _b	B _b	A	A _b	B	R ₈
P ₉	G _b	E _b	E	F	D _b	D	A _b	G	B	B _b	A	C	R ₉
P ₆	E _b	C	D _b	D	B _b	B	F	E	A _b	G	G _b	A	R ₆
RI ₀	RI ₉	RI ₁₀	RI ₁₁	RI ₇	RI ₈	RI ₂	RI ₁	RI ₅	RI ₄	RI ₃	RI ₆		

Example 9. Anton Webern. Symphony Op. 21 (1927–1928) series⁷

We have noticed that the tritone on the diagonal (*A₅-D*) forms a symmetrical structure, but this principle occurs not only in the diagonal but also in the forms of a series: e.g. between (P) part 1 and (R) part 2, (I) part 1 and (RI) part 2. Each segment of a series has its own equivalent in other modifications of a series. The diatonic-sounding series is actually made up of tritones. We have noticed that every single form in the center saves one tritone, which allows us to consistently analyze the entire composition.

⁶ More about it: Janeliauskas, Rimantas (2002). Monaric as a companion of composing. *Lithuanian Musicology*, Vol. 3. Vilnius: Lithuanian Academy of Music, Institute of Culture, Philosophy and Art, p. 73–105.

⁷ In the matrix of works by Webern and Schönberg, tone *B = H*, tone *B_b = B*.

Anton Webern begins *Symphony* Op. 21 (1927–1928) with different variants of the prime form of the row. In this part, Webern uses P0, P4, P5, R1, R3, RI1, RI2, and RI6. These forms of the row are exposed sequentially, i.e. the tones are arranged in a sequence from 1 to 12. The tritone in this part usually occurs vertically (m. 7, 9, 19, 21) and several times in the horizontal (m. 8, 14, 15, 16). It is important to emphasize that the series is used conceptually as the main series is exposed in twelve bars (mm. 1–12). The series is orchestrally divided into segments: the first four tones (*A-Fis-G-As*) are exposed in the first four bars followed by a pause, then two more segments are exposed (*E-F, H-B*). The last segment of the series consists of four tones (*D-Cis-C-Es*), which means that it is symmetrical to the first. It is possible to split the series into three tones, thus obtaining a musical palindrome.

Example 10. Anton Webern. *Symphony* Op. 21 serial palindromes

It is possible to express this structure numerically, which further reveals the symmetry of this tritone-based series: $3 + 1 + 1 - 4 + 1 \pm 6 - 1 + 4 - 1 - 1 + 3$. In the second part (mm. 27–58), the composer uses P7, P8, P10, R3, R5, R4, RI3, but in this part the tones are not always consistently exposed in sequence. The tones of the rows are divided into different registers: the R3 series, which begins at the 26th bar and ends at 33rd, and its tones are split into one for each instrument. In this subdivision, the tritones are broken not only vertically, horizontally, but also diagonally. In the last division (mm. 59–66), it comes back to the serial forms P1, P4, P5, P8, which were exposed at the beginning of the work. It is important to emphasize that identical serial forms are exposed (P4 and P5) at the beginning and the end of the composition. There is an allusion to the arch form, because we see material at the end that is initially exposed in a similar way. When we listen to a piece of work, we hardly associate these two divisions; we can only identify it by looking at the score. Paradoxically in tonal music we always pay attention to a tritone while in music based on tritones we do not distinguish them and therefore it is hard to analyze them by hearing.

Conclusions

It can be said that in the approach to the tritone there was a real breakthrough: from the hard-to-explain, unused and banned interval in music to the inevitable role in the music of the 20th century, based on many composing systems. As we examine the evolution of the concept of the tritone in the context of the theoretical systems of the 20th century, we note that the greatest debate arises because of the different theoretical position regarding the interval.

The 20th century brought new challenges and problems at the same time associated with the tritone. It is assumed that the change in the concept of a tritone, which is directly related to the change of the conception of a tritone, determines the emergence of new composing systems. This becomes obvious in the 20th century where the tritone strongly determines the compositional process as well as generates horizontal, vertical, and diagonal structures. In this paper, we regarded the concept of the tritone from its prohibition to tritonic apotheosis as closely related to compositional processes.

Sources of examples and tables

- Example 1. Sensory dissonance: (a) Perfect Fifth, (b) Tritone, (c) Major Seventh. Example came from: Marcin Strzelecki doctoral thesis (2014: 9).
- Example 2. Created by the author of this article, but ideas and information came from: Troschke, von, Michael (1989). Tritonus. HmT – 17. Hamburg: Auslieferung.
- Example 3. Created by the author of this article, but ideas and information came from: Zarlino, Gioseffo (1558). *Le institutioni harmoniche*. Venice: Francesco dei Franceschi.
- Example 4. Analysis of Johann Sebastian Bach *Sehet, wir gehn hinauf gen Jerusalem* (1729) BWV 159, mm. 10–14. Created by the author of this article.
- Example 5. Analysis of Johann Sebastian Bach Matthäus-Passion BWV 244. Created by the author of this article.
- Example 6. Analysis of Claudio Monteverdi. *Litany of Loretto* (XVII a.), p. 32. Created by the author of this article.
- Example 7. Persichetti, Vincent (1961). *Twentieth-Century Harmony: Creative Aspects and Practice*. W. W. Norton & Company.
- Example 8. Юзеф Гейманович (1971). Об одном свойстве вертикали в атональной музыке. *Музыка и современность*, вып. 7 [сб. статей]. М.: Музыка, p. 294–318.
- Example 9. Created by the author of this article.
- Example 10. Created by the author of this article.
- Table 1. Created by the author of this article.

References

- Aaron, Pietro (1976). *Libri tres de institutione harmonica* (Bologna: Benedetto di Ettore, 1516). New York: Broude Brothers.
- Ambros, August Wilhelm (1880). *Geschichte der Musik II Band*. Leuckart, Leipzig.
- Aretinus, Guido (1876). *Micrologus Guidonis de disciplina artis musicae*. Trier: Commissionsverlag J. B. Grach. <https://archive.org/details/micrologusguido00hermgoog> [Accessed 22 January 2017].
- Aristoxenus (1902). *The harmonics of Aristoxenus*. Edited with Translation, Notes, Introduction, and Index of Words. By Henry S. Macran, M.A. Oxford: Clarendon Press. <https://archive.org/details/harmonicaristo00arisgoog/page/n6> [Accessed 22 January 2017].
- Artusi, Giovanni (1600/1950). *L'Artusi, ovvero Delle imperfezioni della moderna musica*. Venice: Giacomo Vincenti. (trans. O. Strunk). In: *Source Readings in Music History*: 393–404. New York: W.W. Norton & Co.
- Babbitt, Milton (1960). Twelve-tone invariants as Compositional determinants. *The Musical Quarterly*, Vol. 46, No. 2: 246–259. Special Issue: Problems of Modern Music.
- Bartel, Dietrich (1997). *Musica Poetica: Musical-Rhetorical Figures in German Baroque Music*. University of Nebraska Press.
- Coclico, Adrianus Petrus (1552). *Compendium musices*. Nuremberg: Joannis Montani & Ulrichi Neuberi. Contractus, Hermanus (2015). *Opuscula musica*. (trans. Ellinwood, Leonard, New edition). *Eastman School of Music Studies*, No. 2: 413–422. Rochester: University of Rochester.
- Cope, David (1977). *New Music Composition*. New York.
- Dammann, Rolf (1984). *Der Musikbegriff im deutschen Barock*. Laaber: Verlag.
- Descartes, René (1649). *Le passions de l'ame*. Paris: Henry Le Gras.
- Deutsch, Diana (1991). The Tritone Paradox: An Influence of Language on Music Perception. In: *Music perception*, Vol. 8: 335–347. University of California.
- Fux, Johann Joseph (1725). *Gradus ad Parnassum*. Typis Joannis Petri Van Ghelen. Vienna, Austria: Sacrae Caesareae Regiaeque Catholicae Majestatis Aula-Typographi.
- Hindemith, Paul (1945). *The craft of musical composition*. Book I. New York.
- Hanson, Howard (1960). *Harmonic materials in modern music: resources of the tempered scale*. New York.
- Helmholtz, Herman (1877). *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik*. 1877, 6th ed., Braunschweig: Vieweg, 1913; vert. A. J. Ellis as *On the sensations of tone as a physiological basis for the theory of music* (1885). Reprinted New York: Dover, 1954.
- Janeliauskas, Rimantas (1983). *Funkcinės dinamikos aspektai šiuolaikinių lietuvių kompozitorių kūryboje*. Doctoral thesis. Valstybinė konservatorija.
- Janeliauskas, Rimantas (2002). Monarika kaip komponavimo bendrybė. In: *Lietuvos muzikologija*, Vol. 3: 73–105. Vilnius: Lietuvos muzikos akademija, Kultūros, filosofijos ir meno institutas.
- Křenek, Ernst (1940). *Studies in counterpoint*. New York.
- Leeuw, Ton de (2005). *Music of the Twentieth Century: A Study of Its Elements and Structure*. Amsterdam University Press.
- Maniates, Maria, Rika (1979). *Mannerism in Italian Music and Culture, 1530–1630*. The University of Chicago Press: Renaissance Society of America.
- Mersenne, Marin (1636–1637/2001). *Harmonie Universelle contenant la theorie et la pratique de la musique*. Paris: Centre national de la recherche scientifique. <http://gallica.bnf.fr/ark:/12148/bpt6k5471093v>. [Accessed 01 April 2017].
- Persichetti, Vincent (1961). *Twentieth-Century Harmony: Creative Aspects and Practice*. W. W. Norton & Company.
- Pister, Aleksandra (2005). Muzikos retorikos tradicija Johano Kuhnau „Bibliinė istorijose“. Teorinis konceptas. I dalis. In: *Lietuvos muzikologija*, VI: 6–33. Vilnius: Lietuvos muzikos ir teatro akademija.
- Schönberg, Arnold (1922). *Harmonielehre*. Vienna: Universal Edition.
- Spechtshart, Hugo (1488). *Flores musicae*. <https://archive.org/details/ita-bnc-in1-00000531-001>. [Accessed 13 June 2017].

- Strzelecki, Marcin (2014). *Relacje pomiędzy harmoniką a brzmieniem w muzyce XX wieku*. Doctoral thesis. Krakowska akademia muzyczna.
- Stumpf, Carl (1898). *Konsonanz und Dissonanz. Beiträge zur Akustik und Musikwissenschaft*, 1: 1–108. <http://echo.mpiwg-berlin.mpg.de/ECHODocuView?url=%2Fpermanent%2Fvlp%2Flit38474%2Findex.meta&cpn=10&start=1> [Accessed 8 June 2019].
- Ernst, Terhardt (1974). Pitch, Consonance, and Harmony. In: *Journal of the Acoustical Society of America*, Vol. 55: 1061–1069.
- Tinctoris, Johannes (1477). *Liber de arte contrapuncti*. (red. Albert Seay; 1975) http://www.cengage.com/music/book_content/049557273X_wrightSimms/assets/ITOW/7273X_00_Musical_Interlude_4a_ITOW_Tinctoris.pdf. [Accessed 25 January 2017].
- Troschke, von, Michael (1989). Tritonus. HmT – 17. Hamburg: Auslieferung.
- Vicentino, Nicola (1996). *L'antica musica ridotta alla moderna prattica* (Rome, 1555; facs. ed., Kassel, Basel, London, and New York: Bärenreiter, 1959); trans. Maria Rika Maniates as *Ancient Music Adapted to Modern Practice*. New Haven and London: Yale University Press, 1996). https://www.musicologie.org/Biographies/v/vicentino_nicola.html [Accessed 26 January 2017].
- Zarlino, Gioseffo (1558). *Le istituzioni harmoniche*. Venice: Francesco dei Franceschi.
- Юзеф Гейманович (1971). Об одном свойстве вертикали в атональной музыке. In: *Музыка и современность*, вып. 7 [сб. статей]. М.: Музыка, 294–318.
- Яворский, Болеслав Леопольдович (1972). *Воспоминания, статьи, переписка*. Том 1. (red. Rabinovitch). М.: СК.

Nuo tritonio draudimo iki apoteozės: istorinė perspektyva

Santrauka

Nedidelis tyrimo objektas – tritonis – turi labai plačią savo sampratos kismo istoriją. Neatsitiktinai tai lemia ir itin įvairiapusių taikomų teorinių modelių bei analizės technikų spektrą. Nors muzikos sintaksėje tritonis yra vienas mažiausių elementų, jis pasižymi ypatinga ne vien savo skambesio, bet ir tyrimo problematikos įtampa. Jo funkcionalumą ir reikšmingumą liudija kintanti samprata bei naudojimo kanonai skirtinguose muzikos istorijos tarpsniuose: nuo jo draudimo (viduramžiais), toleravimo (Renesanso, baroko laikotarpiais), įsigalėjimo (klasicizmo, romantizmo laikais) iki apoteozės XX a. kompozicinėje technikoje bei harmoninėse sistemose.

XX a. tritonio intervalas tampa neatsiejama kompozicinės vertikalės ir horizontalės dalimi. Teorinėse ir praktinėse sistemose tritonis vis dažniau siejamas su harmoniniu / melodiniu intensyvumu, įtampa. Į kompozitorių bei teoretikų akiratį patenka sąlyginai naujas fenomenas – skambesio intensyvumo, įtampos reiškinys, kuris buvo apibendrintas ir „nuskaitytas“ nuo svarbiausios tritonio akustinės ypatybės. Pastebėta, jog šis tritonis pasižymi skirtingais fizikiniais ir psichofiziologinio suvokimo ypatumais: gebėjimu sukelti sonorinį efektą, stimuliuoti chromatiką specifiniu disonansiškumu, įtampa, taip pat deriniu nepastovumu ir trauka į kitus intervalus, jis neturi pastovaus tono, tik vedamuosius.

Tiriant XX a. komponavimo sistemas, išryškėjo kompozicinės vertikalės, horizontalės bei įstrižinės tritoninis konstruktyvizmas. Tritonio įsigalėjimas XX a. kompozicijoje nulėmė kūrinii harmoninės sandaros, skambesio bei suvokimo pokyčius. Svarbu pabrėžti, kad XX a. iš esmės pasikeitė ne tik akordų sandaros elementai, bet ir pačios vertikalės samprata – nuo konkretaus akordo (funkcijos) iki individualios, konceptualizuotos struktūros sąskambio.

The Audiation of a Triad and its Rejection in the Composing Process

Abstract. In this article a well-known object – a triad chord – is discussed in the context of two types of musical syntax. Triad's role in classic musical syntax, as well as its acoustic properties and corresponding audiation are well established. However, Richard Cohn notices that triads are not only ideal acoustic objects, but also ideal mathematical objects: the potential of consonant triads to engage in parsimonious (stepwise) voice-leading is a function of their group-theoretic properties as equally tempered entities, but triads' acoustic properties have masked recognition of its group-theoretic potential and substantial intellectual resources. Neo-Riemannian theory deals with non-functional, voice-leading based triadic relations, which create different musical syntax.

These two types of musical syntax correspond with two types of logic in the composing process: musical logic (notion, coined by H. Riemann), which includes audiation; and structural logic, which relies only on abstract thinking processes and seeks to find internal order of elements without audiation. Regarding the triad as a material for composition, triad's possibilities to engage in structural composing while rejecting its audiation properties will be examined (since the usage of a triad in functional harmony and classic musical syntax is already well established). Conscious rejection (or restriction) of aural conducting in the composing process is also characteristic of some Lithuanian composers. (Auto)analysis of composers' creative process reveals strategies of composing with the triad while rejecting its aural properties. The goal is to see such a known object in a new light and explore its new potential.

Keywords: triad, neo-Riemannian theory, audiation, generative voice-leading, musical syntax, musical logic, group theory, structural composing, Ričardas Kabelis.

1. Triad's double nature. The peculiarities of the phenomenon of a triad

1.1. Triad's acoustic nature: musical syntax, musical logic and the audiation of a triad

A set of three notes in thirds, a triad (in particular, the consonance triad – a chord of three tones obtained by the superposition of two (major and minor thirds) is a very special object in music and music theory. As (Michael Beiche 2000: 8) notices, “the whole term's¹ history shows its exclusive value in harmonic and in general musical context”. Through centuries, music theorists regarded the triad as a perfect consonance (Parcutt 2011), a natural phenomenon (Marx 1839; Hindemith 1937), the Holy Trinity of music (Herbst 1653; Simpson 1659), the primal harmony and source of music (Andreas Werckmeister 1702; Eduard Krüger 1866)². Latter belief that all music consists solely of triads was even more confirmed after the discovery of a triad in the overtone series. It proved a triad to be an essential/basic chord since it already exists in nature, in any musical sound. The discovery of overtone series not only justified the triad as a source of music, but also allowed to understand the phenomenon of triad's inversions. Some theorists (e.g. Vogler 1802; Hauptmann 1853) also comprehend a triad as a unit, the unity of three tones into oneness (germ. *dreitönige Einheit/Klangeinheit*)³.

We can notice that notions of a triad emphasize its acoustic properties (“perfect consonance”, “overtone series”). As Richard Cohn notices triad's “unique acoustic properties are well established and indeed are fundamental to standard approaches to triadic music” (Cohn 1997: 2).

Regarding the triad, as the most important chord, harmonic music may be divided into three main periods according to Willi Apel (1969: 372–374):

- pre-tertian harmony period (c. 900–1450); potentialities of the triad have not yet been exploited.
- tertian harmony period (c. 1450–1900), the third/triad is sovereign.
- post-tertian harmony (c. 1900–). After the exhaustion of the triad, new combinations were sought after.

Thirds and triads were especially preferred in so-called common practice period. It may be said that functional tonality system indicates certain priority for thirds, thirdiness. Reinhard Amon explains it as the most consonant division of fifth, which forms tonal system (Amon 2005: 58). In Schenkerian analysis aimed to

¹ The term of harmonic triad (“trias harmonica”) first mentioned by Johannes Lippius in “Synopsis musicae novae” (1612).

² More notions of a triad as an origin of all harmony, may be found in Michael Beiche, 2000: 8–9: “a triad is the highest content of composition”, “the origins of all perfect harmonies” (Lippius 1610); The triad may be said to be the basis of our whole harmonic system” (Piston 1944); “la triade de Tonique est l’alpha et l’omega” (Gevaert 1905); “ut mi sol, re fa la – tota musica et harmonia aeterna” (Buttstett 1715); “the triad is ever-present and that the interpolated dissonances have no other purpose than to effect the continuous variation of the triad” (Mizler 1739); “All sonorities should be reduced to triads and dissonances explained through triads” (Stoepel 1827; Schering 1911).

³ “Triad is a unified entity, not the superposition of two thirds ... the triad must be thought of, not as a mixture of three different pitches, but as a harmonic unity in its own right” (Levarie/Levy, “Triad”, A Dictionary of Music Morphology, 1980, quoted by Beiche 2000: 13).

analyze the music of common practice period the foreground of musical text is also reduced to a primal triad (*Urlinie* and *Ursatz* – simplified horizontal tonic triad). The idea that functional tonality system is encoded in a triad, i.e. that the triad has the potential to develop tonality system, because the vertical structure of a triad (third, fifth intervals) reflects in the relations between triads, was mentioned already by theorist and composer Jean-Philippe Rameau in the 18th century (“*Traité de l’harmonie réduite à ses principes naturels*”, 1722).

The audiation of a triad, corresponding to its acoustic properties and its role in functional tonality system, is well established too. According to Reinhard Amon, “from all chords of three or more tones only major/minor triads cause the sense of full stability” (Amon 2005: 58). Because of its sense of stability, a tonic triad used to have an exclusive privilege to end (and begin) a musical phrase or a whole composition. Thus a function of a tonic triad in musical syntax could be compared to the one of a dot in literary text. Moreover, while hearing a triad, usually we can anticipate the continuation and it happens in the framework of functional harmony.

The audiation of triads and their relations to each other are mostly based on the musical logic, which was described by Hugo Riemann in 1872–1873, in his article “*Musikalische Logik*”. In the article, Riemann explained that musical logic resides in the cadential succession I-IV-I-V-I. His ‘logic’ here was presented in dialectical terms a la Hauptmann triad of triads”, as noticed by Rehding (2003: 68). The perception of music was significant to Riemann. He continues the theory of Rameau of micro-level reflecting into a higher systematic level (macro-level) and claims that tones represent sonorities (*Klangs*), and *Klangs* represent tonalities. “Riemann’s work on tonal functionality is among the sources that established the tonic-subdominant-dominant-tonic progression as archetypical in modern discussions of tonal harmony”, as Rehding put it (Rehding 2003: 38).

All in all, the system of functional tonality is inseparable from its musical logic and so has its own distinguishable musical syntax.

1.2. Two types of musical syntax

The role of a triad in functional harmony and its musical syntax is well known and is causing connotations. However, the musical syntax of classical period and its logic is not the only logic music could operate. Classical syntax is governed by music gravitation, tension/release forces, but in some triadic music, for instance late Romanticism, we encounter unexpected modulations or tonal gravity often seems to be in suspension. In his book *Audacious Euphony* (2012) Richard Cohn talks about two types of musical syntax and argues that romantic harmony operates under syntactic principles distinct from those that underlie classical tonality, but no less susceptible to systematic definition. These two types of musical syntax can be compared to a sequence and cadence phenomena. “A sequence is an opposition of a cadence. A cadence creates a sense of resolution, while a sequence is characterized by constant motion with its inner logic of repeats. A cadence is ruled by clear tendencies, goals, directions and functional powers; in a sequence functionality is in suspense, here dominates a melodic, voice-leading based developing of a *musical* idea. A cadence concludes a phrase, section, or a piece, whereas a sequence rushes forward” (Amon 2005: 230).

The tool to analyze non-functional musical syntax, where gravitation is suspended or rejected, is the neo-Riemannian theory, born as a response to late-Romantic music, which posed a question “if this music is not fully coherent according to the principles of diatonic tonality, by what other principles might it cohere?” (Cohn 1998: 169).

1.2.1. What is neo-Riemannian theory?

Edward Gollin notices that one of three features that characterize the neo-Riemannian perspective is “the interpretation of triadic relationships as transformations that constitute the formal elements of mathematical groups” (Gollin 2005: 153).

Neo-Riemannian theory (NRT) is a segment of Transformational theory, founded by David Lewin and formally introduced in his 1987 work “*Generalized Musical Intervals and Transformations*”, where he addresses musical transformations through mathematical group theory⁴. “Transformational theory continues the tradition of Milton Babbitt and Allen Forte by using mathematics to show the relationship between and among intervals. By performing group transformations or, in our case, NRT, the musician can see meaningful relationships within these *triadic* progressions”, as claimed by Mason (2013: 6).

⁴ “Group theory extracts the essential characteristics of diverse situations in which some type of symmetry or transformation appears” (Aceff-Sánchez 2012: 7).

So neo-Riemannian theory (NRT) “formalizes relationships between consonant major and minor triads from the vantage point of Lewinian transformations, rather than more traditional tonality-based approaches” (Chung 2012: 31). As argued by Cohn (2000: 89), “neo-Riemannian theory maps the group structure of triadic transformations in an equal-tempered (twelve-pitch-class) environment, with special attention to those transformations that optimize pitch-class intersection, and, more generally, voice-leading parsimony”. Cohn also notices that each of these concepts, except group theory (Lewin’s appropriation of mathematical tools for studying triadic harmony is indebted to mid-twentieth century American music theories), was familiar to harmonic theorists in late nineteenth-century Germany.⁵ Hugo Riemann also worked with the quasi-algebraic system of *Schritte* and *Wechsel* operations⁶, presented in his 1880 treatise “Skizze einer neuen Methode der Harmonielehre”, where he proposed a system of transformations that related triads directly to each other (without tonic reference). Riemannian concept of *Harmonieschritte* was the inspiration for neo-Riemannian theory.

Excursus to the group-theory. “Formally speaking, groups are families of functions that act upon specific families of objects. Additionally, a group contains a law of composition that defines how group members can combine with each other”, as mentioned by Chung (2012: 3). A mathematical group must satisfy four properties:

GROUP CLOSURE. “The composition of any two [group] elements ... always yields another element in the same [group]”, as argued by Steven Rings (2011: 12). One can compose (in the sense of applying successively) operations and this will always give another operation. For example, passing 2 keys, then 3 keys, is actually the operation of passing 5 keys.

GROUP IDENTITY ELEMENT. “The composition of the identity element with another member g of the group is equivalent to that member of the group alone” (Chung 2012: 5). If one has a special operation, which is “passing 0 keys”, it will end up on the same note one has begun with.

GROUP INVERSE ELEMENT for any and every element in a group there is also an inverse element, i.e., for any operation, we always have an inverse operation which takes us back exactly where we began. For example, if we pass +5 keys, then -5 keys, that’s equivalent to applying the identity operation. This works in the other way too: if we pass -5 keys, then +5 keys.

GROUP ASSOCIATIVITY. “Given any three or more pc-transpositions, combining (associating) them in different ways (while preserving left-to-right ordering) does not alter the result of the combination” (Chung 2012: 6). If we have three operations: T_p , T_q and T_r and pass first $(q + r)$ keys, then p keys, that is exactly the same operation as passing first r keys, then $(p + q)$ keys (in the end, we always end up passing $(p + q + r)$ keys).

“An example of a group of transformations acting upon a musical space is the group of pitch class transpositions under modulo-12 equivalence, familiar post-tonal theoretical devices. Any pitch class can be related in a discrete way to any other; a certain unique transposition under mod-12 equivalence describes the relationship between the two pitches. A T7 transposition, defined according to conventions of post-tonal theory, acting upon the pitch class “C” (or 0) always transforms “C” (or 0) into “G” (or 7)” (Chung 2012: 4).

Despite its propensity for formalism, neo-Riemannian theory still seeks to elaborate the idea of music perception in the sense of moving through abstract musical space. Daniel Harrison (2011: 548) claims that “one of the main benefits of NRT is animation it brings to relationships that have long been thought to be static”. That is so called “transformational attitude”, a particular analytical perspective Lewin advocates for the use of his theories. Chung (2012: 11) writes, that “for Lewin, transformations model specific actions or *doings*, metaphorical motions through musical spaces across certain distances or intervals. ‘If I am at s and wish to get to t , what characteristic gesture should I perform in order to arrive there?’” As Gollin (2005: 154) states, another important feature of Neo-Riemannian perspective is “the spatial representation of transformational relationships as formal graphs or networks”. Cohn and other NRT scholars develop a set of interrelated maps that organize intuitions about triadic proximity as seen through the lens of voice-leading proximity, using various geometries related to the 19th-century *Tonnetz* (tone network).

⁵ “Recent developments in neo-Riemannian transformational theory have stimulated the recognition of affinities between late-twentieth-century American pitch-class theory and some mid-nineteenth-century German conceptions of harmonic Verwandtschaft. Equal temperament was advocated by Vogler (1802) and by Weber (1817); for Marx (1837) and for Hauptmann (1853), among others, the proximity of a pair of chords was gauged by the number of tones that they shared; Marx and Hostinsky (1879) emphasized parsimonious voice-leading; and Oettingen (1866) and Riemann (1880) advanced transformational views of triadic progression. The single aspect of recent theory that does not first appear in nineteenth-century writings is the mathematical theory of groups, which furnishes neo-Riemannian theorists with a systematic framework for the co-ordination of these concepts” (Cohn 2000: 89).

⁶ *Schritte* are relations between triads of the same mode (major or minor), while *Wechsel* are relations between triads of opposite mode.

1.2.2. Main operations of neo-Riemannian theory

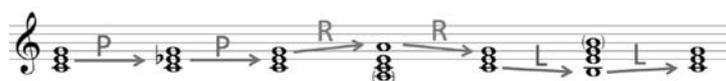
The main elements of the theory are voice-leading perspective based triads' relations. As Gollin (2005: 154) puts it, "the privileging of transformations that maximize common tones while minimizing the displacement of moving voices (known as voice-leading parsimony)", in other words, the minimal change done to one triad in order to obtain other triad; to transform one triad into another.

Neo-Riemannian theory consists of three basic transformations: Parallel (P), Relative (R), and Leading-tone exchange/*Leittonwechsel* (L).

A Parallel transformation converts a major triad to the minor and vice versa by moving the third by half-step. In other words C major is transformed to C minor just as C minor is transformed to C major.

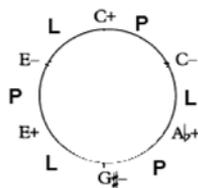
A Relative transformation converts a major triad to a minor triad by moving the fifth a whole-step up and vice versa, moves a minor triad to a major triad by moving the root down by whole-step (i.e. C major to A minor or A minor to C major).

The Leading-tone exchange transformation converts a major triad to a minor triad by moving the root down by half-step, and vice versa, from minor to major by moving the fifth up a half-step to become the root of the resulting triad (i.e. C major to E minor and E minor to C major).



Example 1. NRT transformations (P, R, L) performed on a C major triad (Mason 2013: 7)

These single transformations can be combined into compound transformations. If two, three or four PLR operations are applied successively, they generate various chains and cycles, as seen in (Cohn 1997: 33), for example, binary generator LP/PL produce a cycle of six triads, known as maximally smooth cycle since any pitch class set in the cycle becomes another pitch class set in the cycle by moving a single note by a half-step.



Example 2. LP maximally smooth cycle of triads generated by LP/PL

Interestingly, a maximally smooth cycle appears also in functional tonality system: it is the circle of fifths, which is considered maximally smooth due to the change of one pitch of the scale to create another scale (for instance, C major becomes G major when F is raised to become F#). The preservation of two common tones among the couples of triads appears not only in PLR operations, but is also characteristic in Riemann and Hauptmann theories, where the basis of chords' functional relationship is also common tones. Chords, which share two common tones, have the same function.

1.3. Triad's double/second nature

Richard Cohn draws attention to voice-leading parsimony in triadic relations. "Parsimony is inherent to the PLR-family, whose defining feature is double common tone retention. What is not inherent is an incremental motion of the third voice which proceeds by semitone or by whole tone. This feature is not without significance to the development of musical culture where conjunct voice leading in general and semitonal voice leading in particular, are enduring norms through many epochs and styles" (Cohn 1997: 1–2). Later Cohn mathematically proves that "among mod-12 trichords, the consonant triad alone is susceptible to parsimonious voice-leading under the three PLR-family operations. This circumstance is a function of trichord's step-interval sizes which are an aspect of its internal structure. The optimal voice-leading properties of triads therefore stand in incidental relation to their optimal acoustic properties" (Cohn 1997: 5). Cohn summarizes that "the potential of consonant triads to engage in parsimonious voice-leading ... is, rather, a function of their group-theoretic properties as equally tempered entities modulo-12" (1997: 2).

Cohn explains that, however, "triad's acoustic properties have masked recognition of its group-theoretical potential. Our sensibilities, born of incessant exposure to a musical tradition that habitually implements the acoustic properties of triads as well as to a music theoretic tradition that habitually models this habitual

implementation, have been trained to resist by default any effort to regard the triad as anything other than acoustic *in essence*" (Cohn 1997: 5).

So Cohn shows that actually major and minor triads have two distinct natures: one based on their acoustic properties, and the other on their ability to voice-lead smoothly to each other in the chromatic universe of 24 triads. Whereas their acoustic nature underlies the diatonic tonality of the classical tradition, their voice-leading properties are optimized by the pan-triadic progressions characteristic of the 19th century. That means, a triad encodes not only a functional tonality system (as noticed by Rameau and Riemann), but also other, generative voice-leading system and alternative triadic syntax. Thus triadic successions, generated by PLR operations, may be compared to the phenomenon of a sequence, whereas functional tonality operations T, S and D would constitute a cadence. Daniel Harrison (2011: 552) notices that "transformational theory in general requires a separation of object and activity, of what something *is* and what is *done* to it – with what something is sometimes being defined solely by 'what is done to it'". He claims that transformational theory cannot deal well with "being", so its operations PLR is something what is "done" to an object, whereas T, S and D are fundamentally about "being", especially T.

To summarize our findings so far:

Table 1. Oppositions of double nature of the triad

Riemann	Neo-Riemannian
Musical logic	Structural logic
Cadense	Sequence
Audiation in composing process	Rejection of audiation
Functionality	Non-functionality
Classical	Late-Romantic/Renaissance etc.
Diatonic	Chromatic
Acoustic properties	Group-theoretic properties/voice-leading
Static: labeling objects	Dynamic: labeling relations between objects
Main operations: T S D	Main operations: P R L

All in all, these discoveries about triad's mathematical nature show that a triad is a unique element in music, suitable for self-generating since having a triad (3-tone subset of 12-tone set), and giving voice-leading rules (which consist of P, R, L operations), we can convert it into another member of the same set with the most minimal change and program various chains and cycles. Furthermore, if we have discovered the whole new field of a triad, it means some new possibilities to use it in analysis and composition should be revealed, too. Further we will investigate the ways to compose with a triad, relying on its second nature.

2. A triad as a composition material. The rejection of audiation in triadic composition

According to the two sorts of musical syntax and corresponding two triad's potentials, two types of logic in the composing process can be distinguished as well: musical logic (notion, coined by H. Riemann), which includes audiation; and structural logic, which relies only on abstract thinking processes and seeks to find internal order of elements without audiation.

As it was said, triad's mathematical properties have not much to do with its acoustic properties and audiation. It means that in a composition based on triad's mathematical properties the audiation, which involves our sensibilities and procedural knowledge, should be automatically rejected, leaving the composer on the rational, structural side of composing.

We will take a look at several cases where audiation is rejected in the composing process, and where the main object of composition remains a triad. Two compositions by Lithuanian composers, which expand the usage and perception of a triad, will be analyzed while applying neo-Riemannian theory.

Before starting to analyze, we need to mention that several degrees of triad's presence in such composition of non-functional triadic syntax could be distinguished. The first one occurs when pure triads still can be heard, the triad itself still causes us connotations and corresponds with audiation practice, but the order of their sequence is not familiar to our musical habits. An example of such music, consisting of triads in unexpected relations, can be the music of Renaissance (e.g. Carlo Gesualdo chromatic modality), characterized by unexpected harmonic changes and sudden modulations. Yet the second, a more complex level would be the one where triads cannot anymore be heard in the final sounding result, instead, they are hidden in multi-layers and serve as building blocks for more complex structures/harmonies.

2.1. Analysis of “Cell” (1992) for piano trio by Ričardas Kabelis (b. 1957)

This piece represents the first case of triad’s non-functional usage: the composition consists of triads, alternating in seemingly random order. What is more important, a step further is made by increasing the tempo of harmonic changes. The tempo is so fast (the duration while six triads are played is 52 seconds) that the listener cannot even grasp those changes, so this constant alternating of triads loses its connotation and creates rather an atmosphere, an ambience.

In his composing process, the composer rejects audiation and instead sets such rules: the voices are never led the same direction and triads are constantly inversed. This yields “jumping” voice-leading full of skips. It differs from neo-Riemannian voice-leading idioms, such as parsimonious voice-leading, where triads share common tones and move stepwise.

CELL
for violin, viola and piano

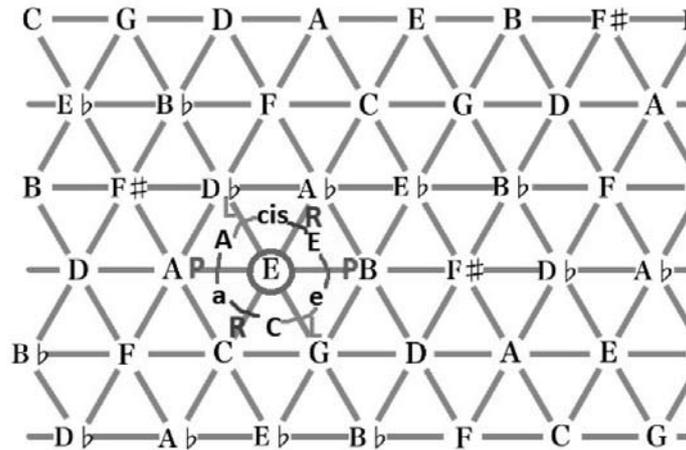
RICHARDAS KABELIS
(*1957)

M. M.  = 52



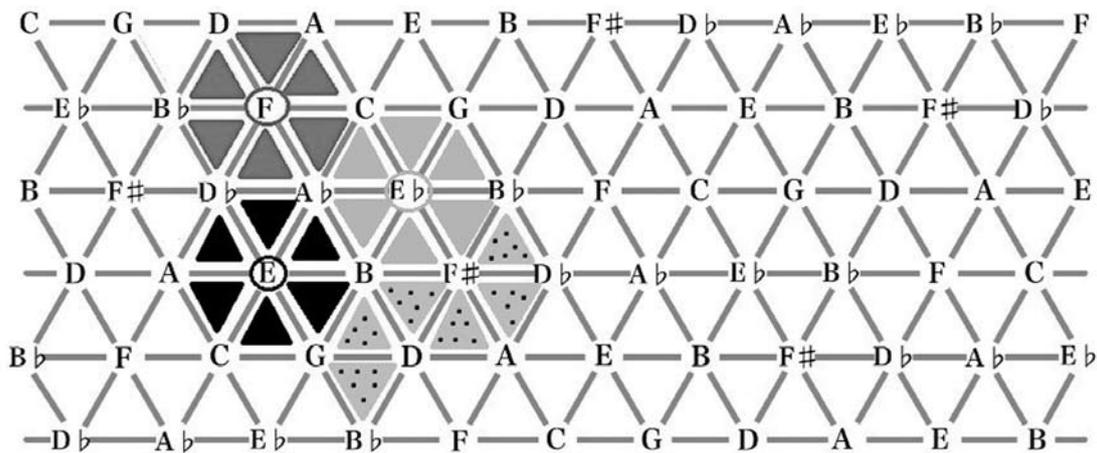
Example 3. Kabelis, “Cell” for piano trio, mm. 1–42

In the piece, firstly a group of six alternating triads – E major, E minor, C major, C# minor, A major, A minor – is introduced. They all share common tone E. We can arrange them in a circle with the most minimal voice leading C a A c# E e (C) and label the neo-Riemannian operations between triads: to transform C major to A minor we need a Relative (R) operation, then from A minor to A major we need a Parallel operation (P), and so on. After labeling all the transformations, we see that actually this set of 6 triads is LRP loop of ternary generator. Cohn (1997: 44) claims, that “a significant feature of these loops is that their 6 triads share a single pitch-class, located at the center of the matrix representation”. Applied twice, LRP returns the sequence into primal triad (loop).



Example 4. LPR-loop around the pitch-class E

So the composition begins with alternating members of ternary loop around central E. Later triads from another group are gradually introduced. It is ternary loop around F, so all six triads share common tone F (in Example 5 marked with dark grey colour). After that the third group generated by ternary loop appears, the central pitch class is Eb (in Example 5 marked with light grey colour). Thus triads expand from the initial center E to both directions by semitone. Finally the rest of triads appear and thus the set of all 24 triads is exhausted. The primal group of common tone E remains present during all the composition.



Example 5. All LPR loops around: E (black), F (dark grey), Eb (light grey), the rest of triads (dotted)

Interestingly enough, the composer was not aware of neo-Riemannian theory and LRP-loops since the article about ternary loops appeared in 1997, and the piece was composed in 1992. Moreover, the voice-leading choices by composer were made improvised, intuitively, based on melodic voice-leading where the voices were exchanged randomly, yet the whole is still surprisingly systematic. Perhaps it shows the cyclic nature of the triads’ non-functional relations and voice-leading possibilities as well as the limits of 12-tone harmonic system capacity.

2.2. Analysis of “Levitating Organza” (2014) for string orchestra by Raimonda Žiūkaitė (b. 1991)

Our second example represents a triad as a building block for more complex structures and multilayered composition. In the composing process, the composer rejects audiation. Instead, two rules for creating a triadic progression are set: a maximally smooth movement, with half-tone step being the only possible step of voice movement and that the progression would be consistent in its moving direction (always upwards or downwards). The piece starts with two triadic progressions, one ascending, played in thirds by eight violins, the other descending, played in thirds by 8 violas and violoncellos.

LEVITUOJANTI ORGANZA 3

Example 6. Žiūkaitė, “Levitating Organza” for string orchestra, mm. 1–8

The primal 6-member segment (cell) (shown in Example 7) consists of two sub-segments (3 + 3), and is either ascending or descending direction. As an important condition was maximal smoothness of voice-leading, so the distance between voices never exceeds a semitone step (inside the segment, two voices move one semitone each; between sub-segments and segments there is only one voice by one semitone movement).

Example 7. The primal segment of "Levitating Organza"

Example 7. The primal segment of "Levitating Organza"

This primal segment yields symmetry in several levels. The roots of triads constitute symmetry of tri-chords, the axis of symmetry of the upper sequence being C, of the lower sequence B_b. Interestingly, at the macro-level – the whole composition – the symmetry axis is B.

After labelling the neo-Riemannian operations we can notice that they are symmetric as well. To get from the first triad (either B major or B minor) to the second we need three operations RLP. Then from the second to the third triad we need only two operations LP, and finally from the third to the fourth we need only one operation P. The operation P is the axis of this symmetry. Symmetry is also seen in Tonnetz representation.

Example 8. The primal segment of "Levitating Organza" in Tonnetz

Example 8. The primal segment of "Levitating Organza" in Tonnetz

These primal segments (cells) of 6 triads are sequentially repeated and form maximally smooth and directional (gradually rising or falling) progressions, which move in stepwise motion starting from B minor and major triads towards furthest point – F major/minor triads.

Example 9. The full triadic sequence of "Levitating Organza"

Example 9. The full triadic sequence of "Levitating Organza"

In the first section of the piece there are two sequences (lines) of triads, in the second section there are four sequences, because two new successions are added, and in the third section there are already 8 different lines of triads sounding simultaneously.

Example 10. The structure of "Levitating Organza"

Example 10. The structure of "Levitating Organza"

All in all, in “Levitating Organza”, triads’ progression is just a thread in multilayered fabric. Major-minor triads connect into the network of triads, which developed gradually reminds of waving (levitating) organza fabric. Smooth voice leading and directional motion give unexpected symmetry. The patterns of micro-level (cell) actualize at macro-level (the composition).

Conclusion

In conclusion, after analyzing some triadic compositions, we can pose the question whether neo-Riemannian theory, being the tool for analyzing non-functional triadic movements, could also be the tool to compose or to generate pre-composition structures, and, more generally, could a triad as an object still be relevant in nowadays composition. As it can be seen in the work of Arvo Pärt, Philip Glass etc., regarding a triad not from a functional harmony perspective and searching for its new potential might still be relevant, and neo-Riemannian theory may provide some strategies for composing or generating pre-composition material. Of course, it is just a tool, it gives us a great way to think about chord relations without the reference to a tonal center and voice-leading inspired perspective, however, its application is quite specific and narrow hence a composer should be flexible while applying it.

As for musical syntax and audiation, Daniel Harrison criticizes neo-Riemannian syntax for its indifference for a sensuous dimension: “objects are inert and without tendency, and all activity and meaning are supplied by transformations applied to them” (Harrison 2011: 552). He notices that “while the substances of T, D and S impose a distorting gravitational field upon pure transformational space, they do restore a sensuous dimension to the hearing and experience of tonal music” (Harrison 2011: 553). All in all, the musical sensibility and gravitation are important, however, the next direction for research should be the preservation of tension/release forces outside the framework of functional harmony.

References

- Aceff-Sánchez, Flor, et al. (2012). *An Introduction To Group Theory With Applications In Mathematical Music Theory*. Publicaciones Electrónicas Sociedad Matemática Mexicana 15.
- Amon, Reinhard (2005). *Lexikon der Harmonielehre*. Vienna: J. B. Metzler.
- Appel, Willi (1969). Harmony. In: *Harvard Dictionary of Music*. Harvard: Harvard University Press, p. 371–374.
- Beiche, Michael (2000). Trias, Dreiklang. In: *Handwörterbuch der musikalischen Terminologie*, Bd.: 6, Si – Z, compiled by Eggebrecht. Stuttgart: Franz Steiner Verlag.
- Chung, Andrew J. (2012). *Lewinian Transformations, Transformations of Transformations, Musical Hermeneutics*. Bachelor Thesis, Wesleyan University.
- Cohn, Richard (1997). Neo-Riemannian Operations, Parsimonious Trichords, and Their ‘Tonnetz’ Representations. In: *Journal of Music Theory*, Vol. 41, No 1: 1–66.
- Cohn, Richard (1998). Introduction to Neo-Riemannian Theory: A Survey and a Historical Perspective. In: *Journal of Music Theory*, Vol. 42, No 2: 167–180.
- Cohn, Richard (2000). Weitzmann’s Regions, My Cycles, and Douthett’s Dancing Cubes. In: *Music Theory Spectrum* 22, No 1: 89–103.
- Cohn, Richard (2012). *Audacious Euphony: Chromaticism and the Triad’s Second Nature*. New York: Oxford University Press.
- Gollin, Edward (2005). Neo-Riemannian Theory. In: *ZGMTH* 2/2–3, Hildesheim u. a.: Olms: 153–155. <http://www.gmth.de/zeitschrift/artikel/520.aspx>
- Harrison, Daniel (2011). Three Short Essays on Neo-Riemannian Theory. In: *The Oxford Handbook of Neo-Riemannian Music Theories* by Edward Gollin, Alexander Rehding. Oxford: Oxford University Press: 548–578.
- Mason, Laura (2013). *Essential Neo-Riemannian Theory for Today’s Musician*. Master Thesis. University of Tennessee. http://trace.tennessee.edu/utk_gradthes/1646
- Rehding, Alexander (2003). *Hugo Riemann and the Birth of Modern Musical Thought*. Cambridge: Cambridge University Press.
- Rings, Steven (2011). *Tonality and Transformation*. New York: Oxford University Press.

Triados (trigarsio) audiacija ir audiacijos atmetimas komponavimo procese

Santrauka

Svarbus muzikos teorijos ir praktikos elementas triada (trigarsis) straipsnyje aptariama dviejų muzikinių sintaksių kontekste. Šalia plačiai žinomų triados akustinių ypatybių ir vaidmens funkcinėje harmonijoje bei klasikinėje sintaksėje, kurioje veikia muzikinė trauka, atskleidžiamas triados vaidmuo nefunkcinėje harmonijoje ir sintaksėje, pvz., XIX a. antrosios pusės muzikoje, kurioje chromatinės progresijos pasižymėdavo ryškiomis moduliacijomis, staigesniais harmonijos pokyčiais, o tonacinė trauka šioje muzikoje dažnai atrodė susilpnėjusi. Richardas Cohnas (2012) teigia, kad muzikinės sintaksės principai romantizmo harmonijoje skiriasi nuo klasikinio tonalumo, ir atkreipia dėmesį į triadų nuoseklios balsavados galimybes, kurios nesusijusios su jų akustinėmis savybėmis. Šis balsų vedimo potencialas kyla iš matematinės *grupių teorijos* savybių, kuriomis triados pasižymi tolygiai temperuotame 12 garsų lauke. Trigarsiai ryšiai kaip matematinų grupių elementų transformacijos interpretuojami vadinamojoje neo-rymaniškojoje (*neo-Riemannian*) teorijoje (NRT). Joje išskiriamos trys pirminės transformacijos: P (*Parallel*, t. y. bendravardis mažoras / minoras), L (*Leittonwechsel*, t. y. vedamojo tono pakeitimas) ir R (*Relative*, t. y. giminingumas), kuriuos tarp objektų išsaugo maksimaliai daug bendrų tonų ir mažiausią judančių balsų poslinkį (vadinamą *balsavados parsimonija*). Transformaciniai ryšiai šioje teorijoje vaizduojami formaliais grafikai ar tonų tinklais (vok. *Tonnetz*).

Taigi triada turi dvi atskiras prigimtis: viena pagrįsta jos akustinėmis savybėmis, kita – galimybė sudaryti nuoseklius balsavados junginius chromatinėje visumoje. Akustinė triados prigimtis sudaro pagrindą klasikiam diatoniam tonalumui, o balsavados savybės atsiskleidžia XIX a. chromatinėse progresijose. Iškeliama prielaida: jei triados intervalinė / vertikaloji struktūra nulemia funkcinę harmoniją, tai ryšiai tarp triadų (neo-rymaniškosios transformacijos) gali nulemti nefunkcinę, generatyvinę harmoniją ir alternatyvią sintaksę. Taip triadų sekos, sugeneruotos LPR operacijų, pagal sintaksę gali būti prilyginamos sekvencijos fenomenui, o funkcinio tonalumo operacijos (T-S-D) – kadencijai. Danielis Harrisonas (2011) pažymi, kad, remiantis minėtąja teorija, reikia atskirti objektą ir veiksmą, atliekamą tam objektui. Transformacinės teorijos operacijos LPR yra veiksmas, atliekamas objektui, o funkcinio tonalumo operacijos (T-S-D) yra buvimas objektu.

Naujai atskleisti triados resursai rodo, kad tai yra programavimui palankus muzikos elementas (nes ryšiai tarp tų elementų yra palankūs formalizuoti). Triada (3 tonų subrinkinys 24 tonų grupėje) yra konkretus objektas, kurį pagal balsavados taisykles (susidedančias iš P, L ir R operacijų) galima transponuoti į kitą tos pačios šeimos objektą minimaliu žingsniu (pakeitus vieną iš trijų tonų) ir taip sugeneruoti įvairias triadų sekas bei ciklus.

Komponavimo procese išskiriamos dvi logikos kryptys, atitinkančios dvi skirtingas sintakses: tai muzikinė ir struktūrinė logika. Straipsnyje analizuojamos galimybės naudoti triadą būtent antruoju, generatyviniu, balsavada grįstu aspektu, kuriame triada praranda savo kaip funkcinės harmonijos elemento konotaciją / audiaciją ir kuris atstovauja struktūralistiniam komponavimo metodui. Kaip tokie triados panaudojimo pavyzdžiai pateikiami Ričardo Kabelio ir Raimondos Žiūkaitės kūriniai. Kabelio trio „Cell“ harmoninėje vertikaloje skamba vien tik triados; jos jungiamos improvizuotai perstatinėjant balsus ir skamba greitai tempu, tad klausantis sukuria tam tikrą atmosferą. Įdomu, kad, atrodytų, atsitiktinai besimainantys trigarsiai vis dėlto sudaro LPR kilpą. Žiūkaitės kompozicijoje „Levituojanti organza“ triados jungiamos į nuosekliai kylančias ir krintančias sekvencijas, kurios sluoksniuojamos, taigi vertikaloje girdimi daugiagarsiai sąsambiai.

Apibendrinant keliamas klausimas, ar gali neo-rymaniškoji teorija tapti komponavimo įrankiu, naudojančiu naujus triados resursus. Daroma išvada, kad minimoje teorijoje neatsižvelgiama į jutiminę muzikos dimensiją, kurią išlaikyti vaduojantis iš funkcinės harmonijos ribų būtų siekiamybė.

Peculiarities of Pitch Audiation in the Explorations of Sound Quality

Abstract. Sound quality is one of the essential articulatory components of contemporary art-music. It is a widely discussed, albeit still a largely secretive dimension. Terms “sound quality” and “timbre” are often used interchangeably, however this leads to a rather narrow view towards this issue, as the scope of qualitative articulations in contemporary art-music often expands to other musical parameters, such as loudness, rhythm, and even pitch. Pitch is the primary object of this paper, as its potential for qualitative articulations is a largely undiscussed topic, which can prove to be useful for both composers and researchers.

In order to unravel the nature of qualitative articulations in such compositions, we propose a cognitive approach towards the musical parameters and the phenomenon of sound quality itself. We discuss the parameter of pitch as a perceptual phenomenon, analyze the different ways it can be processed in our perceptual apparatus and different types of teleology that could be consequently produced.

The analytical approach based on the interactions of *Gestalt* principles, that we employ here to study the organization of sound quality, proves to be a reliable tool, as we approach the implementations of pitch articulation from horizontal, vertical and diagonal perspectives, discuss their syntactic relations and cognitive effects. We analyze qualitative articulations of pitches in a handful of excerpts from the compositions by Johannes-Maria Staud, Mathias Pintscher, Ondrej Adamék, Toshio Hosokawa, and the author of this paper.

Keywords: audiation, pitch, sound quality, timbre, cognition, perception, contemporary music, composing.

When I first started my composition classes we had a group lecture on music theory tailored specifically for composers. One day our professor pressed down a C-major chord and asked: “How do you develop from here? Is it a theme, or is it harmony?” To my surprise, the opinions differed significantly. As for myself, I did not want any development of this at all, as I thoroughly enjoyed listening to the slight alterations between string vibrations of a sustained chord.

As illustrated by this example, pitch, despite being one of the most obvious and the most established parameters throughout the history of Western music, can be interpreted/perceived by composers in a variety of ways. It may as well lose its dominance in the hierarchy of musical parameters and assume a supplementary role. This is especially evident in the new music that has a strong emphasis on sound quality but still features well-pronounced pitch articulations. This could be said about the oeuvre of such composers like Johannes-Maria Staud, Mathias Pintscher, Ondrej Adamék, Toshio Hosokawa and many others including myself. However, the role of pitch is easily overlooked when analyzing such music. This is mainly due to a plethora of seemingly more important qualitative aspects that are encoded in these hyper-detailed scores. This article aims to correct (at least to a modest extent) this iniquity by focusing on qualitative aspects of pitch in the scores of aforementioned composers.

What is pitch and how is it related to sound quality?

When discussing the phenomenon of sound quality, one rarely concerns himself with the parameter of pitch. In fact, it is often being polarized as being opposite to the qualitative aspects of the piece. We are not going to rival this opinion here, but rather expand on it by discussing pitch as a perceptual phenomenon in order to reveal its qualitative aspects.

The controversy of relations between sound quality and pitch indeed lies in the perceptual domain. Pitch, according to Bob Snyder (2000), along with harmony and rhythm are the primary musical parameters. Word “primary” here distinguishes their ability to have fixed proportional relationships that can be quantifiable in a scalar way and recognized when they reoccur during the composition. Secondary musical parameters – tempo, loudness and timbre – on the other hand, cannot be identifiable as being “different by the same amount” if separated in time, nor can they be measured in scalar units (Snyder 2000: 195–200). Secondary parameters are not being perceived as concrete values, but rather as perceptual abstractions, relations of which are perceived only by subjectively comparing different values of the same parameter.

Sound quality is a very broad notion that defines various characteristic aspects of the sound. It is mostly rendered via subjective expressions such as *bright, dark, harsh, soft, loud, mellow, intense* etc. It is a concept that is determined by the correlation of pitch, duration, loudness, and various aspects of timbre¹. It determines and

¹ Such as brightness, harmonicity, attack quality, spectral flux etc.

describes subjective characteristics of a given tone, passage, texture or any other perceptual unit. Sound quality depends on various aspects, such as timbral attributes of the instrument and/or register, playing technique, sonority (*harshness* or *softness*) of sounding pitch intervals, temporal dissonance (as defined by Stockhausen; 1959) and countless of other variables², however timbre and loudness appear to be the most prominent among them. In this regard the sound quality despite being shaped by all primary and secondary parameters as a whole is being perceived as a secondary one.

Sound quality, as a perceptual phenomenon is heavily related to the sound processing in the human brain and all the auditory apparatus. According to Andrew D. Lyons (2003), many areas of our brain merge sensory information. For example, rhythmic and pitch interval tasks activate the linguistic part of the brain in the left hemisphere. On the other hand, pitch and timbre tasks activate areas near the visual cortex which is associated with visual mental imagery. This area is at the back of the brain and includes parts of both hemispheres. Timbre and melodic outlines (contours) are, however, associated with the right hemisphere, suggesting spatial manipulation of mental images (Lyons 2003: 36–37). This ought to be a significant discovery for the field of music theory, as it shows that our cognitive system processes musical parameters not only as fixed acoustic objects, but tends to alter that processing depending on the context of surrounding elements. This suggests that if pitch can be processed by different parts of the brain depending on the particularities of sound quality, then it can assume different roles in the hierarchical system of sound parameters. We can assume that when music is putting a high emphasis on its qualitative aspects, pitch tends to be subjugated to other parameters, such as timbre. Thus pitches may gain certain traits that could shift their audiation closer to the way we would normally audiate secondary musical parameters.

Paradigms of pitch articulation

Notions of **schemata of order** and **schemata of order-relation** stated by Michel Imberty (1985) become groundwork for this paper. They describe different types of syntactical relations between musical objects. According to Imberty, **schemata of order** are formed by simple successions and juxtapositions and embrace both proximate and distant relations (increase, decrease, repetition and imitation). **Schemata of order-relation**, on the other hand, involve the organic relations that enable the establishment of relations between temporally-adjacent elements (theme, variation of the theme, syntactical or rhetorical relations, etc.) According to Imberty, schemata of order-relation are prevalent in tonal, and schemata of order – in atonal music (Imberty 1985, In: Deliège and Mélen 1997: 388).

In Western musical tradition pitch, as a primary musical parameter, has rather complex and very clearly defined relations with other pitches in both horizontal and vertical domains. However, when the composer shifts his/her focus to the qualitative aspects of the sound and starts developing relationships between different sound qualities, the hierarchical dominance of pitch starts being compromised. As pitch becomes subjugated to other parameters it as well tends to absorb their audiative traits, i.e. pitch starts being treated as one of many denominators of a particular sound quality rather than as a primary teleological object of musical events. It is worth noting that similar subjugations are not exclusive to the parameter of pitch. Rhythm (another primary parameter), despite often being very elaborate in such music, frequently suffers the same kind of subjugation. The complexity (or sometimes *hyper*-simplicity) of rhythmic structures oftentimes oversteps our cognitive capabilities, which causes certain rhythmic structures to be perceived more as specific sound qualities than as a set of temporal relations.

Thus said, the hierarchical relations between primary musical parameters in sound quality-oriented music tend to lose the vast majority of “absolute” syntactic values. Syntactic relationships here become far less elaborate than in tonal music. This is also evident in the terminology that is being used to describe them. If the use of linguistic analogies (phrase, sentence, syntax, etc.) in order to describe the relations in tonal music has proven to be the most convenient, we are much more comfortable resorting to the visual ones when it comes to discussing sound quality-oriented music. The use of such terms as “textural shapes”, “sound sculpting”, “gestures”, “colors” or “contours” became a *de facto* standard in contemporary music. Teleological interactions between such visual analogies are (in comparison with syntactical ones) rather basic and are most comfort-

² You can find a more thorough discussion about articulation of sound quality via different parameters in my previous publications (Maslekovas 2014; 2015; 2017).

ably analyzed by employing *Gestalt* principles³, which (again) originate primarily from a visual domain. This indicates that syntactic relationships in such music lean towards schemata of order⁴.

Operating the pitches

As we analyze the possibilities of operating pitches in any kind of music, we can group them into three different categories according to the dimension that is prevalent when the operations are taking place; in other words, according to the dimension that bares the cognitive ties between different pitches. This way we can distinguish **horizontal**, **vertical** and **diagonal** operations. These three types of operations may be employed by a composer regardless of the above-discussed paradigms. However their roles and manifestations differ quite substantially depending on the enact paradigm. Therefore, we are going to discuss them (however putting a greater emphasis on schemata of order) in this following chapter.

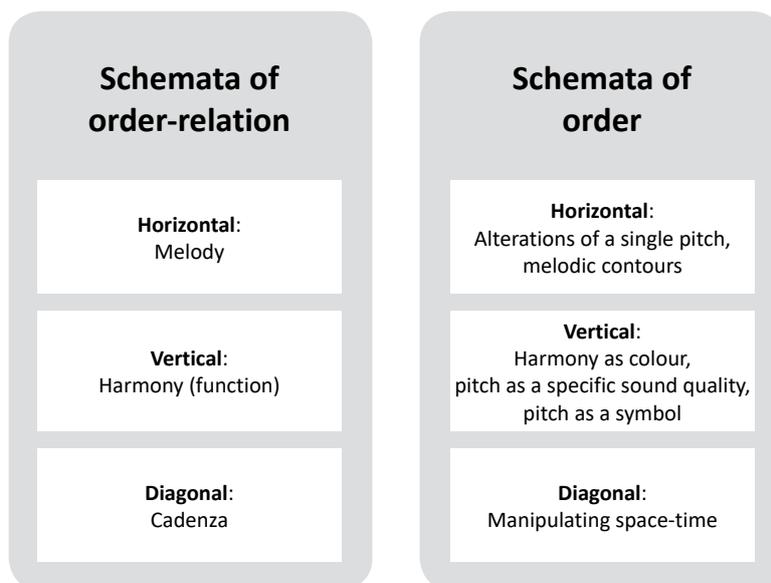


Figure 1. Horizontal, vertical and diagonal pitch operations in regard with schemata of order-relation and schemata of order

When schemata of order-relation are considered, horizontal pitch operations are the ones that produce motifs, melodies and various linear objects of melodic origin. These are linear successions of pitches that produce linguistic-like “meanings”, which are created by interactions between hierarchical roles of each individual pitch. Vertical operation here refers to harmony that is creating patterns of tension and release due to the same hierarchical relations.

As for schemata of order, **horizontal** operations can take a very different direction. When sound quality becomes a central piece of the composition, even the smallest alterations may become of a great importance; even those that might be considered an afterthought in a conventional repertoire. A great example would be *vibrato* – a technique traditionally attributable to the interpretation of music, as an element mostly depended on the choice made by a performer. However, when it comes to articulation of the sound quality, these tiny pitch alterations might be employed as the main, thoroughly controlled element, as we see in the excerpt from Penderecki’s *Threnody for the Victims of Hiroshima* (Figure 2), where entire texture is based only on different alterations of *vibrato*. This example shows that the composer is not interested in clearly perceivable pitches, but rather employs them as constructive components in order to create a fluctuating shape of multiple pitch alterations. The end result alludes to those string vibrations of a sustained C-major chord that I referred to in the introduction of this paper. One can consider it as a much exaggerated reconstruction of this acoustic phenomenon.

³ Namely similarity, proximity, good continuation, common fate.

⁴ This comparison is made with only the parameter of pitch at the lowest hierarchical level in mind. However, when considering higher hierarchical levels that I refer to as sonic structures (sound quality versus another sound quality) one can find traits of both, *order* and *order-relation* paradigms. In my previous publications I refer to it as the hierarchy of dimensions (Maslekovas 2014).

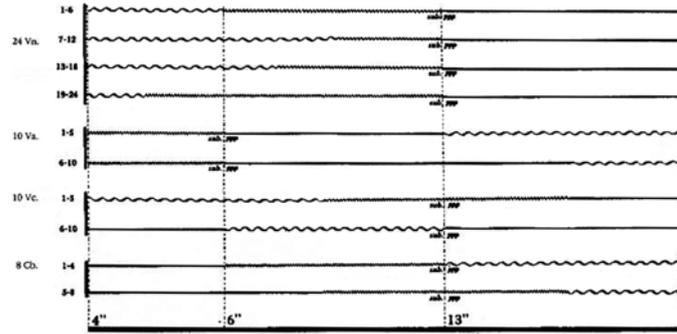


Figure 2. Constructive use of vibrato in *Threnody for the Victims of Hiroshima* by K. Penderecki

Here we can make an observation that discernibility of individual pitches and their relations is an unwanted occurrence in sound quality-oriented music. This explains an outrageous use of another previously-considered trifle and purely decorative pitch articulation technique – *glissando*. Sliding between different pitches it blurs or even erases perceptual boundaries between different pitches. The importance of *vibrato* and *glissando* in sound quality-oriented music is very much related to a psychoacoustic phenomenon to which Snyder refers as “perceptual noise”. Our perceptual apparatus tends to reduce the amount of information that it is receiving and thus categorize units (for instance, pitches) into abstract ranges of variables. For example,



there is a certain amount of deviations in frequency that would still be considered as the same pitch or interval, albeit slightly out of tune. There are also certain thresholds that, if properly implemented, can make the pitch sound ambiguous⁵. This reduction of information helps the brain to interpret pitch intervals as linguistic syntax⁶. However, introducing a heavy amount of “perceptual noise” weakens this syntactic potential and helps qualitative aspects to emerge. If we look at the excerpt from *Chamber Noise I* for double bass and cello by Ondrej Adamék (Figure 3), we can not only see an absurd amount of glissando, and a pretty elaborate use of vibrato but also a number of timbral alteration techniques (such as transitions from ordinario to sul ponticello, various plucking techniques, pressure alterations, etc.), severe loudness articulations and many other small details. All these elements are used as a perceptual noise that turns what would otherwise be considered as melodic contours into articulated noise.

Figure 3. Horizontal pitch articulation turning into perceptual noise in *Chamber Noise I* for double bass and cello by Ondrej Adamék

⁵ Perhaps the most iconic manifestation of these phenomena can be found in jazz music and it is called “the blue note”.

⁶ See more: Snyder 2000: 135–158.

Melodic contours (sometimes referred as melodic outlines) *are the most memorable characteristics of non-tonal melodies* (Dowling and Harwood 1986: 133–134). The key difference between them and linear structures of schemata of order-relation is that pitch sequences that shape melodic contours do not necessarily originate from a melodic source. They do not form a “meaningful” syntax between intervals due to the lack of tonal center, thus they are not being perceived as a cohesive “narration” but rather as abstract shape – contour. As we can see in the excerpt from Toshio Hosokawa’s string quartet *Silent Flowers* (Figure 4), there is a number of small individual melodic outlines. We can see that pitch articulation-wise these contours have very few components and are unable to create any hierarchies within themselves. However, they feature distinct shapes and qualitative attributes that group them into two categories, which we will picturesquely call “gliding leaps” and “chromatic passages”. They do not possess any particular “meaning” per se, but they create syntactical relations throughout the piece in the form of interactions between different textural shapes.

The image shows a musical score for string quartet, consisting of four staves. The score is divided into four measures, each with a different time signature: 3/16, 4/8, 6/8, and 4/8. The music features various dynamics such as *ff* (fortissimo), *pp* (pianissimo), *sf* (sforzando), and *ppp* (pianissimissimo). There are also articulations like *arco* (sul pont.) and *freeze!*. The notation includes slurs, accents, and various note values, illustrating the melodic contours discussed in the text.

Figure 4. Melodic contours in *Silent Flowers* for string quartet by Toshio Hosokawa

We can observe, that these particular melodic contours are heavily related by timbral attributes, such as attack quality (accents, *pizzicato*, *col legno*), harmonicity (*sul pont.*) and articulation of loudness (*cresc./dim.*). These attributes help them to be perceived as particular sound qualities that indicate their vertical origin. The term “vertical” in this compositional approach is not equivalent to harmony. Rather, it indicates a distinct sound quality and its changes. This concept also includes a purely coloristic approach to harmony (e.g. piano pieces by Morton Feldman), but can also be applied to other objects that shape a particular sound quality.

If we take a closer look at the same excerpt from Hosokawa’s string quartet (Figure 4), we can see that pitch articulation here has much bigger influence on a vertical dimension, rather than the horizontal one. The first structure, the abrupt chromatic passage, creates a cluster-like harmony and a degree of temporal dissonance (polyrhythmic aspect) that produces a very intense sound quality. Gliding leaps, on the other hand, create a gradual increase of intensity, expanding from unison to a dissonant chord. Linear (horizontal) teleology of pitches here creates distinct qualitative aspects of both “chromatic passages” and “gliding leaps”, which helps us with grasping a dichotomy between those two textural types. Focusing on the qualitative differences between these two textural types forms teleology of a higher-level and brings it to the vertical domain, as it becomes a sequence of qualities, rather than a sequence of pitches.

Sound qualities of consonant and dissonant harmonic intervals can become very important factors in shaping the overall sound quality of the piece or articulating other parameters, such as timbre. It may as well become a significant constructional element, as it has the power to fuse or separate different timbres. If we look at the excerpt from *Sydenham Music* for flute, viola and harp by Johannes-Maria Staud (Figure 5), we can not only see pitches articulated as the melodic contour produced by harp (oval markings), but we can also notice certain elements in those contours that interact with other instruments and thus create additional textural layers. Flute and viola possess timbral attributes that are considerably different from the ones of harp (mainly due to different attack quality) and thus are being perceived as different textural layers – melodic outlines of harp (dashed markings) and soft sustained notes of flute and viola (dashed-dotted markings). However certain pitches in the harp part (A and C#) interact with the other instruments via harmonic unison that alters the perception of flute and viola texture so it becomes a derivative of harp (thin dotted markings). Vertically implemented pitch articulation here acts as a fusing agent that helps consolidate different timbres and create a multidimensional texture.

Figure 5. Harmonic unison as a fusing agent in *Sydenham Music* for flute, viola and harp by Johannes-Maria Staud

As an opposite case, we can look at the ending of my composition *Winter Calligraphies* for symphony orchestra (Figure 6). Here we can see bass clarinet playing D in the lowest register combined with the low E of bowed marimba. These two tones possess quite similar timbral attributes, as they both are soft, “wooden” and have a fair degree of white noise. If implemented in harmonic unison, these two tones would seamlessly blend together thus emphasizing the significance of the pitch. However this time they produce a certain sound quality that is designed to mimic and enrich the pitchless hum of a double base bowed on a tail piece, which is the foundation of the sound quality of this section.

Figure 6. Harmonic dissonance as the enhancer of sound quality in *Winter Calligraphies* for symphony orchestra and mixed choir by Andrius Maslekovas

These examples allow us to uncover how a choice of (a) particular pitch(-es) for vertical implementation can help a composer to manipulate timbral attributes of different tones. It can help strengthen qualitative bonds between different timbres, unify a segment or a textural layer, or, in opposite, segregate similar timbres, emphasize their qualitative values and help create a unique sound quality.

Vertical implementation of pitch can also carry a symbolic meaning. A good illustration of that would be Penderecki's *Polymorphia*. As pointed out by Manos Panayiotakis (2017), the famous resolution of a micro-tonal cluster into the C-major chord (the last and perhaps the most significant event of the piece) not only serves as a major contrast point of the composition, but also as a symbol of tonal tonic. “The establishment of the triad – perceived as a tonic – follows at the very end of *Polymorphia* and leads to the perception that everything that was heard before was within the dominant harmonic area” (Panayiotakis 2017: 57). Panayiotakis further states that “The existence of a tonal, consonant sonic event – C major triad – generates a very powerful type of contrast, representing general consonance and dissonance, which brings back to mind the fundamental principles of the tonal harmony of the past, next to contemporary massive micro-tonal harmonic relationships. Along these lines, since there was no other consonant harmonic impression during the whole composition before the very end of the work, every dissonant sonority that sounded previously, however tense, seems to function as a fundamental component of a long, gradually developed, abstract type of dominant, released into the final, non-abstract C major tonic triad” (ibid.). It acts as a symbol of tonality and all Western musical tradition. This evokes an interesting type of syntactical relations within this piece. On a small scale level it features relations attributable to schemata of order; however on a large scale level it creates a clearly

identifiable resolution that changes the perception attributable to schemata of order-relation. It creates a certain perceptual ambiguity: on the one hand it exploits the means of “the new music” and creates abstract visual-like perceptual cues, on the other hand, at the highest level of musical form it employs a very apparent syntactical cue, which negates previous experiences. This ambiguity creates a very interesting audiative object – a resolution that is cleansed from its straightforward ordinary meaning and thus has gained abstract implications (e.g. a dichotomy between old and new, order and chaos, good and evil etc.). One can think of it as a transition from a sign to a symbol.

Perceptual ambiguity can occur not only between the types of schemata but also between the vertical and horizontal pitch articulations. It can create an interstitial auditory state between horizontal and vertical domains, which we would like to refer to as **diagonal**⁷. The term *diagonal* was first introduced by the famous French philosopher Gil Deleuze, when he made parallels between music by Pierre Boulez and the manner of literary works by Marcel Proust. It was described as *a manner in which noises and sounds detach themselves from the characters, places and names to which they are first attached in order to form autonomous “motives” that ceaselessly transform themselves in time, diminishing or augmenting, adding or subtracting, varying their speed and their slowness* (Deleuze 1986, In: Murphy 1998: 70). Deleuze refers to those elements as “blocks of duration”, “ceaselessly varying sonorous blocks”. He calls them diagonal in order to mark the fact that they are not reducible either to the vertical or horizontal values. In Western classical music this phenomenon would manifest itself in the form of *candences* – short episodes that carry both horizontal and vertical values.

When emphasizing the sound quality, the idea of simultaneous changes in horizontal and vertical domains can be materialized in a plethora of different ways that are offered by the articulation of timbre. However, if we only concern ourselves with pitch articulation in such structures, we can see that it creates another type of ambiguity, this time between two *Gestalt* principles, namely *Continuity* and *Common Fate*. If we look at the excerpt from my composition *Incantation of the Freezing Haze* for flute solo (Figure 7), we can see a downward falling melodic contour that ends with two leaps of major sevenths. The natural course of this outline would be a gradual descend B-B \flat -F-E-E \flat -D as is being dictated by the *Gestalt* principle of Continuity. However, when the last two notes are substituted with leaps to the same pitches of different octaves, it creates a parallel line that is perceived as moving to the same destination by *Gestalt* principle of Common Fate. These leaps disrupt the sense of directionality and replace it with a sense of spatial expansion. This alters musical time-space continuum and creates a unique sound quality, which can be sculpted into a variety of over time expanding and diminishing shapes.



Figure 7. Diagonal structures in *Incantation of the Freezing haze* for flute solo by Andrius Maslekovas

Concluding thoughts

Analysis of the musical excerpts presented in this paper reveals that pitch audiation and, eventually, articulation in sound quality-oriented music does not rely on syntactic relations between pitch structures, but rather on visual imagery that helps sculpting the shape of the sound quality. Teleology in such musical works appears not to be based on the development of functional progress, but on interactions between different shapes, where pitch becomes a valuable asset of manipulating various qualitative aspects. This unfolds a very interesting aspect of audiation, where a certain musical parameter absorbs audiative traits that are intrinsic to another musical parameter. However this insight opens Pandora’s Box of questions that are not being addressed in this paper: despite of the focus on pitch, which is being presented in this paper, one can assume that such relations may occur between various musical parameters. This leaves a lot of room for future explorations for both cognitive and creative points of view, as there is a lot of studies to be done regarding the sound processing in our perceptual apparatus, and a lot of out-of-the-box ideas to be generated in order to compose new, unique-sounding music.

⁷ See more: Maslekovas 2015.

References

- Deleuze, G. (1986). Boulez, Proust and time “Occupying without counting”. In: Murphy, Timothy S. Boulez/Deleuze: A Relay of Music and Philosophy. In *Angelaki: Journal of the Theoretical Humanities*, 3/2, 1998, p. 69–74.
- Deliege, Irène & Mélen, Marc (1997). Cue Abstraction in the Representation of Musical Form. In: *Perception and Cognition of Music*. Deliege, I. & Sloboda, J. (ed.), Psychology Press Ltd., p. 387–412 (e-book).
- Dowling, W. J. and Harwood D. L. (1986). *Music Cognition*. MIT Press.
- Lyons, Andrew D. (2003). *Time Space Texture: An Approach to Audio-Visual Composition*. Dissertation.
- Maslekovas, Andrius (2014). Vertical and Horizontal Sonoric Structures as Constructional Elements of Sonoristic Music. In: *Principles of Music Composing*, XIV, p. 30–49.
- Maslekovas, Andrius (2015). Manifestations of a Diagonal Dimension in Quasi-Melodic Elements of Sonoristic Music: *Incantation of the Freezing Haze* for flute solo by Andrius Maslekovas. In: *Principles of Music Composing*, XV, p. 187–197.
- Maslekovas, Andrius (2017). Skambesio kokybės artikuliacija sonorinių struktūrų daryboje [Articulation of Sound Quality in the Construction of Sonoric Structures]. In: *Lietuvos muzikologija*, XVIII, p. 96–111.
- Panayiotakis, Manos (2017). From Massive Clouds to C major: Aspects of Tension and Release in Krzysztof Penderecki's *Polymorphia*. In: *Principles of Music Composing*, XVII, p. 53–58.
- Snyder, B. (2000). *Music and Memory. The introduction*. Bradford Book.
- Stockhausen, Karlheinz (1959). How Time Passes By. In: *Die Reihe* (English Edition), p. 10–40.

Tono aukščio audijavimo ypatybės skambesio kokybės artikuliacijos kontekste

Santrauka

Tono aukštis – tai bene paskutinis skambesio parametras, apie kurį susimąstome minėdami skambesio kokybę. Nėgana to, esame linkę skambesio kokybės ir tono aukščio sąvokas pateikti kaip tam tikrą prieštarą. Nors tokia prielaida nėra neteisinga, straipsnyje mėginta šiek tiek išplėtoti skambesio kokybės ir tono aukščio santykių koncepciją, o aptariant tono aukštį kaip kognityvinį reiškinį gilintasi į kokybinius jo aspektus.

Įvairūs moksliniai tyrimai rodo, kad žmogaus smegenys yra linkę skaidyti ir jungti sensorinę informaciją. Tono aukštis priklausomai nuo konteksto gali būti apdorojamas įvairiose smegenų zonose, esančiose skirtinguose smegenų pusrutuliuose arba tarp abiejų pusrutulių. Įvertinus tyrimų rezultatus galima teigti, kad tono aukščio audiacija gali pasireikšti skirtingai: kaip lingvistinė sintaksė, kaip minčių vaizdiniai ar suvokiamos erdvės pokyčiai. Taigi priklausomai nuo skambesio kokybės ypatybių tonų aukštis gali atlikti skirtingus vaidmenis skambesio parametrų hierarchijoje.

Tono aukščio išstūmimas iš jam tradiciškai priklausančios dominuojančios hierarchinės pozicijos bene geriausiai atsiskleidžia naujoje muzikoje, kurioje daugiausia dėmesio skiriama skambesio kokybei (tembrui), tačiau tonų aukščio artikuliacija išlieka ryški. Puikių šios muzikos pavyzdžių galima atrasti tokių kompozitorių kaip Johannesas-Maria Staudas, Mathiasas Pintscheris, Ondrejus Adamėkas, Toshio Hosokawa, taip pat šio straipsnio autoriaus kūryboje. Tonų aukščio operacijos šių autorių muzikoje yra visiškai kitų nei nuo seno vakarų muzikos tradicijoje įsigalėjusių intencijų išdavos, todėl čia jos turėtų būti traktuojamos kaip priklausančios kitai aukščio organizavimo paradigmam. Norint nustatyti įvairias tonų aukščio audijavimo alternatyvas, pasireiškiančias į skambesio kokybę orientuotoje šiuolaikinėje muzikoje, straipsnyje išanalizuoti minėtų kompozitorių kūrinių pavyzdžiai, aptarti jų sintaksiniai ryšiai ir kognityvinis poveikis.

Audiating Timbre: From “Inside the *Materia*” to a Textural Prototype

Abstract. Timbre is usually left out the scope of audiation topics. This deficiency may be related to a historically-rooted habitude to treat timbre as an auxiliary or supplementary factor in the realm of musical practice. Although nowadays compositional reality manifests as a completely different picture in regard to timbre usage, because of the lack of conceptual purity it often gets lost in the ocean of multifarious yet narrowly-oriented studies. This paper attempts at drawing conceptual guidelines for a better understanding of compositional approaches in respect of timbral manipulation as well as their possible audiative origins.

Respecting both psychoacoustic specifics and culturally-determined factors, the functional potentiality of timbre is generally reduced to two basic aspects: manifesting as a pure quality on one side or as a delineator (based on its contribution to identifying a sound source) on the other. In addition to this ever-lasting ambiguous implication, a hierarchical gradation is suggested for a deeper comprehension of timbre, entrenching its meaning underneath and beyond the prevailing treatment as an equivalent to a musical instrument. Two instances – Helmut Lachenmann’s *Dal Niente (Interieur III)* (1970) and Tristan Murail’s *Ethers* (1978) – are examined as reflecting polar audiative approaches in accordance with the drafted theoretical frame: one (Lachenmann) permeating deeply “inside the *materia*” of a sounding body and thus fracturing the unity of timbre related to one musical instrument; the other (Murail) treating timbre as a prototype for conceiving superior levels of musical structure (fused timbres, textures, illusory sound images) implemented by several levels of fusion procedures.

Keywords: audiation, timbre, psychoacoustics, instrumental *musique concrète*, spectralism, Lachenmann, Murail, fused timbre, texture, illusory sound image.

Introductory inquiries

Audiation appears to be one of the most secret phenomenon of musical experience. Audiation in regard to timbre is even more submerged in cognitive opacity. However, clarifying a concept overflowed by speculative manifold in theoretical field may contribute to a more transparent and conscious consideration.

What would work as guidelines that could help to orient oneself as a researcher, listener or a composer seeking for elaboration of his/her compositional strategies in respect of timbre? What could be the basic pillars trying to draft a more general theoretical framework for the audiative perspectives of timbre? Taking into consideration psychoacoustic, cultural as well as conventional discourses referred to music theory, the following chapters aim at drawing some indicative directions for a more deliberate comprehension of this intricate subject-matter.

Concerning timbre as an equivalent to a musical instrument: underneath and beyond

There are deep historical roots of associating timbre (or whatever its historical or contemporaneous synonymic equivalents such as tone, sound, tone colour, sound quality, *Klangfarbe*, etc.) with musical instruments from the first documented records showing the existence of the concept.¹ Despite questioning such a generalisation, this connexion of timbre to a musical instrument remains notably viable among different discourses taking into account an overall awareness regarding timbre. The reasons for this habitual prejudice is evidently in pertinence with the widely acknowledged tendency to bind sounds to their sources and causes, which actually exceeds the domains of the specific musical context.

Binding sounds to their sources and causes is a relevant ability essential in encounters with any kind of environmental phenomena: nature, cultural products or activities (music as one of them), intercommunication (e.g. speech) (Erickson 1975: 1; Slawson 1981: 132; Smalley 1994: 37; 1997: 110; Houtsma 1997: 111). According to Robert Erickson, this mental operation may simply be noticeable in many situations of daily life (such as recognition of a warning signal, mother’s voice etc.) (Erickson 1975: 1) sometimes playing a crucial role in case of danger (e.g. recognising the roar of a lion). This conjuncture of a sound to its source is sometimes so strong and abrupt that they can even be assimilated in human consciousness, as a common locution, noticed by Cornelia Fales, illustrates: “I hear a cricket; not – I hear a sound that may indicate the presence of a cricket” (Fales 2002: 63). Thus timbre, as a sonic physiognomy (Chion 1986: 7), functions as a crucial indicator, a direct link referring a sound to its possible source or a related process.

¹ The historical retrospective regarding the evolution of the concept of timbre is exhaustively discussed in dissertation by William James McGee (1982: 25–58).

This common mental procedure substantiates the traditional treatment of timbre in musical contexts as well. Although timbre has long been put aside conventional theoretical inquiry compared to the elaborated analytical tradition in respect of pitch organisation, in everyday usage timbre and its association or even assimilation with a sound source (i.e. musical instrument) is strong and widespread among both musically-educated and musically-uneducated people. Analogously to the previously quoted statement, a common utterance “I hear violin” is no less popular. For the vast majority of people, the recognition of a sound source (musical instrument) is accomplished relatively fast and requires much less efforts compared to the structures based on other musical parameters (such as modes, melodies, rhythmic patterns, etc.) do (Erickson 1975: 9–10).

The habit discussed is reflected or at least related to the application of timbre in compositional organisation as well, especially in the case of traditional instrumentation/orchestration. Linking sounds to their sources and also linking sounds that originate from the same (or similar) source between themselves (Smalley 1997: 110) is a great perceptual potentiality and serves as an effective compositional vehicle. In general, this property allows to sustain continuity of particular structures (a melodic line or several distinct lines in polyphonic situations) and to separate ones from the others (appearing sequentially or simultaneously). Summarizing the existing research into the perceptual contribution of timbre (as an indicator of a sound source) to compositional organisation, several prevalent strategic possibilities can be distinguished:²

- 1) linear grouping of sequential sounds; the continuity of one timbre is an important factor to form a coherent line due to the aptitude to track a sound source over time (singer’s voice, clarinet, set of carillon bells; McAdams, Giordano 2008: 72). This principle ensures coherence of a melodic or rhythmic structure or other consistent patterns (the sounds of a melody do not usually jump from instrument to instrument, contrariwise – the pitches change while the constant timbre integrate them into united construction; Erickson 1975: 12).
- 2) simultaneous grouping; timbre can be an effective means to divide simultaneous musical elements into separate layers/blocks. It can be applied to form polyphonic structures, separating melodic line from accompaniment, etc.
- 3) segmentational grouping; some timbral combinations may contribute to the segmentation of musical material into structural constructs of different levels (from small elements to parts or even characterise entire movements of a piece).
- 4) forming orchestral gestures; i.e. creating characteristic sound images, which are comprehended as experiencing timbral evolution (e.g. orchestral augmentation, descent, sudden attack, sound wall, downfall etc.).

Behind this habitual induction of a source, a certain sound quality is firstly sensed, which invokes a particular association. A sound is being caught by the human sensory system and later being linked to the objects or situations, which are already known from the past experiences. The paradox here is that the sensed physical reality is indeed neither uniform, nor stable regarding one and the same sound source in its various appearances. Here we face the phenomenon of categorisation, which means we refer a sound to its source despite the variability in its qualitative nature. That is also called a subjective constancy (Erickson 1975: 11–12), when the multifarious sensations are ordered into defined classes in accordance with one’s experience, education, sociocultural environment etc. In other words, it is an ambiguity between fixed timbre (as a trigger of the already known) and dynamic timbre (an actual realisation here and now; François 1990: 117–118). From the perspective of acoustic accuracy, “if a particular constant timbre would be associated with the sounds of a musical instrument, the relationship between timbre and physical sound attributes would become very loose or non-existent” (Houstma 1997: 111). Actually, as acoustic analysis would show, there does not exist “the bassoon timbre”, but rather a bassoon timbre at a given pitch and dynamic, produced with a specific articulation and playing technique (Siedenburg, McAdams 2017).

In general, we tend to categorize sounds in many different levels, ignoring more or less palpable differences, such as:

- individual characteristics of each instrument (we tend to categorize timbre of a particular instrument to its entire family, ignoring the differences that appear from instrument to instrument);

² Although this summarisation embraces insights of various researches, the classification is mainly based on types distinguished by Stephen McAdams (2013).

- registers (one instrument shares different timbral qualities in respect to its particular register; as the most common example is the case of clarinet's registers which feature extremely different qualities in its low, middle or high registers; Slawson 1981: 132);
- dynamics (dynamics also makes a ponderable influence to a resultant sound quality; Ambrazevičius 2012: 13–14);
- articulation (changes of attacks, position of tongue or hand, etc. highly contribute to timbral characteristics);
- playing techniques (a range of playing techniques from conventional ones to extended means expands the diversity of timbral quality to hardly circumscribed areas).

All this diversity of qualities is actually perceived by human sensation, only our former experience, habits, intellectual properties are inclined to classify them into categories which are largely assumed in contact to practical incentives.

The sensory reality is conditioned by the configuration of factors on even a deeper level, which is actually beyond our direct perceptual accessibility and is only acquired by employing technological devices. In this approach, every perceived quality is indeed determined by a complex sound structure, which is a focus of acoustic and psychoacoustic research. The phenomenon that interests psychoacousticians most is the transition between data of physical reality analysed by hearing organs and their result in a perceptual system. The emergency of a particular sound quality appears after analysing and fusing many acoustic elements apparent in nature (Shouten 1968, in: Erickson 1975: 9), or in Fales' words "timbre must wait until signals from all elements reach the auditory cortex where they are grouped and subjected to the process of perceptual fusion into the unitary sensation of tone quality" (Fales 2002: 62). This process is described using different names according to several authors such as subjective sound experience (Erickson 1975: 9), perceptual fusion (Fales 2002: 62), perceptualization (id: 63–65), emergent quality (Wright, Bregman 1987: 64–65), emergent property (Cutting 1976; McAdams 1982, in: Wright, Bregman 1987: 64–65), spectral fusion (Cutting 1976; McAdams 1982, in: Wright, Bregman 1987: 64–65), but all of them address a perceptual nature of timbre phenomenon.

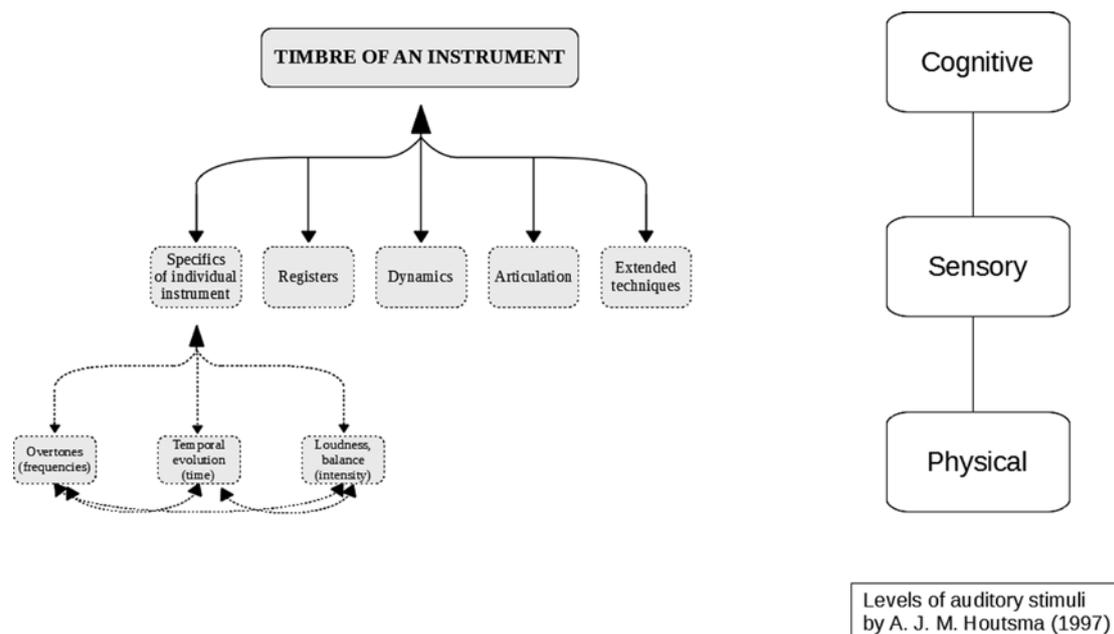
Nevertheless, physical factors that may contribute to the perception of a specific sound quality are also intensively explored. The overtone spectrum (namely the balance between partial tones in a steady condition) was initially found as a main factor determining the experience of particular timbre.³ Later, many other factors were involved as also relevant in the final perceptual result, such as spectral envelope, temporal envelope, absolute frequency position, various characteristics of onset and steady states, etc.⁴ On the most primitive level, however, we can reduce all these aspects into several primary elements, which may actually be attributed to parameters of different origin: frequencies (overtones), time (temporal evolution), loudness (absolute or relative intensity), as well as combinations and interactions between them all (balances, formations, shaping etc.).

As it was just stated, this deep acoustic level is indeed hardly accessible by human senses. However, it is worth mentioning that we can merely perceive the traces of it in cases when the distinct components can be achieved by raw hearing. It may happen in very deliberate situations such as overtone singing (when several overtones are extracted from an overall sound), or multiphonic techniques of woodwind instruments, also the sound of a bell (when the sound splits because of inharmonic partials therein) and other.

After delving deeply into the timbral inner constitution lying underneath its casual treatment step by step, we can schematise the discussed points into a kind of hierarchical gradation framework. The treatment of timbre as an equivalent to a musical instrument, which is mostly historically-established, is a point of departure in this proposed schema. The established unity of timbre as bound to one instrument is queried by a more subtle qualitative nature, which manifests the variability of timbre in regard to different registers, specifics of a particular instrument, articulation, playing techniques, etc. In the meantime, the latter are the results of perceptual processing of various acoustic elements in even a deeper dimension (see Scheme I).

³ The recognition of the crucial role of sound spectrum to sound quality is accredited to the pioneer of psychoacoustics Hermann von Helmholtz and his pivotal study "On the Sensations of Tone as a Physiological Basis for the Theory of Music" (1862) (McGee 1982: 33–34); however, with a lot of modifications and additions, it was further pursued or developed by majority of psychoacoustics researchers.

⁴ A concentrated survey of psychoacoustic research in regard of timbre perception is presented in the study of Caroline Traube (2006).



Scheme I. Gradual fracturing of timbre category

A parallel between the proposed framework and the levels indicated by Houtsma (1997: 111–112) may be drawn. In his gradation, he distinguished physical, sensory and cognitive areas. The latter is characterised as dependent on the learned habits through cultural experience. It is important to note that the content of this cognitive level may change when the interpretation of perceptual givens is changed. It is the most flexible sphere adjusting to the shifts of cultural or social trends.

As we were exploring the inner nature of timbre, the perspective towards an opposite direction can also be drawn. From the orchestration field, it is a well known practice when several instruments, or groups of instruments, are combined together in order to create a new fused timbre. This phenomenon is also called “emergent quality” (McAdams, Bregman 1979: 39; McAdams, Giordano 2008: 77; Wright, Bregman 1987: 64; which recalls the mentioned psychophysical nature of timbre) as a perceptual fusion of many different elements into a particular quality. It is a psychoacoustic occurrence when several different timbres combined together lose their discrete features and identifiability – instead they blend into a newly emerging quality as an inseparable unity. There are some important factors contributing to the phenomena of a blend of different timbres attributed to various musical instruments. Mostly discussed in psychoacoustic studies are those:

- frequency relationships derived from simple ratios (McAdams, Bregman 1979: 39);
- synchronicity of attacks and decays (McAdams, Bregman 1979: 39; McAdams, Giordano 2008: 77), or elimination of clearly audible attacks (McAdams, Bregman 1979: 34);
- spectral similarities (especially regarding the shaping of attack) (McAdams, Bregman 1979: 39; McAdams, Giordano 2008: 77);
- relations between spectral centroids, and the overall centroid of the combination (McAdams, Giordano 2008: 77);
- spectral affinities between noise and tone (Fales, McAdams 1994).

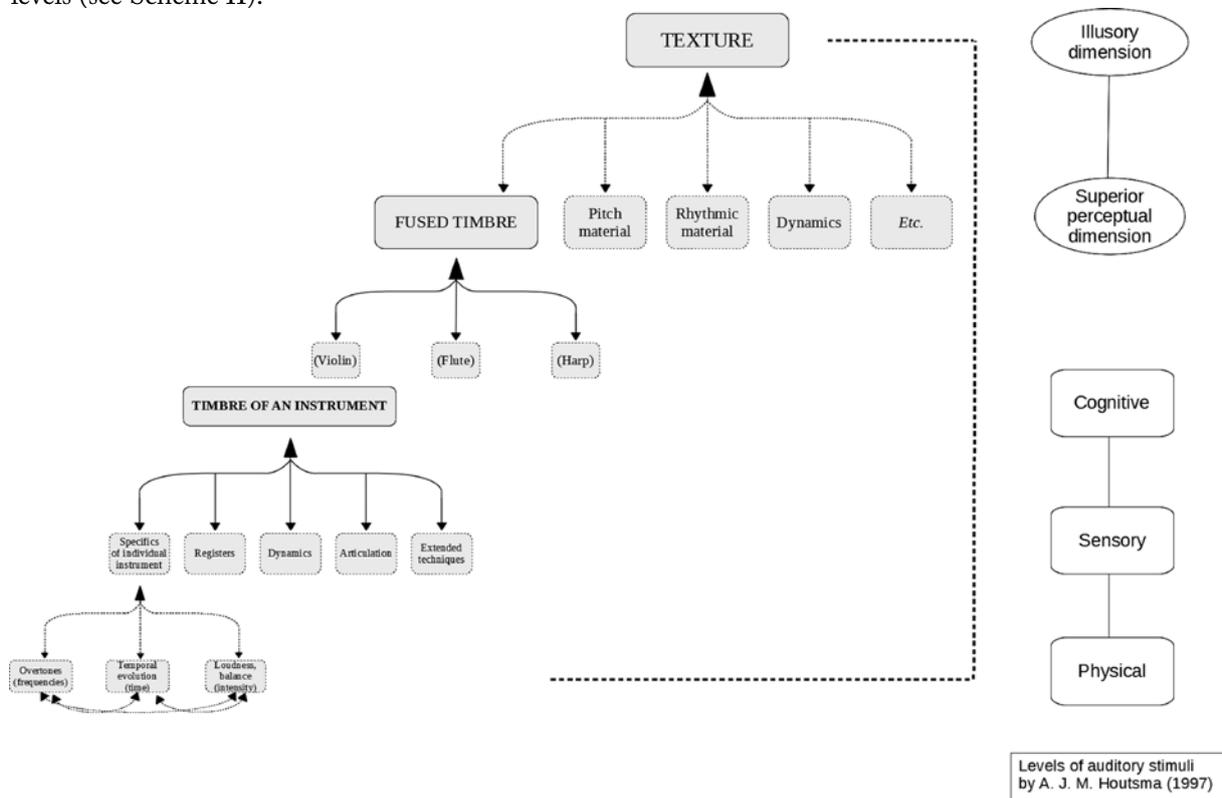
Some tendencies of composing practices offer us a further step in this merging – fracturing chain. It is a level where other parameters may also be employed in order to create a unique composite quality. This process can be called textural formation – a realisation of any sonic illusion or image conceived by the composer. As it is pointed out by psychoacoustic researchers, “the perception of a homogeneous musical texture requires a grouping of many events across pitch, timbre, and time into a kind of unitary structure, the textural quality of which depends on the relations among the events that are grouped together”⁵ (McAdams, Depalle, Clarke 2004: 276).

⁵ It is mostly apparent in the manifestations of spectral music, where the scores themselves are like representations of spectral sonograms of particular timbre (e.g., Gérard Grisey *Periodes*). However, this principle is supposed to encompass all compositional realisations where the separate musical elements (be timbres, pitches, or rhythms) blend into a unitary formation while losing or obscuring their distinct identification (as we observe in the works by Ligeti, Xenakis, Penderecki, and others).

Here we can draw of a parallel between two opposite poles of our proposed framework. This textural level, where different parameters (such as pitch, rhythm, intensity) are combined together in order to create a new quality, is like a mirror of the deepest physical level, where timbre is conditioned by the combination of the several distinct parameters.⁶

However, as Shlomo Dubnov insightfully noticed, in the meantime it is sufficient to state that we define “musical texture as the principle of organization of sound which is not derived from learned schemes and as such it requires a probabilistic approach for its description.” In addition, he claims that “the most salient difference between texture and timbre is the perceptual non separability of timbre versus the separability of texture into several sources and segmentation in time” (Dubnov 1996: 5). The perceptual features and potentialities of textural combinations is still a large space for further research. However, we can generally claim a prototype for this textural level lying deeply inside the acoustic nature of timbre itself.

The perspectives revealing the merging potential allow us to extend the hierarchical gradation schema to the opposite direction at least by two levels, respectively called timbral fusion and textural formation. Timbral fusion may allude to the new resultant colour appearing after combination of distinct primary colours in visual art; thus we can refer to as a superior perceptual dimension. The textural level may be referred to imaginary illusions and thus may be called illusory sound images. After all this broad theoretical inquiry, timbre may be characterised an emergent phenomena in its essence – a key tenet which links all the distinguished levels (see Scheme II).



Scheme II. Hierarchical gradation schema of timbre concept

The suggested hierarchical framework reveals the depth of the potentiality of timbre in regard to compositional consideration. Moreover, it invokes a space of numerous directions in the process of audiation. Unfortunately, the world of a composer’s inner-reflections during the act of creation is hardly accessible by verbal expressions. However, the reflections of this intimate process can be traced in notated representations as well as sonic results themselves. Thus the inner processes may be pursued retrospectively. Such retrospective inquiries of two musical instances and their representations are attempted in the following chapters.

⁶ We can designate several attempts to relate the intrinsic acoustic level of a sound to the extrinsic structural level of music throughout the 20th century. Henry Cowell pursued conceptualization of time proportions based on relations between overtones of the sound spectrum (1969/1930). The analogous parallel was highly elaborated in Stockhausen’s conceptualisation of time (1959/1957). However, we can hardly equate these attempts to the current meaning of texture, which not always seeks for a mathematical accuracy of the proportions regarding time or pitch.

... From “Inside the Materia”: Helmut Lachenmann’s *Dal Niente* (*Interieur III*)

Helmut Lachenmann’s *Dal Niente* (*Interieur III*) for one clarinet player (1970) – from the traditional perspective approaching timbre as equivalent to a musical instrument – should be considered as mono-timbre-like piece, mostly based on pitch and rhythmic material. We can notice elaborated pitch and rhythmic structures in this particular score as well; however, one certain moment alters the ordinary course significantly.

From the first impression, the first line of the piece seems as a very coherent, consistent melodic line. A uniform rapid movement of adjacent (or close) pitches in clear directions seems as an obvious example of continuous passage. However, a dimension of timbre is a factor that brings new circumstances into this apparent consistency. Diamond shapes mark a presto-movement in the “extremist *pianissimo*” of very delicate key-noises mixed with audible pitches, while round shapes mark ordinary pitches. Because of the considerable difference in regard of timbre and dynamics as well, a line actually divides into separate elements from the perspective of listening experience (see Figure 1).⁷ This statement is reaffirmed by the explanation note of the composer himself in the *Performance instructions* of the score, where he explicates that “the notes with stems and normal heads strewn among the square notes on Page 1 should burst in as rapid and more or less surprising ‘fade-ins’ (just as quasi fragments of a broadcast become audible through the sudden turning-on of a radio).”

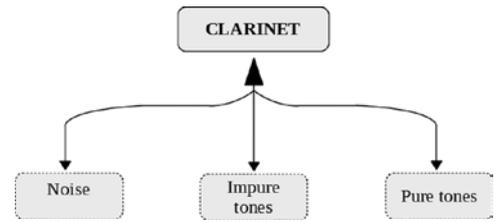
Figure 1. Separation of two layers in Helmut Lachenmann’s *Dal Niente* (*Interieur III*), line 1

In the interplay of these two dominating timbres, a third quality is introduced into the process: pure breath represented by square shapes apparently differs from the previous two prevailing qualities significantly and thus stands apart as one more independent layer (see Figure 2). These three layers featuring different timbral qualities evolve their independent roles quite elaborately, and seem to be dominating parts throughout the entire piece.

Figure 2. Separation of three layers in Helmut Lachenmann’s *Dal Niente* (*Interieur III*), line 6

⁷ This particular analysis is influenced by the author’s listening experience of the performance by clarinetist Alain Damiens. Internet access: https://www.youtube.com/watch?v=Gxbsdy_fYrA

The extraction of these three timbres from one clarinet timbre can be explained by taking the extremes based on the qualitative scale from pure tone on one pole and pure noise on the other. The discerned layers correspond to the extreme points of the indicated scale: pure breath (as noise) and ordinary pitches (as pure tones) while vague *pianissimo* sounds locate somewhere in the middle of this range (call them impure tones). The greatest possible distances in respect of spectral characteristics as well as independent strategies of evolving material assigned to those timbres determine the effect of hearing three different instruments instead of one at the same time (see Scheme III).



Scheme III. Fracturing timbre of clarinet into 3 sub-timbres in Helmut Lachenmann's *Dal Niente (Interieur III)*

If we take a closer look at the first line once again, we can notice one more subtle yet important detail. Some *pianissimo* sounds are covered with an additional mark above, which signifies loud key-noises, while the rest of notes are continuing without it (see Figure 3). This shows that even one of the already distinguished timbral categories is not completely uniform itself but contains different nuances instead.

Figure 3. 2nd level of separation of timbre layers in Helmut Lachenmann's *Dal Niente (Interieur III)*, line 1

If we investigate the score attentively, we find that each of the three distinguished timbral categories is further divided into various sub-categories. Here a systematised graph is suggested representing the range of qualitative types apparent in the piece (see Scheme IV).

What is even more important, they function neither accidentally, nor as auxiliary colourations; instead, contradictory relations are being developed between them that eventually result in a complex multi-level polyphony. In the following example, we notice an interaction between the layers extracted only from breath category: frullato – non frullato, wide mouth cavity (circle) – normal mouth cavity, inhalation (triangle bracket) – exhalation (square bracket) (see Figure 4).

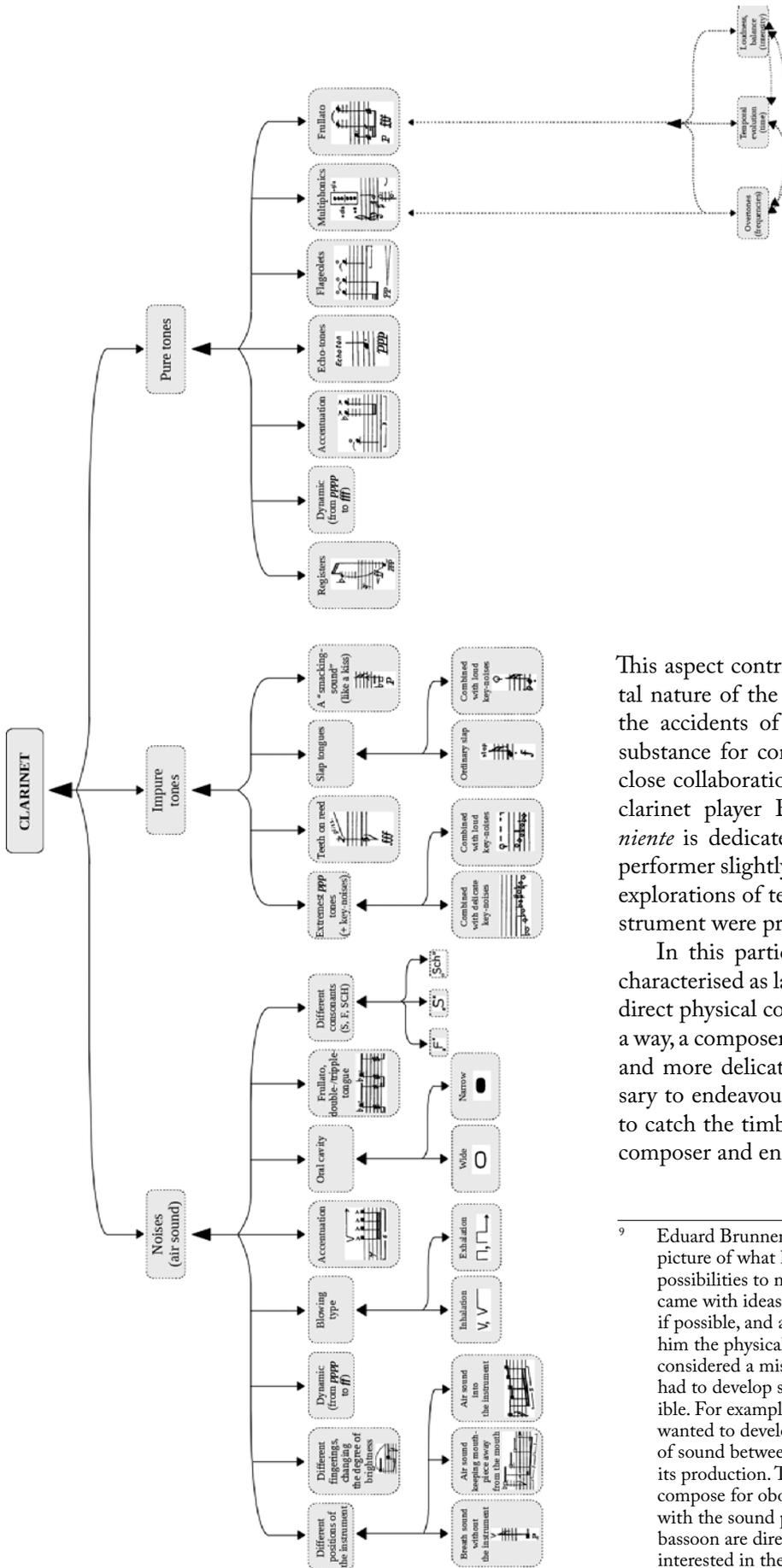
Figure 4. Multi-level polyphony in Helmut Lachenmann's *Dal Niente (Interieur III)*, line 60

One note may be added to this systematisation. As we move inwards the sound quality level by level, we eventually arrive at the primary acoustic area, which, as it was proposed, is beyond the perceptual abilities of human. However, some traces may be noticed, which refer to that deep acoustic origin. When a complex (or multiphonic) sound is produced, some of the overtones become apparent and heard, which initially belongs to the inner structure of a sound (see Figure 5). Thus, we encounter a border between unitary timbral quality and its disassembling into the primary elements.

Figure 5. Multiphonic sound in Helmut Lachenmann's *Dal Niente (Interieur III)*, line 42

This process of extracting “shades of shades” can be interpreted as going deeper and deeper “inside the *materia*” of one particular instrument well as the body of a performer who is exploiting it, or in Lachenmann's words, “the instrument becomes a device: a characteristically manipulated filter for the players breath as controlled by the composition and its interpretation”.⁸ The possibilities of this interaction may be limitless. The audiative process of the composer is thus very strongly dependent on the familiarity with material constitution of the objects he is working with.

⁸ Description found in the introductory notes of Breitkopf publication of Lachenmann's *Dal Niente (Interieur III) für einen Solo-Klarinetisten*, internet access: <https://www.breitkopf.com/work/3857/dal-niente>.



Scheme IV. Fracturing of sub-timbres across several levels in Lachenmann's *Dal Niente (Interieur III)*

This aspect contributes to a largely experimental nature of the compositional process, when the accidents of experiments may become a substance for composition. It is witnessed by close collaboration between Lachenmann and clarinet player Eduard Brunner whom *Dal niente* is dedicated to. Remembrances of the performer slightly disclose the process how the explorations of technical possibilities of the instrument were proceeded.⁹

In this particular case, audiation may be characterised as largely guided or influenced by direct physical contact and experience. In such a way, a composer is stipulated to develop more and more delicate hearing; the same is necessary to endeavour for the listener too in order to catch the timbral delicacy conceived by the composer and encoded in the piece.

⁹ Eduard Brunner: "... he [Lachenmann] had a clear picture of what he wanted and asked me about the possibilities to make his idea sound. Lachenmann came with ideas that I had to translate into sound, if possible, and after making it I would explain to him the physical process. Sometimes what was first considered a mistake would turn into resources I had to develop so they could become reproducible. For example at the beginning in "*dal niente*" he wanted to develop the expressive feeling in the band of sound between sound and no sound, so to say, its production. That is the reason why he could not compose for oboe or fagot. Helmut was fascinated with the sound production process, and oboe and bassoon are direct. Due to that interest he became interested in the clarinet" (Agundez 2011: 30).

...to a Textural Prototype: Tristan Murail's *Ethers*

Another instance chosen for investigating audiative strategies of timbre is Tristan Murail's *Ethers* for flute (in C/in G/bass flute/piccolo), five instruments (tenor/bass trombone, violin, viola, cello, double bass) and continuum of maracas (1978). This set-up of multifarious timbres presupposes colourful textures as well as elaborated timbral diversity reflected in the musical structures – with maracas as a source of noise, four qualitatively akin instruments of the same string family, several types of melodious woodwind instrument, and brass instrument featuring harsher qualitative characteristics compared to others.

The piece is initiated by the continuous drone of maracas sound. After a short introduction of noise, the strings start to enter successively. This moment of entering deserves a particular inquiry. The strings start to enter *dal niente* (i.e. from silence, extending the attack so that it is barely palpable), and depressing the string with the finger of the left hand very lightly in order to produce a harmonic tone. That means that the beginning of a sound is very indefinite and containing a big portion of noise because of the light pressure and slow bow proceeded at the same, which prevents a sound carrying clear pitch from appearing at the beginning. All these factors contribute to the maximum kinship of such different kinds of instruments as maracas and the strings. Because of the noise component in the sound and indefinite attack, the strings approach maracas' sound as much as possible and gradually evolve as its inherent continuation. Further, string players strengthen the fingering pressure in order to produce ordinary pitch (not a harmonic tone anymore), and reduce the amount of noise to a minimum. This progression goes along all the strings, until they reach a moment of synchronization at the loudest dynamic of the first wave (which is *pp*), and then dissolve towards *ppp* dynamic (see Figure 6).



Figure 6. Tristan Murail's *Ethers*, section A, page 1

This process evidently corresponds to the already seen progression from noise toward pure pitch. First of all, it is traced at a raw timbral level: maracas sound is blending with the indefinite attacks of the strings and moving towards ordinary pitches of the strings. However, if we make a more profound inquiry, we can notice some parallels of the similar processes going through other parameters as well. From the temporal perspective, the strings enter and progress individually and independently until they are coordinated into a synchronized unit and finally spread out. Thus asynchronicity and synchronicity may be treated as a temporal metaphor of noise and pitch respectively. Dynamics is also inherently involved in this process – starting from silence (or barely audible) to a relatively clearly perceptible sound and finally dissolving into silence again. The analogous principle can be detected in the area of pitch either, moving from very high partials corresponding to fundamental $C\#_1$ (which are hardly perceived in real situations) towards lower partials (more apparent and relevant in timbral perception) and thus approaching the fundamental sound and finally returning to the high partials (Pastor 2007: 6) (see Figure 7).

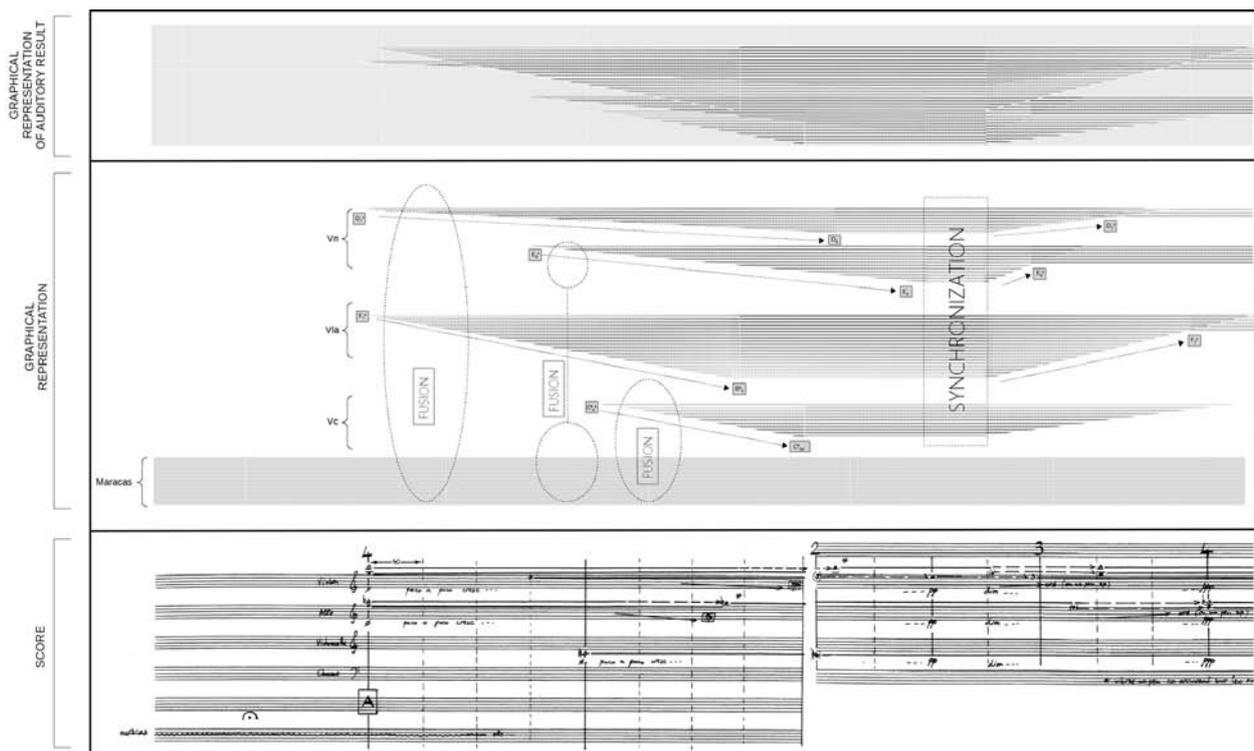


Figure 7. 3 level representation of Tristan Murail's *Ethers*, section A, page 1

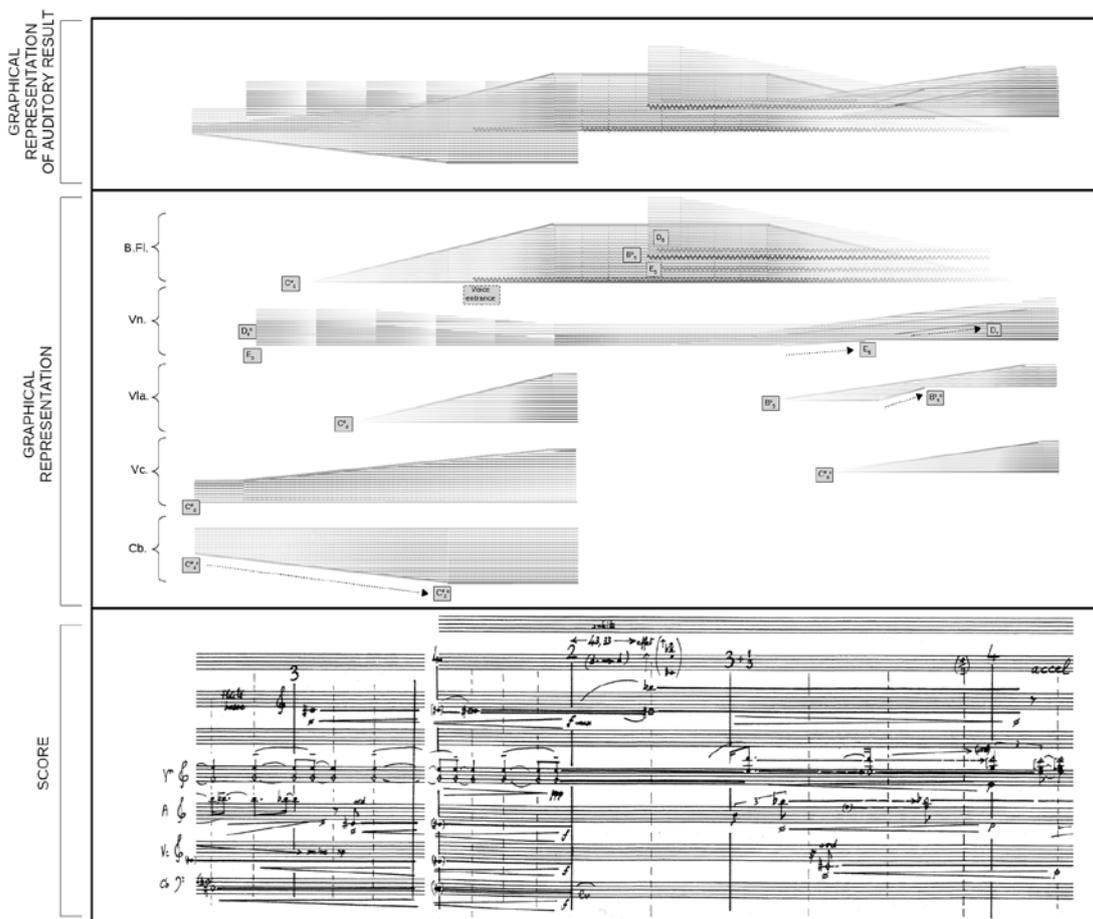


Figure 8. 3 level representation of Tristan Murail's *Ethers*, section A, page 3

Consequently we can see how the whole textural formation, in a more abstract level, reflects the image of sound development from noise to tone and again to noise. We can notice a conceptual analogy of timbral progression with the one found in the piece of Lachenmann, though implemented in completely different ways.

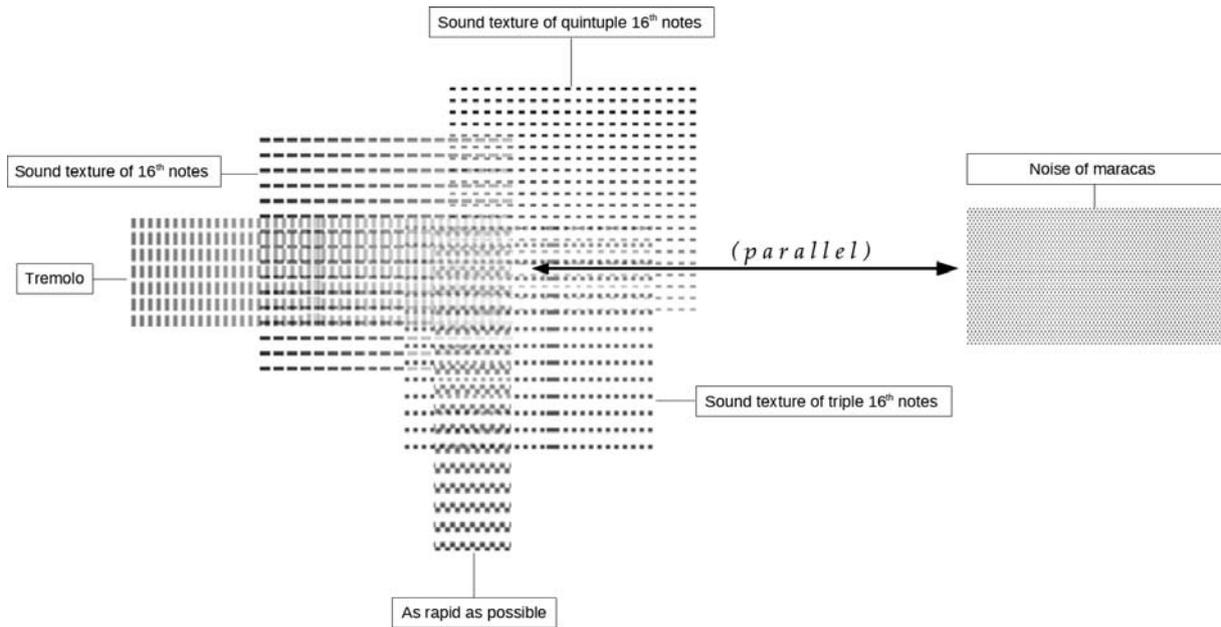
This textural cycle is repeated several times each time progressing towards the image of more and more clear pitch until the sixth phase, when the development of progression reaches its full realization. When the strings evolve to the ordinary pitches at $C\#_{4/2}$ (except the violin playing harmonic sounds), a flute is added to this compound sound at $C\#_4$ and finally is left to sound almost alone after all the strings except the violin are withdrawn from the texture. When the flute sound is exposed, the voice of a performer is involved in combination with the flute sound. The collection of pitches is not accidental: $C\#_4$ of voice and $B\flat_5$ of the flute originate from the same spectrum of $C\#_1$; their simultaneous combination should theoretically result in appearance of difference and sum tones (which are actually indicated in the score as well) (idem: 9). Re-emergence of the strings conform to this sonic effect precisely, as they appear as a natural continuation, featuring the same constitution of pitch structure as the discussed complex sound (Figure 8). This moment can be indicated as the epitome of ambivalence between unity and multiplicity, which is a key impetus, an essential quandary characterising a spectral/post-spectral kind of music. Furthermore, it retrospectively confirms the principle of development of the preceding textural material.

So far, we have seen an evolving progression starting from maracas (as a source of noise) and gradually moving towards textures implementing the images of clear pitch realised by combinations of different instruments. There are various realizations of fusing–fracturing processes throughout the piece. However, a reverse of these functions is also indicated. At the moment of culmination, we see some scattered elements throughout the different instrumental parts: chaotic rhythmic patterns, quasi-accidental accentuation, pitches deviating from the area of spectral structure (idem: 36–39) (Figure 9).

Figure 9. Tristan Murail's *Ethers*, section G, page 27

The resultant effect of the overlap of all these elements together may be described as a shimmering mass delineated by the piccolo *tremolo* at the top and trombone *tremolo* at the bass. Through a combination of these elements, a prototype of maracas noise is possibly invoked (see Scheme V and Figure 10).

After the investigation of the key moments of the piece, we can notice a completely different realisation compared to the previous analysis though corresponding to a similar conceptual idea. In this case, an image of timbre becomes an impetus for audiating the whole texture and even long-term segments of the piece. This instance evidently follows the upward direction in our schema of hierarchical gradation by fusing timbres into new qualities and, at a conceptual level, creating illusory sound images implemented by complex textures and involving all the parameters into the process.



Scheme V. Graphical representation of complex texture combined of various elements in Tristan Murail's *Ethers*, section G, page 27

GRAPHICAL REPRESENTATION OF AUDITORY RESULT

Picc. { E₁ D₁ C₁

Strings (Vn, Vla, Vc, Cb)

Tbn. { A₁ B₁ D₁

SCORE

Figure 10. 2 level representation of Tristan Murail's *Ethers*, section G, page 27

Concluding Remarks

After raising both theoretical and practical inquiries, timbre itself as well as its relation to audiation contexts are evidently complex and multifarious phenomena. Certain theoretical tools may, however, be employed in order to even partially extricate this complicated subject-matter.

In accordance with both psycho-acoustic and cultural discourses, two key properties appear as being critical in respect of compositional functionality of timbre: i.e. a qualitative aspect (referring to the inner nature of particular sound) and an identificatory aspect (linking a particular sound quality to its possible sound source). The first may be invoked by exposing miscellaneous timbral attributes in compositional circumstances, the other may be employed as a means for delineating particular musical structures.

Additionally, the schema of hierarchical gradation is proposed in order to show a conceptual volume approached as a vertical dimension of timbre. It entrenches consideration of timbre as an equivalent to a musical instrument into two polar directions: (1) permeating deeper and deeper inside its qualitative nature and gradually fracturing the unity of traditionally-established category of one instrument's timbre; multiplicity of sub-timbres may be extracted level by level keeping this direction, while disassembling a sound into its primary elements at the acoustic level (spectral constitution) would represent the final stage; (2) new qualities may be obtained through fusing processes of several superior levels following the opposite direction.

In light of the drawn theoretical framework, two musical instances were put under investigation in regard to timbral strategies. Lachenmann's *Dal niente* was indicated as representing the inward direction in respect of the proposed hierarchy as compositionally-substantiated permeation deeply "inside the material" of a sounding body. Murail's *Ethers* exemplified the upward direction by elevating a prototype of raw timbre into superior levels of musical structures (timbral fusion – textural formations – strategies of long-term development).

In accordance with a multifarious and rich conceptual potentiality, it may be stated that audiation of timbre is an intricate phenomena, and no unilateral principles may be defined. It may be dealt only as a complex picture of socio-cultural, perceptual, individuality of the composer and other factors.

References

- Agundez, Antonio Galindo (2011). *Conflicts in contemporary music interpretation Brunner-Lachenmann: A case approach*. Degree Project, Master of Fine Arts in Music, Symphonic Orchestra Performance, Academy of Music and Drama, University of Gothenburg.
- Cowell, Henry (1969). *New Musical Resources*. Something Else Press, Inc., MCMLXIX, firstly published in 1930.
- Dubnov, Shlomo (1996). *Polyspectral Analysis of Musical Timbre*. A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy, Hebrew University.
- Erickson, Robert (1975). *Sound Structure In Music*. University of California Press, Berkely, Los Angeles, London.
- Fales, Cornelia (2002). The Paradox of Timbre. In: *Ethnomusicology*, Vol. 46, No. 1 (Winter), pp. 56–95.
- Fales, Cornelia & McAdams, Stephen (1994). The Fusion and Layering of Noise and Tone: Implications for Timbre in African Instruments. In: *Leonardo Music Journal*, Vol. 4, pp. 69–77.
- François, Jean-Charles (1990). Fixed Timbre, Dynamic Timbre. In: *Perspectives of New Music*, Vol. 28, No. 2 (Summer), pp. 112–118.
- Houtsma Adrianus J. M. (1997). Pitch and Timbre: Definition, Meaning and Use. In: *Journal of New Music Research*, Vol. 26, pp. 104–115.
- McAdams, Stephen (2013). Timbre as a structuring force in music. *Proceedings of Meetings on Acoustics*, Volume 19, Montreal, Canada, 2–7 June. Internet access: <http://acousticalsociety.org/> [accessed on 2018 11 10].
- McAdams, St., Bregman, A. (1979). Hearing Musical Streams. In: *Computer Music Journal*, Vol. 3, No. 4 (Dec.), pp. 26–43.
- McAdams, St., Depalle, Ph., Clarke, E. (2004). Analyzing Musical Sound. In: *Empirical Musicology: Aims, Methods, Prospects*. Edited by E. Clarke ir N. Cook, Oxford University Press.
- McAdams, St., Giordano, B. (2008). The Perception of Musical Timbre. In: *Oxford Handbook of Music Psychology (1 ed.)*. Edited by Susan Hallam, Ian Cross, Michael Thaut (Dec.).
- McGee, William James (1982). *An Expanded Concept Of Timbre And Its Structural Significance, With A Timbral Analysis Of George Crumb's "Night Of The Four Moons"*. Dissertation, the University of Arizona.
- Pastor, Felix (2007). *Tristan Murail's Ethers*. Brooklyn, July 2007.
- Siedenburg, K., McAdams, St. (2017). Four Distinctions for the Auditory "Wastebasket" of Timbre. In: *Frontiers in Psychology*, October, Vol. 8. Internet access: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5632649/> [accessed on 2018-11-14].
- Slawson, Wayne (1981). A Theoretical Study in Musical Timbre. In: *Music Theory Spectrum*, Vol. 3, Spring, pp. 132–141.
- Smalley, Denis (1994). Defining timbre – Refining timbre. In: *Contemporary Music Review*, Vol. 10, Part 2, pp. 35–48.
- Smalley, Denis (1997). Spectromorphology: explaining sound-shapes. In: *Organised Sound 2 (2)*. Cambridge University Press, United Kingdom, p.p. 107–26.
- Stockhausen, Karlheinz (1959). How Time Passes By. The English edition of *Die Reihe*, Vol. 3, the original version dates from 1957.
- Traube, Caroline (2006). *Instrumental and Vocal Timbre Perception*. Internet access: http://www-gewi.uni-graz.at/staff/parncutt/guests/2006/traube/Slides_Ctraube_timbre.pdf [accessed on 201 12 10].
- Wright, J. K., Bregman, A. S. (1987). Auditory stream segregation and the control of dissonance in polyphonic music. In: *Contemporary Music Review*, 2 : 1, pp. 63–92.

Scores, Records, Internet Sources

- Lachenmann, Helmut. Introductory notes in Breitkopf publication of Helmut Lachenmann's *Dal Niente (Interieur III)* für einen Solo-Klarinettenisten, BG 866. Internet access: <https://www.breitkopf.com/work/3857/dal-niente> [accessed on 2018-12-12].
- Lachenmann, Helmut (1970). *Dal Niente (Interieur III)* für einen Solo-Klarinettenisten. Breitkopf & Härtel, Wiesbaden (printed in Germany), HG 866, 1980.
- Murail, Tristan (1978). *“Ethers”* pour flûte et 5 instruments (avec continus de maracas). Editions Transatlantiques E.M.T. 1488.
- Record of Helmut Lachenmann's *Dal Niente (Interieur III)* für einen Solo-Klarinettenisten by Alain Damiens. Internet access: https://www.youtube.com/watch?v=Gxbdsy_fYrA [accessed on 2018-12-01].

Audijuojant tembrą: nuo materijos gelmių iki faktūrinio prototipo

Santrauka

Paprastai tembras lieka už audiacijos temos akiračio ribų ir tai gali būti susiję su istoriškai įsišaknijusiu įpročiu tembrą traktuoti kaip pagalbinį, papildomą muzikos praktikos veiksnį. Nors šių laikų kompozicinė realybė operuojant tembru visai kitokia, koncepcinio grynumo stoka dažnai sąlygoja klaidžiojimą tarp įvairialypių, tačiau labai specifiskai orientuotų tyrinėjimų. Straipsnyje stengiamasi nubrėžti orientacines gaires aiškesniam kompozicinių strategijų tembro atžvilgiu supratimui bei jų galimos audiacinės kilmės indikavimui.

Atsižvelgiant tiek į psichoakustinę specifiką, tiek į kultūriškai nulemtus veiksnius, funkcinis tembro potencialas gali būti redukuotas į du pamatinius aspektus: viena vertus, tembras yra kokybė, kita vertus – žymuo (remiamasi polinkiu atitinkamo tembro garsą sieti su jį skleidžiančiu šaltiniu). Kompoziciniu požiūriu, pirmasis orientuotas į įvairialypių tembrinių savybių eksponavimą ir operavimą jomis, antrasis pasitelkiamas tam tikrų muzikinių struktūrų pabrėžimui (sujungimui, atskyrimui, segmentavimui ir t. t.).

Be to, hierarchinės gradacijos modeliu siūloma atskleisti konceptualų tembro tūrį – tarsi vertikalią jo dimensiją. Jis praplečia tembro, tapatinamo su muzikos instrumentu, supratimą dviem kryptimis: 1) vis labiau gilinantis į kokybinius garso niuansus, įsitvirtinusi „vieno instrumento tembro“ kategorija palengva skyla į daugiau subtembrų; pirminių tembrą lemiančių elementų akustiniu lygmeniu (spektrinės garso struktūros) pasiekimas yra galutinė stadija einant šia frakcionavimo kryptimi; 2) judant priešinga kryptimi ir vykstant įvairių lygmenų garsinio lydymosi procesams, išgaunamos naujos, išvestinės tembro kokybės.

Pagal nubrėžtas teorines gaires nagrinėjami du tembrinių strategijų muzikiniai pavyzdžiai. Lachenmanno „Dal Niente“ (1970) reprezentuoja judėjimo gilyn kryptį, kompoziciškai pagrįstą skverbimąsi į vidinę skambančio kūno materialinę struktūrą. Tristanto Murailio „Ethers“ (1978) iliustruoja judėjimą aukštyn, kai gryno tembro prototipas iškeliamas iki aukštesnių lygių struktūrinio prototipo (tembriniai lydiniai – faktūrinės formacijos – ilgalaikės vystymo strategijos).

Atsižvelgiant į įvairialypį ir turtingą koncepcinį potencialą, galima teigti, kad tembro audijavimas yra sudėtingas fenomenas, todėl negali būti paaiškintas vienareikšmiais principais. Jis gali būti suvokiamas tik kaip kompleksinis sociokultūrinis, percepcinių, individualių kompozitoriaus veiksmų nulemtas rezultatas.

Understanding and Interpreting Classical Guitar Morphologies within the Sound Sculpting Arena

Abstract. In line with the 2018 underlying conference theme centred on 'audiation', my paper will be an explanation of the meaning behind interpreting morphologies on a six-string classical guitar, especially for sound-based music. Taking groups of similar techniques, I will look into all aspects of expressing guitar music in terms of a spectral and structural approach; in other words, investigating 'guitar morphology'. A better understanding will arise from analysing the musical consequences involved from an audiative perspective.

My main focus will be on the listening experience, comprehending and apprehending the resonance detail of existing and newly discovered classical guitar techniques. The intention is to extend sensibility of sound discernment of these particular morphologies. For instance, can we hear the minute variances of pitch and noise and realise differences, and how do we make sense of them? For a pedagogical approach, it is obvious and necessary to devise a methodology. To this end, I believe in the value of assisting musicians in all stages of development to consider the holistic quality of sounds they produce and encounter.

After a critical look at existing terminology for procedures of producing morphologies that are non-standard and examining their suitability, a section concentrating on hearing the consequences of techniques that produce subtle changes in linear and non-linear trajectories and varied amounts of pitch content will follow. For example, three types of 'snare drum' technique have been identified, *normal*, *lateral glissando*, and *slide glissando*; all possess three phases, *preparation*, *resonance*, and *release*. They differ by the direction of spectral contour during the resonance phase. After the preparation phase 'snare drum' normally follows the archetypal attack/decay model, while the others are refracted morphologies.

The point will be to work toward forming a method for aurally recognising small alterations in timbre and emphasising the importance of the whole sound when a single morphology or groups of morphologies occur in various combinations. The aim is to develop a progressive and radical forward-thinking pedagogical audiative system that embraces a storehouse of specially selected techniques as equal in value.

Music educators are expected to teach the complex undertaking of helping pupils to be creative. Therefore, an ever-developing set of tools is essential for future learning outcomes, instructions that will help students to bring out and realise their inner potential. The proof will be musicians who can build a meaningful musical syntax in many genres. This will be accomplished by the ability to fully comprehend what one hears, interpret in the moment, and thus provide a logical and worthy musical discourse.

Keywords: source bonding, extended technique, guitar morphology, spectromorphology, reduced listening, deep listening, inherent and external listening.

Introduction

The musical domain is no longer limited to conventional sounding models. For the guitar, my instrument, there is now a surprising sonic array of sounds ranging from the real to the unreal, and beyond. I believe that there is a need to reevaluate traditional sound-making, as the links are often broken; sometimes sound-shapes and qualities occur from unconventional causes.

There are two key concepts that underpin the research – *morphologies*, and *extended techniques*. Firstly, the notion of morphology is used as an experiential tool. Expressing guitar music in terms of morphologies means a spectral and structural approach. For example, *morphology* may be described as the spectral detail of a sound through time; put it another way, morphologies are sound objects that engender a spectral continuum. These two mutually inclusive aspects, a spectrum and activity through time, provide a framework for understanding and experiencing music's temporal flow. Secondly, the sonic outcome from the extended techniques I am interested in form spectra that avoids the sound convention of attack followed immediately by a stable (though slowly decaying) resonance comprising as much pitch material as possible.

Learning to perform morphologies means engaging with the interrelations of sound components and resonance values during the temporal flux of the music. Improvising involves capturing and manoeuvring the spectral content involving elements of freedom. Composing is the process of depicting the morphologies in order to produce a score, where the composer strives to apply methods of representation that are as precise and simple as possible. These may have ties with traditional notation when relevant, or such methods may involve graphic symbols to capture the entire duration of the sound.

For many contemporary guitar works common articulations as well as stability of notes and intervals are absent. Moreover, reference of metre is often missing. Composers encounter the problem of how to cultivate an aesthetic sensibility and create cohesion in a sound world that is potentially open. Developing appropriate sound-making methodologies is one of my passions.

With the help of a few musicians' research, notably of Denis Smalley, Pauline Oliveros, David Toop, Edwin Gordon, and Gilbert Biberian, we will look at ways of explaining and understanding repertoire that incorporates techniques other than conventional pitch playing. Denis Smalley tells us that when listening to music we find rewarding it is because, "there is some shared experiential basis both inside and behind that music" (Smalley 1997: 1). Discussing our musical experiences is important. Engaging with Pauline Oliveros' *Deep Listening* principle we can learn to "remove cognitive filters in order to experience deeper forms of audition" (Oliveros 2005: 4). We will look at developing tools to describe the features of perceived sounds, and explaining how they work in the context of the music, diagrams will help contextualise interpretation.

What does it mean to 'sculpt sound' on a six-string classical guitar? The main issues are concerned with refining listening, questioning terminology, technique, an all-inclusive approach in the field, experiential observations, and learning models. Understanding and definitions will arise from analysing these areas. To explain I will take groupings of similar techniques and look into all the aspects of their sound through time, and take account of the musical consequences involved; in other words 'guitar morphology' (Vishnick 2014: 192).¹

Refined listening and terminology

My main focus is on comprehending and apprehending the subtle detail of existing and newly discovered classical guitar techniques. Concentrating on particular techniques, the aim is to extend awareness of sound apprehension. For instance, can we hear the minute changes inherent in these sounds through time and chart differences in the spectra?

There are two aspects to guitar morphologies, *inherent* and *external*. I will explain sound events along with their intrinsic relationships within musical pieces. However, Smalley reminds us, "a piece of music is not a closed, autonomous artefact: it does not refer only to itself but relies on relating to a range of experiences outside the context of the work" (Smalley 1997: 4). Therefore, as a cultural construct, a fundamental external basis is necessary so that the inherent can have meaning. The important point is that "the intrinsic and extrinsic are interactive" (Smalley 1997: 4).

As far as I am aware, in music for acoustic instruments there is no term that represents a link between fundamental morphological qualities and external referential sound associations. However, for *acousmatic* music an expression has been invented that describes this connection.² Smalley uses the term *source bonding* to represent the activity of morphologies from inside the work to the sounding world outside. His definition relates to the natural tendencies of sounds sources and causes, and the relationships of sounds to each other, as they give the impression to have mutual or associated origins.

My contention is that *source bonding* should be brought into the instrumental music arena. It is present in guitar playing, and may be discovered through the various physical activities that occur in sound-making; put it another way, when human agency is involved source bonding will occur. Through cultivating methods of apprehension unhindered by preconceptions, Oliveros tells us: "One of the Deep Listener's goals is to listen to each and every sound exactly for what it is, nothing more, and nothing less" (Oliveros 2005: 4). See Figure 1. Further aspects will become clearer in the forthcoming sections.

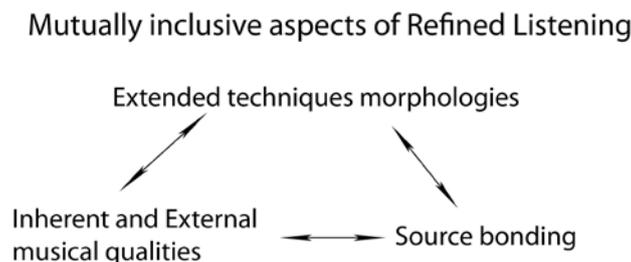


Figure 1. Mutually inclusive aspects of Refined Listening

¹ For more information on Guitar Morphology and Morphological Structuring see *Sculpting Sound on the Classical Six-String Guitar Volume 2* by M. L. Vishnick. Published by CreateSpace ISBN-10: 1514652404.

² Acousmatic music is a form of electroacoustic music that is specifically composed for presentation using speakers, as opposed to a live performance. It stems from a compositional tradition that dates back to the introduction of *musique concrète* in the late 1940s.

As well as advocating the term *source bonding*, I want to examine another expression, *extended technique*. My definition is designed to identify methods of producing sounds that are non-standard. Bearing in mind all guitar techniques connect to the original source by way of being analysed in respect to the archetype. In 2014 I stated that an *extended technique* is: “An unconventionally played procedure that produces morphologies containing a spectral content alternative to the conventional pitch-biased attack-sustain/decay model”. Therefore, music may be developed by examining the spectral possibilities from the selected extended techniques, produced through manipulating the placement of consecutive, merged, and combined morphologies. This is tied to the relationships that occur in shaping phrases, being aware of pitch relations, and exploring dynamic levels.

We can now examine how *source bonding* and *extended technique* can be applied to our diverse and wonderful musical world.

Techniques

Here I would like to start thinking about a pedagogical approach, especially as there is a need for devising and developing methodology that will help educators. Discovering musical links is important for future teacher-performer-composer communication; new shifts in language are created by researchers questioning the musical world in which they live, not in a vacuum. Moreover, for the listener to make sense of new ideas there must be some shared cultural basis.

To my way of thinking students need to consider all aspects of the sounds they produce on their instruments. I have identified nine groups of extended techniques. Each classification has its own unique qualities, and they provide a storehouse of sounds especially selected for their particular morphological values; they fit into my vision of ‘sound-based’ music. They are as follows – Harmonics, Bottleneck, Snap pizzicati, Cross stroke, Snare drum, Fretless, Soundhole resonances, Tapping, Nut side, and Mute.

Focusing on the impact of aural awareness and clarity in a historical musical context, the importance of documenting extended guitar techniques lies not only in reaching contemporary guitarists, composers, and musicologists, but also future generations of musicians. Therefore, Figure 2 has been devised to show the diversity of unconventional sounds used by composers over the last few decades; it is by no means exhaustive.

Extended techniques	Execution
Battuto	Hit the strings with part of a hand.
Behind head-nut	Pluck the string length between the head-nut and tunin h rollers to produce a filtered spectrum.
Buzz gliss (strings 6 or 1)	Pull string 6 or string 1 off the neck onto the neck’s side, slide along to produce linear or glissandi morphologies.
Cross stroke	Using combinations of the three lower strings, right-hand index fingernails scrape along the string length.
Cross stroke (active scordatura)	Using combinations of the three lower strings, right-hand index fingernails scrape along the string length. An iterative metallic-sound with a refracted rich spectral content results.
Finger scrape	Rub finger(s) along strings, usually lower ones, to produce noise.
Golpé	Tap the soundboard with a right-hand fingernail or fingertip to produce a percussive sound.
Harmonics, high and soundhole	Harmonics that are located between fret III and the headstock nut, and between the end of the fretboard and bridge.
Half-harmonic	A semi-dampened harmonic, actually an imprecise placement of a natural harmonic to filter the spectrum.
Guiro action	Draw on external implement (plectrum or bottleneck) along the fretboard and catch the frets.
Hand-brushing and rubbing	Move hand(s) across or along the strings to produce noise.
Harmonic tambora	Strike the strings with an outstretched right-hand finger, typically index or thumb, at a natural harmonic node point to produce a resonance.
Nail scrape	Drag a right-hand nail along a lower string to produce noise.
Nail sizzle	Place stopping finger next to a string, allowing adjacent plucked string to rattle against the fingernail.
Nut-side	Pluck the string-length between a stopped left-hand finger and the head-nut; pitch content with compressed nature occurs.
Multiphonic harmonic	Place a finger of one hand lightly on the string exactly over a node point, then attack with the other hand to produce a resonance.
Palm slam	Short percussive sound produced by attacking strings downwards onto wood.
Rapid mute	Resting the left-hand fingers lightly on the string(s), without pressing them to the fretboard, pluck with right hand in a conventional manner; successions of linear or refracted morphologies are used.

"Snare drum"	Cross adjoining strings, then strike in a conventional manner, three phases occur; preparation, glissando resonance, and release.
Snap pizzicato (long)	Produced in two stages; lift the string away from the soundboard, then initiate a release allowing the string to bounce against the fretboard. The pitch material is left to resonate.
Snap pizzicato	Produced in two stages; lift the string away from the soundboard, then initiate a release allowing the string to bounce against the fretboard. The player intervenes to stop the resonance almost immediately.
Soundhole resonance (palm, fist, or thumb)	From just above the strings, use an appropriate part of the hand to press towards the soundhole quickly; an attack followed by a decaying noise-oriented spectrum occurs.
Tambora	Using a flat part of right hand, attack the strings rapidly just inside the bridge to produce a percussive sound followed by a resonance.
Tapping, bi-tone (long)	Use the fingers to apply a suitable amount of force to push the string(s) against an appropriate fret position. Two sounds emerge, resonances are a composite of lower and upper pitches.
Tapping, bi-tone	An interrupted version of <i>bi-tone (long)</i> . Use the fingers to apply a suitable amount of force to push the string(s) against the fretboard. Two sounds emerge, short resonances are a composite of lower and upper pitches.
Tapping, mute (long)	Damped version of bi-tone tapping, lower bi-tones are filtered out by damping action. Consequently, pitch content consists of upper bi-tones only; attack followed by a resonance.
Tapping, mute	An interrupted version of <i>mute tapping (long)</i> , lower bi-tones are filtered out by damping action. Consequently, pitch content consists of upper bi-tones only; attack followed by a short interrupted resonance.
Wet finger	Slide a wetted finger lightly across the back of the guitar to produce a noise-based glissandi.
Whistling sound (also called sweep or finger rubs)	Slide along lower string(s), upwards or downwards, using thumb and middle finger or palm to produce a friction-based sound.
External implements	
Beater	Strike strings with the head.
Bottleneck	Using a finger, the player allows the bottleneck to attack with an appropriate amount of force before producing upwards or downwards glissandi.
Bow	Attack the string(s) in arco style using a cello or double bass bow to produce an attack and resonance.
Fan (small, hand held)	Strike the strings or body of the guitar to produce mechanical tremolando.
Mallet	Strike strings with the head or rub guitar body to produce noise.
Mini alligator clip	Attach clip to string(s) to produce a rattling effect.
Paper clip	Attach clip to string(s) to produce a rattling effect.
Paper knife	Insert between the strings, alternately over and under to produce noise.
Pencil	Filter the spectrum by inserting between string combinations, typically under string 6, over string 5, etc.
Rubber wedge (small)	Filter the spectrum by inserting between string combinations, typically strings 6 and 5.
Ruler	Filter the spectrum by inserting between string combinations, typically under string 6, over string 5, etc.
"Snare drum" (matchstick)	Insert between two crossed adjacent strings to filter the spectrum.
Sponge	Slide across or along the strings to produce noise.
Tuning fork	Strike the strings, then apply to the strings and draw across to produce glissandi.
Spoon (table or tea)	Apply to string(s), move along plucked string(s) to produce glissandi.
Thin metal rod	Insert between the strings, alternately over and under to filter the spectrum.
Body sounds and utterances	
Finger snapping	Apply tension by pressing the pad of the thumb firmly against the pad of middle finger – slide thumb towards your index finger while sliding middle finger towards your palm.
Tongue clicks	Produced by rapid movement of human tongue. Place the tip of the tongue directly behind front teeth, then move the tongue along roof of the mouth. Stiffen tongue and apply pressure.
Twine	Tie to string, typically string 6, and wrap over other strings or rest behind the neck to produce noise.
Whistle	Purse lips into an O shape, leaving a small opening for air; gently expel air with the tip creating a vacuum against the roof of your mouth with your tongue. Making sure that the tongue is not flat up against the roof of your mouth, create a hollow space in the middle but completely sealed all the way around the edge of the palette. Lower the jaw and pull tongue free from the vacuum to hear the click.
Electronic devices	
Feedback	Typically, controlling a feedback loop between the signal from an undersaddle pickup and the speaker of an amplifier.
Looper pedal	Typically, records your guitar as you play, plays it back to you over and over again in a loop.
'Plus' footpedal (by Gamechanger Audio)	Real-time audio sampler; the algorithm lets you capture small bits of the signal and loop it into a seamless sound.

Figure 2. Unconventional sounds used by composers

For this paper I will concentrate on ‘Snare drum’ techniques as they represent particularly subtle changes in timbre and possess a more-or-less equal amount of pitch and noise content. Moreover, their sonic trajectories are linear and non-linear. See Figure 3.

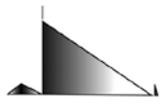
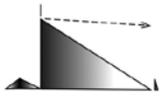
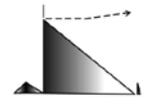
Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
‘Snare drum’ (normal) <i>Extended</i>		V 	Three phases - textural preparation - percussive noise attack (may be multiple), decaying spectral activity, noise release. 2nd phase duration 2" to 6".	Soft, always subtle loud to soft - soft to very soft.
‘Snare drum’ (lateral glissando) <i>Refracted and Extended</i>		V 	Three phases - textural preparation, percussive noise attack (may be multiple), refracted decaying spectral activity, noise release. 2nd phase duration 2" to 6".	
‘Snare drum’ (slide glissando) <i>Refracted and Extended</i>		V 	Three phases - textural preparation - percussive noise attack (may be multiple), refracted decaying spectral activity, noise release. 2nd phase duration 1" to 4".	

Figure 3. Three ‘Snare drum’ techniques detail

Music study has tended to concentrate on theory, writing notation, and analysis. There is little research on how human gestural activity impacts on musical performance. This may be because it is customarily expected. For example, a phrase played on the guitar incorporating pitch content may sound like it sings, echoing a vocal presence. This can have a physical and psychological effect on the listener. Interpreting the source-bonding threads and extracting meaning is an eventual goal of this line of thinking, alongside the expressive and emotional significance of inherent and external musical qualities. Describing musical gestures through morphological value will help listeners to identify significant behaviours.

Three types of ‘Snare drum’ techniques have been identified – *normal*, *lateral glissando*, and *slide glissando* (Vishnick 2014: 261). However, here I will concentrate on *lateral glissando*. ‘Snare drum’ morphologies have three phases – *preparation*, *resonance*, and *release*; preparation that induces a soft and subtle texture, followed by a percussive noise attack (this may be multiple attacks), which is released into the decaying spectral activity, then a noise cessation. Attack, resonance, and termination function in various ways. For example, the preparation phase of ‘snare drum’ morphology can operate as an anacrusis. Morphologies terminate naturally when the sound reaches silence, or prematurely through performer intervention. The direction of spectral contour during the resonant phase of a *lateral glissando* is refracted.

As time is needed to cross two adjoining strings, a variable preparation period is required. Figure 4 shows the two phases. The crossed strings are secured with an adjacent fingertip; any left-hand finger may be employed. This can be applied between various frets positions. When executed, a mixture of soft noise and pitch content occurs; this is always a subtle slight scuffle of sound.



Figure 4. Two phases of ‘Snare drum’ technique

The preparation acts as an upbeat to the second phase. The richest spectrum is produced when using the lower wound strings. However, by including the upper nylon strings an added spectral interest arises. Very little use of the upper strings has been found to date in the existing guitar literature.

To play a *lateral glissando*, two strings are crossed using the method described above. However, the string that is being crossed over is pushed a little further before being anchored by a left-hand finger. Then using the gap that is now between the crossed strings, the string that has been pushed a little further is drawn back slowly and deliberately after the right-hand attack. This creates a subtle, but effective, microtonal glissando.

Each player will manipulate the microtonal refractions differently. Therefore, the sonic result will vary; the amount of glissando pitch distance is left to the performer, leading to a certain amount of interpretative freedom. See Figure 5. Rasgueado techniques may be included to produce multiple attacks at the beginning of the resonant phase. Releasing the crossed strings produces a quiet percussive sound that is an integral part of the morphology.



Figure 5. 'Snare drum' (*lateral glissando*) with gap for creating microtonal *glissando*

The notation symbols reflect the three main phases; see Figure 3. A vertical line, variable in length, with an embedded small semi-circle denotes the preparation. This is attached to a graphic representation of the decaying resonance phase, a decreasing set of connected diagonal lines. The length of the resonance indicates the duration of decay. A separate symbol is used to represent release possibilities. Between the second and third phase, a broken horizontal line signifies variable amounts of relative silence. This is seen as part of the third phase – anticipation of the termination. To appreciate morphological value, hearing the sounds in extended passages is invaluable. Therefore, see the 'Snare drum' studies and associated sound files found in my *A Survey of Extended Techniques on the Classical Six-String Guitar with Appended Studies in New Morphological Notation* (Vishnick 2014: 271).

On hearing the sounds, the term 'Snare drum' for this technique may set certain expectations for the listener. In regard to source-bonding, note that various mental images from one's experience of hearing 'loose snares' rattling after the initial attack on the underside of a drum will occur.

Our ears have both entrance and exit. The visible ear is ever vigilant. David Toop tells us: "The question of subjectivity is particularly acute within the domain of listening, sound so elusive in time and space, always the auditory equivalent of invisible". Musical imaginings are stimulated within the mind rather than the external world. Looking at source-bonding from a compositional perspective, for example, the ear hears a sound, an image is conjured up – in this case maybe a stick hitting the snare drum is seen in one's mind – then the resonance forms a contour that becomes an idea for an appropriate notational symbol.

According to Gordon: "Unless one can audiate what is seen in notation before he/she produces sound on an instrument as dictated by the notation, what he (she) is reading will have only theoretical meaning for him/her". The result is academic rather than a musical meaning. My point is that the player will learn a lot more about the music itself by developing a sense of the musical sounds before interpreting the notation.³

This raises the point of learning to audiate before learning to read music. I would advocate that teachers use various improvisational methods and help the student to understand creative performance; however, discussing improvisation and creative performance methodologies are for another, maybe future paper.

Music educators are expected to teach the complex undertaking of helping pupils to be creative. Therefore, an ever-developing set of tools is essential for forward-looking pedagogical improvement, instructions that will help students to bring out and realise their inner potential. Knowing the details of a sound from one's mind or inner ear before physically hearing is undoubtedly extremely useful. Teaching students to hear and comprehend music rooted in the imagination is important. Figure 6 draws the elements together.

³ For further clarification on the meaning of audiation, see Gordon 1989: 5.

A holistic approach

For an all-inclusive approach, a method for aurally recognising small changes in timbre is useful. Here we can tap into existing electroacoustic research, in particular the concept of *reduced listening*.⁴ This type of concentration occurs through focused and continual listening. For Smalley: “It is an investigative process whereby detailed spectromorphological attributes and relationships are uncovered” (Smalley 1997: 5). In order to pay full attention on refining the detail and quality of sounds, the listener tries to suppress any distractions. Smalley again, “reduced listening is therefore an abstract, relatively objective process, a microscopic, intrinsic listening” (Smalley 1997: 5). Therefore, concentrating on the characteristics of the sound is essential.

Smalley and Oliveros concur, as they focus attention on how listening is an act of cognition; it can shape auditory perception. This form of perceptual scrutiny is generally employed in the creative process. I believe it is important to bring this type of listening into the performer-listener and audience-listener arena. However, care must be taken to teach the importance of maintaining a balance between *reduced listening* and *deep listening* together with *inherent* and *external* threads. For example, being aware that over-analysed morphological listening may lead to detrimental effects on intrinsic-extrinsic aural observations; I sometimes want to allow the music play on my senses and not to think analytically.

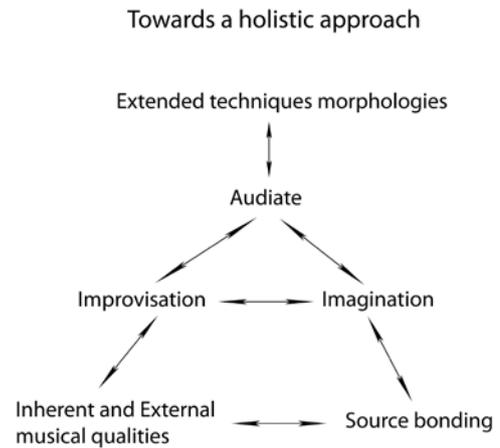


Figure 6. Key elements

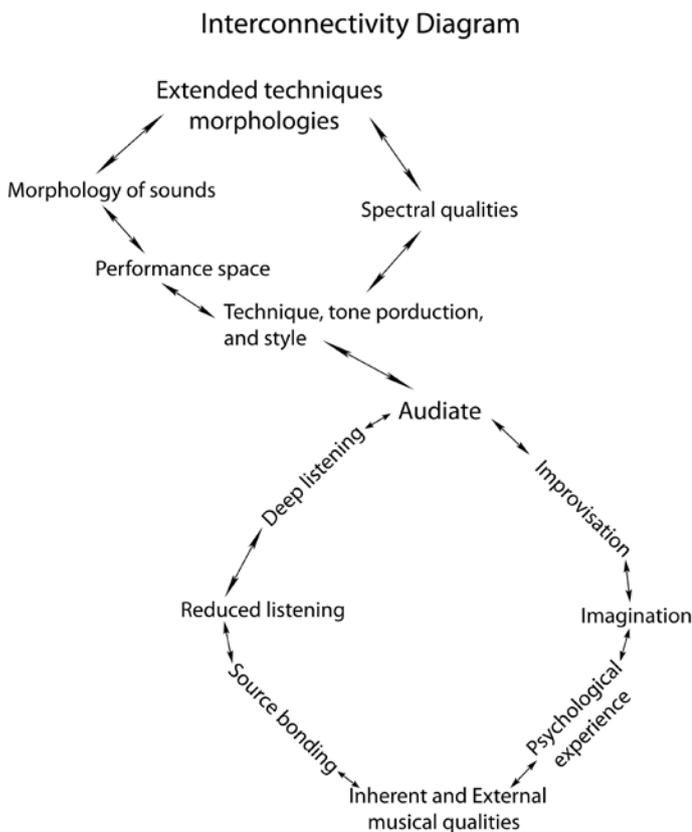


Figure 7. Interconnectedness of the considerations involved

The instrumental music arena

In order for a morphological approach to work, educators will have to notice the importance of the whole sound that is produced. I would advocate a paradigm shift, a move away from pitch emphasis, giving equal emphasis to the morphology of sounds, alongside spectral qualities and other factors such as style, technique, tone production, performance space, and psychological experience. Figure 7 shows the interconnectedness of the considerations involved. The aim is learning to comprehend all aspects of what is heard and understood when a musical sound or gesture occurs. Not only for guitar sounds, can this model be extended to all instruments and audible events in the environment.

It is physical activity that produces sound-making gestures on the guitar, a causal chain linking action to source; morphological consequences through human agency are the result. My sense of touch, whether applying nail, fingertip or an implement becomes the supplier of energy. Smalley adds: “A gesture is therefore an *energy–motion trajectory* which excites the sounding body, creating spectromorphological life” (Smalley 1997: 5). From the perspective of the performer and observing listener three elements occur – the visual, tactile, and aural; processes concerned with muscle pressure and relaxation, exertion and resistance.

⁴ Reduced listening is a Schaefferian concept. See Schaeffer (1966) and Chion (1983) for a full discussion.

For me, the gesture process is bidirectional. For example, I play a ‘Snare Drum’ extended technique on my guitar causing a resultant morphology; conversely when I listen to the morphology the human element behind is heard, caused by the gestural activity; intentional acts and emotive elements are present throughout the process, including imagination. Relatedly, Smalley says: “Everyone uses this *spectromorphological referral process* when listening to recordings of instrumental music” (Smalley 1997: 5). We listen to music and also automatically gain a wealth of psycho-physical information by decoding the human activity behind the morphological information.

When thinking of the millions of people who have experienced listening to guitar music, it is obvious that an underlying process of conscious and unconscious visual and aural training has occurred; it may be referred to as a culturally acquired familiarity of sounding gesture. However, in much contemporary guitar music that contains passages of extended techniques, the sound-making becomes remote from the generally recognisable.

The playing of extended techniques can transform the source, the ear becomes dubious about the cause; the morphological nature takes us into the realm of the imagination. On the subject of musicians breathing life into contemporary music, which he calls *animation*, Gilbert Biberian’s exploratory book *Liber* is on the vast subject of articulation. He tells us: “a rich and daring imagination (is) of paramount and fundamental importance” (Biberian 2012: 15).

Furthermore, when listening to a recording, or not being close enough to the performer at a concert, the sounds heard may be difficult to decipher. We may be uncertain how the sounds behavior was made. For example, we may be unsure of how the pitch trajectory was accomplished. My hope is that it will become possible for composers to create guitar music where the gestural cause – source relations are even more adventurous and imaginative. For me, this remote order of imagination is a rich area for compositional and improvisational exploration.

Experiential information

The reality of my musical world is about integrating standard and common historical techniques with extended techniques; this may cover many styles and genres. My intention is to connect morphologies from guitar techniques to today’s world in a holistic manner; I wish to develop a progressive, radical forward-thinking pedagogical listening system that embraces all techniques as equal in value.

I have carefully nurtured the concept of ‘guitar morphology’. Part of its meaning is as a tool for expressing and evaluating holistic listening experience, the mutually dependent interrelationships between the sound spectra emanating from the guitar and how they change through time. Note that in music we sometimes need words that are invented specifically for describing sonic phenomena. A morphological approach can provide a framework for understanding audiative structural relations and behaviour experienced in the temporal flux of music.

Music educators can now embrace the notion of ‘sculpting sound’ as manipulating the spectral content of morphologies in many ways, always taking into account pitch, spectra, morphology, style, touch, technique, auditorium, psycho-acoustics, and psychology.

Final thoughts: To the future

When we combine my thinking behind guitar morphology with inherent and external listening plus the processes of reduced and deep listening, together with Smalley’s writings on spectromorphology, we may form the basis of moving towards a pedagogical audiative system. Meaning is embedded in the musical syntax, which is directly related to the workings of the inner and outer ear, as well as the source bonding aspect. It is our job as educators to really understand these three aspects and teach them to our students, enabling an all-encompassing view of the morphology of sounds in general.

Furthermore, to *audiate* is to use listening in all its facets towards creativity; this will inevitably engage the ability to recognise how the past, present, and future impact the senses. My belief is that studying the aspects arising from audiation will help anyone interested in sound to develop a higher sense of awareness in regard to sonic life experiences from childhood to the present. Moreover, I would encourage music lovers to engage in future personal sound experiments. For example, organise listening trips in various environmental situations.

I would like to put forward the idea that morphological musical thinking is a dynamic activity that involves perceiving spectral energies and configurations in space. Once thought about, it is a straight-forward experiential principle. As we have seen, everyone hears sounds and associates those sounds with experiences from life.

References

- Biberian, Gilbert (2012). *Liber, the Book of Guitar*. Cheltenham, UK: Nouranexis Publications.
- Ciciliani, Marko (2018). *Musical Experience Beyond Audible Sound and its Relevance for Electro-Acoustic Composition*. University für Musik und darstellende Kunst Wien Institute for Composition and Electro-Acoustics (ELAK) Rienöfßgasse 12, 1040 Vienna, Austria.
- Gordon, Edwin E. (1989). *Audiation, Music Learning Theory, Aptitude, and Creativity*. Suncoast. Music Education Forum on Creativity Journal, p. 75–81.
- Oliveros, Pauline (2005). *Deep Listening: A Composer's Sound Practice*. iUniverse.
- Osborne, William (2000). *Sounding the Abyss of Otherness: Pauline Oliveros' Deep Listening and the Sonic Meditation*. New York: Lang, p. 65–86.
- Polanyi, M. and Prosch, H. (1977). *Meaning*. USA: University of Chicago Press.
- Smalley, Denis (1997). *Spectromorphology: explaining sound-shapes*. UK: Cambridge University Press.
- Toop, David (2016). *Into the Maelstrom: Music, Improvisation and the Dream of Freedom: Before 1970*. London: Bloomsbury Academic.
- Vishnick, Martin (2014). *A Survey of Extended Techniques on the Classical Six-String Guitar with Appended Studies in New Morphological Notation*. London: <http://openaccess.city.ac.uk/4164/>

Klasikinės gitaros morfologijos samprata ir interpretacija garso kokybės formavimo srityje

Santrauka

Pradėti reikėtų nuo to, kaip mes šiais laikais suprantame garso išgavimą, ypač turėdami omenyje, kad daugybė šiandien girdimų morfologinių elementų nėra konvencionalūs. Tyrinėdami įvairias muzikines praktikas galime pradėti kurti tam tikrus teorinius įrankius, kurie padėtų apibūdinti patiriamus garsus ir paaiškintų jų funkcionavimą muzikiniame kontekste. Pagrindinių garso kokybės formavimo problemų analizė suteiks gilesnį pažinimą ir padės sukurti tikslesnius apibrėžimus, o tai leis paaiškinti dėl specifinių gitaros atlikimo technikų kylančio garsyno estetinius padarinius.

Straipsnio tikslas yra padidinti sąmoningumo lygį šioje srityje pasitelkiant subtilių morfologinių elementų racionalų supratimą ir subjektyvų pajautimą, taip pat vidinių bei išorinių ryšių tarp garsinių įvykių nagrinėjimą. Ypač svarbu susieti pagrindines morfologines ypatybes su išorinėmis referencinėmis garso asociacijomis, įtraukti į tyrimų lauką tokius aspektus, kaip išplėstinės atlikimo technikos, sąsajos su garso šaltiniu (angl. *source bonding*) ir giluminis klausymasis (angl. *deep listening*).

Labai svarbu atkreipti dėmesį į pedagoginius metodus, padedančius suformuoti metodologines sąsajas tarp ateities mokytojo, atlikėjo ir kompozitoriaus; manytume, kad būtina atsižvelgti į absoliučiai visas instrumento garso savybes, klasifikuoti atlikimo technikas pagal jų skambesio specifines savybes. Straipsnyje gitaros išplėstinės atlikimo technikos tyrinėjamos koncentruojantis į jų suvokimą klausia, aptariama jų dokumentavimo problematika ir muzikos istorija. Čia paaiškinamos morfologijoje slypinčios susikoncentravimo į „snare drum“ ir lateralinio *glissando* technikas priežastys, atskleidžiama žmogaus gestų inkorporavimo į garso funkcionavimo atpažinimą svarba.

Tarp kitų straipsnyje gvildinamų temų pateikiami notacijos simbolių paaiškinimai morfologiniame kontekste, nagrinėjamos sąsajos su vaizduote, aptariami sąsajų su garso šaltiniu (angl. *source bonding*) lūkesčių padariniai klausytojui, improvizacinių metodų ir kūrybinių atlikimo technikų svarba. Aptariant šias problemas, akivaizdžiai atsiskleidžia pedagoginių įrankių, skirtų vidinio potencialo išlaisvinimui bei mokinių vaizduotės lavinimui, poreikis.

Iš čia kyla diskusija apie holistinę metodiką, skirtą smulkių tembro kaitos niuansų suvokimui lavinti, ir jos sąsają su elektroakustiniuose kognityviniuose tyrimuose analizuojamu nuo konteksto atriboto garso savybių klausymu (angl. *reduced listening*). Aptariamas atlikėjo (kaip klausytojo) ir publikos (kaip klausytojo) klausinės percepcijos kūrimas.

Siekdami suprasti visus girdimus skambančio garso ar muzikinio gesto aspektus, inicijuojame diskusiją; išreiškiame palaikymą paradigminei poslinkiui tolyn nuo tono aukščio, kaip prioritetinio muzikinio garso aspekto, link lygiaverčio garsų morfologinių elementų, spektrinių savybių ir tokių veiksnių kaip stilius, technika, išgavimo būdas, atlikimo erdvė ar fiziologiniai potyriai traktavimo. Šią diskusiją papildoma tems apie garsinius gestus formuojančius fizinius veiksmus, dvikrypčius procesus, psichofizinę informaciją, įgytą kultūrinį pažinimą ir kt.

Šiandienos muzikoje labai dažnai naudojamos mišrios, standartinės grojimo technikos ir nekonvencionalūs morfologiniai elementai. Straipsnyje stengiamasi integruoti ir sujungti morfologinius elementus iš visų šiuolaikinėje muzikoje taikomų gitaros atlikimo technikų į vieną progresyvią, radikalią pedagoginę klausymo sistemą. Sąvoka „morfologiniai gitaros elementai“ siekiama apibrėžti tam tikrą sistemingą konstrukciją, kuri palengvintų laiko tėkmėje vykstančius audiacijos struktūrinius ryšius ir jų funkcionavimą. Ši sąvoka mus atveda prie kitos, „garso kokybės formavimo“, sąvokos, atspindinčios spektrinio morfologinių elementų turinio manipuliacijas.

Posūkio link pedagoginės audiacijos sistemos tikslas – audiacija ir visi jos aspektai turi skatinti kūrybiškumą. Morfologinis muzikinis mąstymas yra eksperimentinis procesas, dinamiška veikla, kurioje tarpsta spektrinių energijų percepcija ir jų erdvinės konfigūracijos.

Technology Assisted Audiation in New Composing Practice

Abstract. Technology assisted audiation is a composing practice that offers deep insight into the unexplored sound territories, gives more control over manipulation of the material, and potentially opens doors to new and unexpected options in the creative process. This paper presents an overview and brief analysis of the composing practices open to technology assisted audiation that were involved in the making of several contemporary works for live performances by musicians or audience. The main focus of this research is works that are not written for electronics or fixed media, but intended to be performed by live human factor.

The development of sound recording devices through history had a major impact on the way we imagine, use and edit sounds when composing music. It is interesting to see how much of technology is involved in composing practices behind works that are actually mainly acoustic in the end, as well as how many of electronic devices are almost always present in our environment and, consequently in every music performance.

To present different levels of technology that can be involved in the process of audiation, it is crucial to observe some of the approaches employed by several composers: John Cage, David Helbich, Stefan Prins, Johannes Kreidler, Simon Steen-Andersen and Jessie Marino.

In order to present practical methods of creating realistic audio sketches or “performance simulations” during the course of my own composing practice, I describe procedures undertaken in two case studies based on my works with musicians and smartphones.

Presentation of various approaches to technology assisted audiation and practical explanations of methodology in composing practices should be able to offer an extended technique for creating music material and obtaining full control over new.

Keywords: new composition, composing practice, music technology, sound recording, conceptual music, digital concepts in music, audio sketch, electronic device.

Introduction

This article explores the processes of technology assisted audiation in the composing practice of non-electronic works. During the past years, I have been interested in observing how much of our audiation is influenced by technology and consequently it requires us to further rely on electronic devices to upgrade and improve our composing practice. As a result, we have many interesting works of new music that are based around digital concepts, or are replicating the artificial methodology, even when works are to be performed live, without any electronics involved in the final production. It is particularly interesting to examine the results of works that begin with technologically assisted audiation and end with live acoustic reinterpretation of material that was initially brought by electronic devices. It could be discussed that they take a form of a “re-make” or “replicas” of digital material. These works play with rotating roles, using human performers to model technology, as well as propose notion that we have, perhaps already evolved far enough to start thinking of technology as our prime model from which we copy systems for our own functioning.

Ever since the first forms of *Musique concrète* we have been familiar with technology assisted audiation, where technology assists composers in testing-out and hearing-out the ideas during the writing process. It can be defined as a form of audiation that relies on the use of devices in order to search, explore, record, document and manipulate material needed for composing of a new work. It most often means producing sound samples and/or using recordings of sounds to examine, select, edit and simulate the results of their performance as precisely as possible for a new piece in the making.

1. Technology Influenced Audiation

The development of technology through history had a great influence on what one can imagine as sound, as well as how close one could examine and understand the sound. “Since the moment when technology allowed the scientist and engineers to capture sound to the various storage mediums, those recorders and playback devices captured the imagination and minds of general public all around the world” (Brief History of Sound Recording). Following the list of patents of devices through history from Phonoautograph to iPod (see Table 1) we get a clear reminder of how perception, creation, availability and ownership of sound has progressed in our lives, and it most certainly had impact on what we audiate in our composing practice.

Table 1. Inventions of sound recording and reproducing devices in chronological order from Phonoautograph (1857) to Apple's ipod (2001) (Morton: 2004, Greg: 2010)

Year	Device	Author / Inventor / Patent / Copyright
1857	Phonoautograph	Édouard-Léon Scott de Martinville
1876	First electrical synthesizer	Elisha Gray
1877	Phonograph	Thomas Edison
1898	Telegraphone	Valdemar Poulsen
1952	Blattnerphone	Louis Blattner
1926	Field-effect transistor	Julius Edgar Lilienfeld
1930	Magnetophone	Fritz Pfelemer
1937	Stereophonic sound-system	Bell Laboratories
1947	Point-contact transistor 1947	John Bardeen, Walter Brattain, and William Shockley
1951	CSIR Mark 1 (CSIRAC) First computer to play music	Team led by Trevor Pearcey and Maston Beard
1952	Transistor radio	Intermetall company
1954	Stereosonic Tape	EMI
1955	Multi-track recorder	Les Paul
1956	Clavivox Synthesizer	Raymon Scott
1957	Mark II Music Synthesizer	Herbert Belar and Harry Olson
1962	Compact audio cassette	Philips
1978	Digital Editing System (first DAW software)	Soundstream
1979	Walkman	Sony
1979	IXI (first digital audio player prototype)	Kane Kramer
1982	Cds	James T. Russell, Philips and Sony
1983	MIDI standardized	MIDI Manufacturers Association
1983	DX-7 First stand alone synthesizer	Yamaha
1991-1993	MP3 file	Karlheinz Brandenburg
1997	AAC files	Bell Labs, Fraunhofer Institute, Dolby Labs, Sony and Nokia
1999	Mobile Phones as music players	Samsung
2001	Apple ipod	Apple

1.1. Different relations between audiation and technology

In attempt to explore the initial need for technology in the composing process of some of the works written for live performances, we will shortly observe different approaches to audiation in general, particularly different levels of detailed audiation, starting from composing a free space in which anything can happen, to controlling and preplanning every single detail in the work. In order to draw comparisons, we are going to take a brief overview over several works developed around concepts that allowed openness of interpretation and their final sounding results, but also pieces that were in need of precise, thorough and detailed audiation. At the same time, we are going to pay attention to the use of technology in their composing process and note its purpose and relation from one case to another.

The pieces used as examples in the upcoming paragraphs serve to give us an overview of different approaches, as well as different levels of intensities of the composers' audiation during the writing of works, through variety of materials, forms, concepts, aesthetics and performing medium. Needless to say that there is an enormous list of works that were not used as examples here, which is not, in any way, in relation to their significance or artistic value.

1.2. Unintentional assistance of technology

Moving towards close examination of technology assisted audiation, we shall first step away and take a look at works that did not necessarily rely on devices to produce them, but counted on their existence during the performance. The fact is that when we imagine sounds of environment today, we think of sounds of streets, engines, alarms, constructions, air conditioning, coffee machines, phones, or all of the above. It seems that, even when audiating accidental sounds of the environment today, we are always co-working with technology and acknowledging its existence. Although, composers do not need to use technology to audiate the sounds of the environment, just by imagining all possible sounds they are audiating the presence of technological

devices. They might not use technology, but they are open to, or even counting on, sounds of technology entering their works. It is clear that we do not need technology to imagine sounds of our surrounding environment in a concert space during Cage's 4'33", yet it is interesting to ask how much technology is usually present in performances and how much technology was considered present back in the time when the work was audiated in Cage's head? Even though, the premiere was exposed to organic accidental sounds made only by nature and people (Maverick Concert Hall in Woodstock, New York, August 1952), while audiating this work in New York in the 1950s, I believe that Cage was open to having sounds of cars, trains and planes in the background, a ventilation fan or a buzzing light bulb in the room. This theory can be backed up by his perception of the "activity of sound" he explained in the interview with Miroslav Sebestik in 1991. He said "When I hear what we call music, it seems to me that someone is talking. And talking about his feelings, or about his ideas of relationships. But when I hear traffic, the sound of traffic – here on Sixth Avenue, for instance – I don't have the feeling that anyone is talking. I have the feeling that sound is acting. And I love the activity of sound ... I don't need sound to talk to me" (Cage 1991). This leads us to assume that the assistance of technology in Cage's audiation of this work was certainly present in his own surrounding environment. As mentioned earlier, listening to the environment back then, as well as today, almost always considered, listening to technology, too. Alvin Lucier claims that there is audible technology in the recording of this piece made by Gianni-Emilio Simonetti on Sramps Records in Italy: "You can hear the sound of the piano lid being opened and closed as well as the record noise" (Lucier 2012: 66).

In some way, Cage distanced himself from responsibility over the material that is the activity of sound of the environment during the performance of 4'33". While for instance, composer David Helbich, obtains closer control of what we hear of the environment and creates a work for more engaged interaction of the listeners. Helbich instructs audience on how to use their ears, as well as in which direction to listen to their environment. Cage audiated free non-instructed listening and relied on the focus of passive listeners on spontaneous and accidental sounds of environment. Whereas, Helbich is "committed to the idea of an 'audience as active individuals'" (Gottschalk 2016: 240), and he audiated various ways of intentional listening to the environment while using hands to close and open his ears, or focus on listening in a specific direction.

Instructing listeners on how to use their ears while listening to the environment is the method Helbich used in his "NO-MUSIC: earpieces" (previously titled *Keine-Musik*) compositions for ears (2009, 2013, 2014), that are scores and performances for self-performing or conducted audience in various situations, set-ups and contexts. "These compositions are for the reader. The reader is the listener is the performer, without anybody or anything in between the score and the ear. The pieces are also performable on the spot, wherever you are right now. All you need are two (more or less working) ears and two hands. The notation tries to be readable without a musical education. Reading the explanation of signs and intuition should be enough. These interventions are entirely personal and therefore not so much interactive, as 'inner-active', self-performative. The reader as the performer as the listener. The acoustic results change radically with every new location, but the piece still keeps its structural identity. Together, environment and composition dissolve into the responsibility of the listener him/herself; it becomes your own thing, as personal as a bodily experience can be" (Helbich: 2010).

Both of the examples propose ideas of audiating free or directed listening and being open to any sounds of the technology-filled environment entering the works. When working with sounds of environment, composers consent to not knowing precisely what will happen during the performance, but nevertheless they do expect technology to be present in the accidental activity of sounds.

1.3. Mixing intentional and unintentional assistance of technology

In some way similar to previous examples, composer Stefan Prins opened the door for unexpected sound events to enter one part of his work FITTINGinSIDE for mp3 players and trombone. Prins provided semi-controlled / or semi-free space for the appearance of surrounding sounds by making the audience listen to his audio track on their mp3 players, while being exposed to the world outside of the concert venue. After this, they enter the venue and listen to the solo trombone performance while still listening to the track from their mp3 players' earphones. The track for mp3 players intentionally twists the content of the two different spaces: when the audience is outdoors, the track they listen to is based on trombone sounds, whereas during the trombone solo performance indoors, they listen to the sounds of the streets. In our correspondence Prins explained in his own words: "I used mp3 players to be able to create an inversion (and I already knew that the audience would be walking from one gallery to this museum). That is why on the mp3 players they can hear

in the beginning trombone sounds, while the ‘real’ city sounds are all around them, and then at the end it’s the other way around: once they’re in the museum the trombone sound is ‘around them’ and the city sounds are on the mp3-players. I edited the recordings and the sound-processing on my headphones instead of on loudspeakers. And I would go outside to listen to the recordings on an mp3-player, the way the audience would do” (Prins 2018). Therefore, counting on the appearance of technology in the environment was only one part of technological assistance required for this work. Prins additionally relied on technology to record and produce the audio track for mp3 players, and at the same time, used his mp3 player to walk on the street and play the track, in order to simulate the performance results during his composing practice.

1.4. Intentional assistance of technology

When speaking of audiating accidental sounds of the environment, we have a feeling that there is an idea of giving up control over some details in the piece. At the same time, composers cannot be held responsible for whatever sounds happen in the surrounding environment. The composers allow different material to possibly enter their works and hand out responsibility to a matter of circumstances and accidental events.

Almost opposing concept to this would be the idea of relying on a device and another person to pre-compose rules for a new piece, and then having some expectations of the outcome, but not knowing precisely what will it sound like. This is a concept created by Johannes Kreidler in *Fremdarbeit* for flute (or clarinet), cello, drums, keyboard and moderator (2009). The work is moderated by the composer, where he explains that in order to compose this work he outsourced tasks to a programmer from India and a composer from China to produce the work for him. The programmer’s task was to produce detailed statistical data of the content material of Kreidler’s previous works, while the hired composer from China wrote a new piece, respecting these rules. Hence, Kreidler could have had various assumptions of the possible musical results of the work, while the hired composer would have had expected to precisely audiate the piece in detail, during composing in requested style, following the statistical data given by the Indian programmer (based on the analysis produced with assistance of the computer). Of course, there always seems to be a reasonable doubt wrapped around the facts about the actual outsourcing of the composing tasks in this work. In his article, Martin Iddon remains skeptical throughout his writing, stating that “once one’s skepticism has been aroused it seems obvious that a much simpler, easier solution exists than the one which the complete score of *Fremdarbeit* – including the moderator’s sections – describes, which is to say that the piece was written, in all of its specifics, by Kreidler himself” (Iddon 2016: 46).

Be it as it may, we suppose that computer was used to generate statistical data after the analysis of Kreidler’s previous works that had to serve as a recipe for composing (and audiating) a new work produced by someone else. In this work’s concept we encounter the idea of a clear technological assistance for its audiation, yet still being open to accidental events.

Although there is the idea of audiation being handed over to someone else, the other person still had to follow certain parameters that were required by computer statistics. Hence, the control over the material of the work was not entirely given up on, and free audiation was allowed only inside and in between stylistic requirements.

1.5. Audiation provided by technology

This takes us further to examples of works that were built upon materials that originate from electronic devices. Consequently, composing practices of these works did not only include assistance of technology for material audiation, but also for allowing composers to obtain full control over the new material they wanted to manipulate.

Simon Steen-Andersen’s Piano Concerto for solo piano, orchestra, live electronics and video (2014) develops on the material that is based on the recording of a grand piano smashing on the floor after falling from the ceiling. Technology was used to record the actual smashing of the piano, and furthermore, to manipulate the recordings and use samples as models for arranging materials for the live reproduction of these sounds by symphonic orchestra and piano. Furthermore, we have a reproduction of an idea of “cloning” of the pianist. We are shown a video of the same performer playing on the broken piano, while the actual pianist on the stage plays on the sampler in these sections. Obviously the concepts presented in this performance are derived from technological ideas, and their production is only possible by the use of electronic devices.

In a similar manner, Jessie Marino based her work “Nice Guys Win Twice” for ten performers, live electronic audio and video (2018) on an archive of video recordings. Marino searched, browsed and collected

recordings of television presenters on the news and used them as a form of an aural and visual example for the composing practice that unraveled in the workshop with performers (SCENATET group). When I interviewed Marino, she explained that performers were given recorded materials of video samples and then worked on their own interpretation of their content. They watched the video recordings, re-enacted them, recorded themselves, watched, replayed and made adjustments. The final performance of the piece was created in the rehearsals with Marino's direction, with "not more than only 30% of the material notated, eventually" (Marino 2018).

Pre-recorded audio and video materials served as a base for the development of both Steen-Andersen's and Marino's pieces, and electronic devices (audio/video recording equipment, storage media, internet etc.) were used to obtain and reproduce the material, as well as to further manipulate, test and simulate the performing results, during the entire composing practices.

2. Case Studies

In order to be able to take us even further inside the practice of technology assisted audiation, I am going to present two case studies of mine that will explain the use of devices during the composing practice involved in the making of the two works. Both works were composed for live performances, yet they were entirely produced with the assistance of recording devices, smartphones and a computer. Only after the final audio simulations were completed, were they transcribed into music scores. Again, we are going to examine the work based on sounds of environment, but this time, the sounds of devices are not accidental, but transformed into pre-planned, manipulated and completely controlled music material. Then, we are going to focus on the practice of audiating sounds that are conditioned by the options provided by free applications for smartphones.

2.1. Case study 1: "The Upgrade" – for a group of musicians with phones (2017)

The material for the music theatre work "The Upgrade" (2017) for a group of musicians with phones derived from the concept of people sitting in the waiting room and looking at their phones. The general rule was that musicians should all be looking at their phones and they could only use one hand to hold and play their instruments. The soundscape of the piece was to be made out office noise, such as keyboard buttons, air-conditioning in a corner, phone notifications, someone talking to assistant at the desk, construction works outside the window, as well as a bit of people's whistling and singing of pop tunes to pass the time while waiting.



Figure 1. "The Upgrade" (Darmstadt International Summer Courses for New Music, July 2018)

Preparations. In the pre-composing phase, I created a two-minute audio "pilot" sketch of the work, using suitable sound samples I downloaded or recorded for this purpose [Devices: laptop, internet, smartphone, voice recording app, music software (Logic)]. Making this sketch helped me listen through the soundscapes I initially desired as many times as I needed. It assisted me to experiment, explore and input or take out some of the samples, until I had the right excerpt of the sounds I would attempt to replicate with live musicians and further develop the piece from.

Workshop. Since, the piece was imagined as a music theatre, in respect of the story plot, the musicians were meant to look at their smartphones at all times. This meant they could use only one hand to hold and play their instrument. I met with each of the instrumentalists for a session of exploration and trials of all the options that were possible for them to use to produce sounds on their instruments, with one hand, while

holding and looking at their smartphone in the other. All sounds were recorded with a recording application on my phone (it could also be any recording device). After all musicians were recorded and all their sounds prepared for further use, I could begin the actual composing the work.

Composing with audio simulation. All the recorded samples of musicians helped to design a precise soundscape for this work. Being able to manipulate the recordings in the music software assisted me in composing the work, almost as a piece in the style of *Musique Concrete*. Even though I was well aware of all the possibilities and techniques available for musicians who can play with only one hand, having all this sounds recorded, improved my awareness and control over the material in the work even more. Audiation of the piece during this composing process was constantly on a short relation between hearing ideas in my head to instantly trying them out by simulating results in the computer. It felt like the process one would have to follow while writing a piece of electronic *Musique Concrete* work, and it more or less was the same, the only difference being that this work would eventually have to be performed live in the performance, which was the only thing that at certain moments “constrained” and tamed a stream of my audiation.

Therefore, the audiation was most often initiated in my head, but then lead into research and trials that could be tested, checked and heard in my computer software, before I decided upon solutions I was satisfied with. This type of technology assisted audiation provided me with great convenience of having a detailed control over the outcome, even though I was working with, until then, unfamiliar setting with one-handed musicians.

Composing the entire work with the assistance of music software provided me with a valid simulation of how the performance would sound, and I was able to create, step back and listen to different versions of my piece before I decided which one is going to be a final representation.

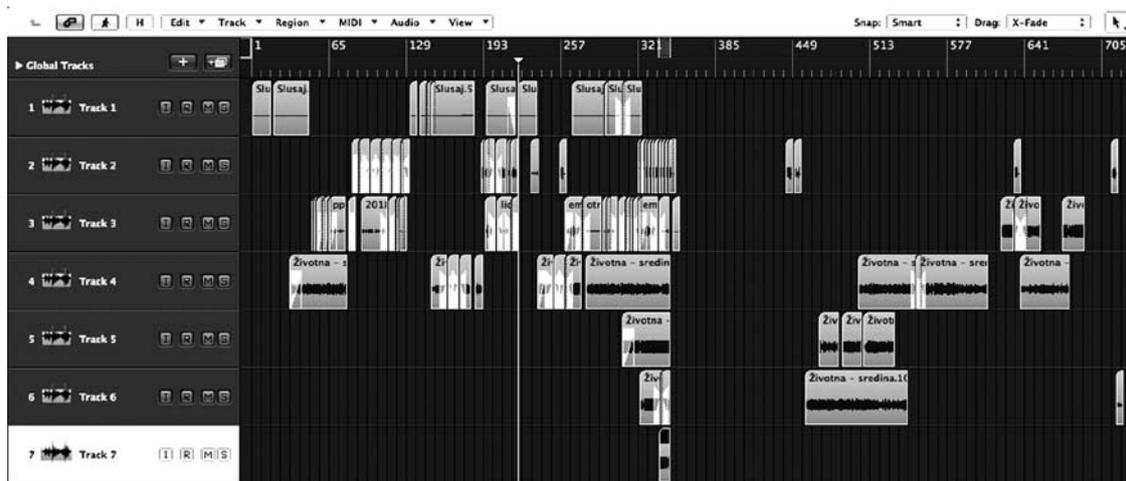


Figure 2. Music Software (Logic)

Notation. It is only after “The Upgrade” was completed in my computer software that I started thinking about notation. Therefore, notation is literally a transcription of the audio-simulation of the piece, just a tool for communicating musical messages. This process of notating an already complete work is quite interesting because it requires decoding sounds into music symbols, as well as rethinking how they would be interpreted, and on occasion having to compromise certain small details for achieving clearer notation.

The composing process in the computer was freed from thinking about bars, measures and rhythmical figures. Making of the score required analyzing and rethinking of transcription of the works’ time and pulse. Consequentially, tempo often responds to the real-time flow (a second = 60 bpm), and rhythmical gestures inside the bars are often rubato. Minor changes were placed inside the score and defer from the audio-simulation of the piece in dynamics, in need of more exaggerated expressivity of certain gestures and sections in the live performance.

Phone Scores. As mentioned earlier, “The Upgrade” is a music theatre with a story plot placed in a waiting room “from a not-too distant future”, and it is why it is of great importance that everyone on stage is looking at their phones. There are no note stands or paper scores on stage. Thus, the final part of the preparations for the performance involved creating animated video parts for musicians specifically made to be played on

each of their smartphones. Musicians' regular parts were sliced in small fragments of pictures of dimensions that were convenient for phone screens and recreated in slides. Using these slides for phone screens, I created perfectly synchronized video parts with a visual counter. Although, the production of video parts was a demanding process, it allowed me to exploit lighting effects and create sections where the phone screens are reacting to the sounds musicians are producing and illuminating their faces while the room is in the dark.

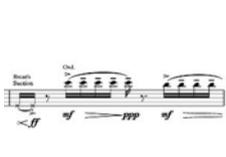
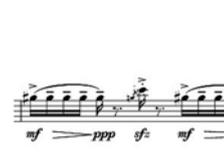
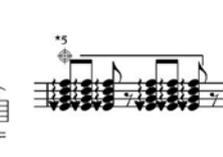
Flute	Piano	Accordion	Violin	Double bass
				
				

Figure 3. One slit of all instrument parts of videos for smartphones

2.2. Case Study No 2: “/com.app.data” – ever-changing piece for two groups of musicians with phone apps (2018)

Smartphones have become crucial parts of our environment. Where there are humans, there are smartphones. Next to sounds of human steps and breathing, there are sounds of notifications, vibrations, video calls, reminders and various apps and games. Inspired by these technological sounds of human environment, this piece's music material is based on sounds of phone apps. This is a music theatre piece for musicians who play their instruments, as well as use their phone apps. The line between their “instrumental” and “app” performance is somewhat blurred, since both instruments and phone apps are used in equal amount, and instrumental material also imitates the sounds from apps, making us wonder which ones we prefer better. There are sections where phones are just a lightning decoration to performed music; there are sections where they are used together with instruments, as well as sections where musicians are just playing on their apps. Some parts are choreographed in various ways with synchronized and unsynchronized movements.



Figure 4. /com.app.data set-up at Impuls Festival 2019, Graz

Preparations. The initial pre-composing phase of making of this work understood researching, downloading and testing many available free applications for smartphones that could serve well in a live music performance. I created a large list of available apps and categorized them by their purpose:

- Reacting – apps react to sound or motion of the phone, producing flashing lights or sound notifications,
- Conducting – apps that instruct and conduct performance by counting the time or displaying moving shapes,
- Playing sounds – apps that produce sounds, as well as record and playback performed sounds with or without added effects.

Eventually, I made a selection of applications that I would use in this piece which instantly influenced audiation of the piece in my head. In order to explore as many possibilities there were, I spent time using the applications and composing fragments of what was to become a new composition.

Composing with audio simulation. As in “The Upgrade”, which was the subject of the previous case study, I recorded every sound that apps could produce and began composing the work by manipulating the recordings in the computer software. Working this way, again, I felt instant gratification having all the musical ideas played back by computer, shortly after they appeared in my head.

This time, I did not record musicians and was not able to create simulation of performance with sounds of actual instruments before the piece was finalized. Nevertheless, I used recordings of the applications to reinterpret instrumental sections with a little added help of MIDI, and again was able to listen to the final version of the composition through audio simulation before I even started working on notation.

Notation. Same as in the first case, notation is a literate transcription of the already completed and finalized audio-simulation of the piece. This process of notating an already complete work and adjusting it to conventional and familiar musical symbols was a challenging task. Finally, to have a live performance from the score, to precisely replicate the audio-simulation of the piece, icons and buttons from applications had to appear in the score, as well as the use of a stopwatch.

Conclusion

Speaking from composer’s point of view, I can state that I could have assumed how all the materials would sound during the composing process, and therefore I could have written the entire piece by audiating in my head. However, I am more than certain that working with recordings of desired materials set me free to work and combine more options of their use and alterations, and while doing so, simultaneously arrive at new ideas that came out of actually knowing the previous results. I was able to arrange various layers in sections of organized living sound-masses in more precise detail, and consequently thoroughly examine and work out details of every gesture in the piece in the exact direction I wanted them and actual and definite sound result that aimed for.

Technology assisted audiation makes use of unconventional material more available and efficient. It creates opportunity for instant testing of trials and making fictional musical ideas simulated and actually sounding out, helping composers not work in the domain of assumptions, but having control over the new material. It allows actual listening to all possible options of the use of recorded material and gives opportunity for a great span of manipulation. All of these tasks are performed in the courtesy of composer’s computer, without having to schedule additional meetings with musicians.

It results in audio simulation of the performance which allows listening, checking, changing until we are completely satisfied with the piece and also can later serve as a great reference for performers during the studying of the work.

Technology assisted audiation allows composing for instruments without thinking about notation. Sounds are used, altered, placed and mixed freely inside the work without necessarily thinking about time, measure, tempos or rhythmical figures.

References

- Brief History of Sound Recording*. <http://www.soundrecordinghistory.net/>
- Cage, John (1991). John Cage in an interview with Miroslav Sebestik. From: *Écoute* (Listen), documentary by Miroslav Sebestik. ARTE France Développement, 2003.
- Gottschalk, Jennie (2016). *Experimental Music Since 1970*. New York: Bloomsbury.
- Helbich, David (2010). No-Music – Earpieces. <http://davidhelbich.blogspot.com/2010/02/keine-musik-ohrstucke-earpieces-in.html>

- Lucier, Alvin (2012). *Music 109: Notes on Experimental Music*. Middletown: Wesleyan University Press.
- Iddon, Martin (2016). Outsourcing Progress: On Conceptual Music. In: *Tempo*, Volume 70, Issue 275, January 2016, 36–49.
- Marino, Jessie (2018). In interview with the author. Skype: October, 2018.
- Milner, Greg (2010). *Perfecting Sound Forever: An Aural History of Recorded Music*. New York: Farrar, Straus and Giroux.
- Morton Jr., David L. (2004). *Sound Recording: The Life Story of a Technology*. Westport: Greenwood Press.
- Prins, Stefan (2018). In private correspondence with the author. Gmail: October, 2018.

Technologijų veikiamą audiaciją naujojoje komponavimo praktikoje

Santrauka

Straipsnyje pristatoma technologiniam asistavimui palankių komponavimo praktiškų, kurios buvo naudojamos kelete šiuolaikinės muzikos kūrinių, skirtų gyvam atlikimui muzikantams ir/ar klausytojams, apžvalga ir trumpa analizė. Pagrindinis šio tyrimo objektas yra ne elektronikai ar fiksuotai medijai parašyta muzika, o ta, kurios atlikimas tiesiogiai priklauso nuo žmogaus.

Tobulėjančios garso įrašų technologijos padarė didžiulę įtaką garsų įsivaizdavimui, naudojimui ir redagavimui komponavimo procese. Stebėtina, kiek daug elektroninių įrenginių yra mūsų aplinkoje, kiek technologijų naudojama absoliučiai akustinių kūrinių sukūrimui ir atlikimui.

Pradedama nuo kūrinių, kurių atlikimui technologijos naudojamos spontaniškai, o jų raiška – netiesioginė, vėliau pereinama prie pasižymintų sąmoningu ir tiesioginiu elektroninių įrenginių naudojimu. Galiausiai tyrinėjami du pačios autorės komponavimo praktikos pavyzdžiai. Pradžioje apžvelgiami tie kompozitorių kūriniai, kuriuose technologiniai įrenginiai naudojami neturint tiesioginės intencijos – čia tarpsta atlikimo erdvėje esantys (taip pat įvairių įrenginių skleidžiami) garsai. Šią kategoriją reprezentuoja Johno Cage'o ir Davido Helbicho darbai. Kitoje barikadų pusėje yra kūriniai, kuriuose technologijas kompozitoriai naudojo audijavimo tikslais. Čia aptartas Johannesas Kreidlerio *Fremdarbeit*, sukurtas trečiųjų šalių specialistų (anlg. *outsourced*), taip pat kūriniai, kurie buvo sukurti naudojant elektroninių įrenginių sugeneruotą muzikinę medžiagą (tokie yra Simono Steeno-Anderseno ir Jessie Marino opusai). Vis dėlto tarp šių dviejų kategorijų yra kūrinių, kuriuose audijavimo procesai pasireiškia ir tiesioginiu, ir netiesioginiu įrenginių naudojimu. Kaip pavyzdys panagrinėjamas Stefano Prinso kūrinių publikai su mp3 grotuvais, kurį atliekant girdimi ir aplinkos garsai.

Pačios autorės kūrybinės tendencijos naudoti technologijas audijavimo tikslais pristatomos dviejose analizėse. Atskleidžiami metodai, padedantys sukurti realistiškus garso eskizus (arba „atlikimo simuliacijas“) komponavimo metu, aptiriamos įvairios atliekamos procedūros ir naudojama įranga. Apžvelgiama garso eskizų teikiama nauda tiek kompozitoriams, tiek atlikėjams.

Šių dviejų pavyzdžių analizė leidžia įvertinti technologijų teikiamą privalumą kuriant naujus kūrinius. Apibendrinant galima teigti, kad technologijų asistavimas audijavimo procese tam tikrais atvejais gali būti perteklinis, tačiau jis gali būti ir naudingas ar net esminis naujų kūrinių gimimui. Kad ir kaip būtų, technologijų veikiamą audiaciją siūlo pasizvalgyti po dar neištyrinėtas garsų teritorijas, suteikia daugiau galimybių manipuluoti garsine medžiaga, atveria duris naujiems ir netikėtiems kūrybinio proceso sprendimams.

3

AUDIACINIAI AUDIATION ASPECTS
KOMPOZITORIŲ IN RELATION
STILISTIKOS IR TO CREATIVE
EVOLIUCIJOS EVOLUTION
ASPEKTAI AND STYLE

“Organized Post-Tonality” and its Aural Perception. The Interaction of Primary and Composite Segments in Schoenberg’s Piano Piece Op. 23, No. 2

Abstract. The term *free atonality* was soon after its emergence heavily denied by Arnold Schoenberg, as is reported by Anton Webern (Webern 1930, see Slonimsky 1971). Indeed, the oeuvre of the Second Viennese School composed between circa 1908 and 1921 is characterized by musical material that is neither without tonality in a broader sense, nor free in the sense of being unstructured at all. On the contrary, the tone material in these pieces is very strictly organized even though these compositions predate dodecaphonic principals.

This leads to the assumption that two levels are coexisting within the focused musical repertoire: (1) a musical surface level which may be distinguished by musical structures that can be aurally (or visually with a score) perceived more immediately, and (2) the structural background level, which is often determined in the pre-compositional phase and in contrast to the musical surface, thus its audibility opens up only after theoretically defining the work. The coexistence of these two levels is a rather intriguing aspect, as it led, at the time of its emergence, to new concepts of composition.

Within the text Schoenberg’s attempts to invent brand new reprise techniques around 1921 are analytically revisited, using Schoenberg’s piano piece Op. 23, No. 2 as an example. The aim is to show how within these reprise sections the structural background level can be made audible by applying the set-theoretical concept of the *inclusion relation*. In that connection, the text wishes to disclose the tension resulting from the permanent interaction between immediately perceivable *primary segments* and structurally relevant *secondary segments*, categories that are understood as representatives of the two diverging levels described earlier. “Audibilizing” the structural background of the piano piece in focus might lead to insights being relevant both to its analytical and practical interpretation.

Keywords: Schoenberg, pitch-class set theory, post-tonal music, analysis.

The European continent may be called the cradle of classical modernism and, thus, also the birthplace of post-tonal music, yet the American continent is the cradle of musical set theory. Since Arnold Schoenberg’s emigration to the United States in 1933, the discourse about his music and the music of the Second Viennese School can be described as being divided into two parts: the European and the American. During the years after the Second World War only very few more or less popular systematic approaches to classify post-tonal musical material were being developed in Europe, in example the teaching books of Hanns Jelinek (Jelinek 1952) and Herbert Eimert (Eimert 1950). In contrast to that situation, the United States were, among other beneficial circumstances, profiting from Schoenberg’s presence at that time, and research on the field of post-tonal theory was blossoming.¹

The development of pitch-class set theory is one of the most crucial outcomes. Pioneer works by authors such as Milton Babbitt (Babbitt 1946), Allen Forte (Forte 1955), and Howard Hanson (Hanson 1960) attempt to deliver solutions to questions surrounding post-tonal compositional techniques and tonal materials that are left unanswered by other analytical systems and tools. One of those aspects is the discrepancy between the level of tonal structures in the background of a given work and the level of the musical surface. Such a discrepancy becomes most relevant during Schoenberg’s turn from so-called free atonality to dodecaphony around 1920–1923. During that phase the composer invented brand new reprise techniques in which, while the reappearance of certain tonal materials is hidden only in the structural background, the musical foreground provides some seemingly completely new arrangement.

Probably the most remarkable example of those techniques is to be found within the piano piece, Op. 23, No. 2, composed in the summer of 1920 (Sichardt 1990: 206).² According to Ludwig Holtmeier, within this brief composition the two poles of free-atonality and dodecaphony are colliding, both being “in full command of their power” (Holtmeier 1999: 50).³ A realization of reprise moments contained in this composition would be hard to achieve just by listening to it. Therefore, it seems necessary to have an analytical view on the piece, at first, to point out where those reprises are hidden.

¹ In that connection, John Covach recently discussed the existence of an “Americanization” of Schoenberg’s compositional respective theoretical concepts, a procedure that might be compared to the one that it is already accepted since a long time in the case of Heinrich Schenker (Covach 2018).

² A fragmentary version of the piece was written down by Schoenberg already on 8 July 1920. Until 27 July 1920, more sketches were drawn and the first complete writing was made.

³ Own translation, original text: “...im Vollbesitz ihrer Kräfte...” For a detailed analysis of the op. 23 cycle of piano pieces see furthermore Bailey 2001.

The image shows a piano score for Arnold Schoenberg's *Five Piano Pieces, Op. 23, No. 2*. The score is divided into several systems, each with specific performance instructions and tempo markings. Grey shaded areas highlight various tonal segments, labeled A1 through B13. The segments are organized as follows:

- System 1 (bars 1-9):** Starts with 'Sehr rasch (♩)' and 'heftig'. Segments A1, A2, A3, A4, and A5 are highlighted.
- System 2 (bars 10-16):** Starts with 'poco pesante'. Segments A6, A7, A8, A9, B1, B2, B3, B4, and B5 are highlighted.
- System 3 (bars 17-23):** Starts with 'freier' and 'accel.'. Segments B6, B7+B8, B9, B10+B11+B13, and B12 are highlighted.
- System 4 (bars 24-30):** Starts with 'freier' and 'accel.'. Segment B1 is highlighted.
- System 5 (bars 31-37):** Starts with 'etwas ruhiger im Ausdruck' and 'rit.'. Segments B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, and B13 are highlighted.
- System 6 (bars 38-44):** Starts with 'accelerando - cresc.' and 'molto rit.'. Segments B1, B3, B4, B7, B8, B9, B10, B11, B12, and B13 are highlighted.
- System 7 (bars 45-51):** Starts with 'etwas langsamer'. Segments A1 (starting with d), A2, A3, A4, A5, A6, and A7 are highlighted.
- System 8 (bars 52-58):** Starts with 'Pesante' and 'allmählich langsamer werden'. Segments A8, A9, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, and B13 are highlighted.

A. Schoenberg, *Five Piano Pieces* Op. 23, Wilhelm Hansen, ed. no. 2326, Copenhagen 1923, p. 6, bars 1–7; “segmentation” with changes after J. Maegaard, *Studien zur Entwicklung des dodekaphonen Satzes bei Arnold Schoenberg*, Copenhagen 1972, vol. 3, p. 66–67.

A. Schoenberg, *Five Piano Pieces* Op. 23, Wilhelm Hansen, ed. no. 2326, Copenhagen 1923, p. 6, bars 6–9.

A. Schoenberg, *Five Piano Pieces* Op. 23, Wilhelm Hansen, ed. no. 2326, Copenhagen 1923, p. 7, bars 12–18.

Figures 1a, 1b and 1c. Organization of tonal material and reprise moments within Schoenberg’s piano piece, Op. 23, No. 2 (reproduced after Schönberg, Arnold: *Fünf Klavierstücke*, Op. 23, ed. no. 2326: 6f. Copenhagen: Wilhelm Hansen). The segmentation is based on the analysis of J. Maegaard (Maegaard 1972 [vol. 3]: 66f.)

The exposition section reaches from bars 1 to 6 and is divided in two parts, named A (bars 1 to 4) and B (bars 5 and 6). While a reprise moment of Part A occurs in Bar 15, the tonal material of Part B is repeated independently from Part A from bars 8 and 13 on. Already this division of the material being exposed within the first bars of the composition shows that, obviously, two levels of perception are relevant for that composition: Part B starts on the first beat of Bar 5, which is, at the same time, the ending point of the preceding phrase, the great crescendo, starting with the upbeat in Bar 2.

For this reason, I may from now on distinguish between (1) the musical surface level which is identical with musical motives, phrases and – to use a term by Schoenberg – “*Gedanken*” and can be perceived immediately by the listener and interpreter and (2) the structural background level, which refers to the tonal material and – often being in contrast to the musical surface level – sometimes opens up its audibility only after exploring and theoretically defining the work.

Let us first have a look at the tonal material of the exposition bars. Where there is no such compositional principle as a tone row functioning as an obvious source of cohesion, it is difficult to decide both how to locate the structural background level and whether it should be to a great extent identical with the musical surface level (at least when being introduced the first time) or not. In terms of pitch-class set theory the question arises as to which way the tonal material should be grouped together.⁴

In 1972, the Danish composer and musicologist Jan Maegaard published an extensive analytical study on Schoenberg’s pre-twelve-tone works based on the composer’s own compositional sketches (Maegaard 1972). Though Maegaard does not use pitch-class set theory, his analytical methods are very close to it, at least when it comes to drawing circles and geometrical figures around groups of notes that belong together, in this way providing a de facto segmentation. However, simply copying Maegaard’s analytical figures in connection with Op. 23, No. 2 (see Maegaard 1972 [vol. 3]: 66f.) and “translating” them into pitch-class sets is not possible as it bears some problem. According to Allen Forte’s “classical” set theory⁵, only sets containing between three and nine pitch classes possess analytical relevance. However, Maegaard’s figures B2, B7, B11, and B13 contain less than three notes. Furthermore, Figure A5 consists of altogether 10 different pitch classes. As a solution to these analytical problems, the excessively small figures may be merged with their neighboring figures and to divide A5 into two parts (see Figure 1a).

These analytical procedures can be justified by a powerful set-theoretical tool with regards to the aural perception of post-tonal pitch structures: the inclusion relation.

Figure 2. Affiliation of all musical sets used in Op. 23, No. 2 to Figure A1, according to the inclusion relation (this graph has been published in Lewandowski 2014: 319f.)

⁴ Sarah Schaffer has discussed this aspect in a comprehensive study (Schaffer 1991).

⁵ The term “classical set theory” refers to the theoretical contents being presented in Forte 1973.

It provides the possibility of both visually and aurally recognizing relations between certain groups of notes, as they are defined as belonging to one family. In the case of Schoenberg's piano piece Op. 23, No. 2, Maegaard's Figure A1 may be considered a superset. All other figures are subsets of A1, meaning that they are related to A1 through either transposition, inversion, or transposition of the inversion. This even might bear a set-theoretical understanding of Schoenberg's term "Keimzelle", the motivic cell given with A1, which is not only developed on the syntactical level (the musical surface), but also on the level of the structural background. At this point, it is not claimed that one is able to hear the exact segmentation of the opening bars of Op. 23, No. 2 given by Maegaard, however, it is assumed that the presence of the inclusion relation explains why we are able to hear the tonal material within that composition as coherent. Therefore, the use of the term "ordered" or "organized post-tonality" is preferred instead of "free atonality" because that term might be misinterpreted as random disordered post-tonal composing, with no underlying compositional rules.

Let us now have a look at the first reprise moment, the reoccurrence of Part B in bars 8 and 9 (see Figure 1b). This short musical section should be played "*etwas ruhiger im Ausdruck*" (somewhat calmer in expression). It is introduced by the mirrored chord at the end of the preceding bar, whose tonal material also contains Figure B1, so that Bar 8 starts with B2. This chord has been described by Holtmeier as the gateway to modernism (Holtmeier 1999: 45). According to him, from the moment of its appearance, everything would be different because of a new-born definition of reprise that follows. Not only does Schoenberg choose a completely new musical character – a mysterious, quietly floating atmosphere which is created by low registers, very soft dynamics as well as half notes and the constant use of triplets – but he also constructs the greatest contrasts on the level of the tonal material. Figures that were consisting of chords within the first bars are now transformed into melodic lines, such as B3. The previous melodic lines within the exposition section appear now as mainly chordal figures (see for example Figure B4).

Though the identity of the tonal material between these bars 8/9 and the previous bars 5/6 within the exposition section is apparent, the musical surface level hides the fact that both passages are linked to each other. Significantly, this concealment evokes the work of Schoenberg's musical rival, Heinrich Schenker, who understood such a hidden musical camouflage in biological terms as a concealed repetition ("*mehr verborgenen Wiederholungen*") (Schenker 1956: 155). In any event, the compositional procedures being effective here may be only brought to light by analyzing the structural background level. Given that analysis, a structural coherence might even be disclosed to the listener's or interpreter's ear.

Figure 3. Arrangement of Figure A1 in bars 10–12
(reproduced after Schönberg, Arnold: Fünf Klavierstücke, Op. 23, ed. no. 2326: 6f. Copenhagen: Wilhelm Hansen)

The following passage, bars 10–12, is defined by the nine-tone Figure A1, the superset of the whole piece. It cannot be described as a reprise section, because A1 is not followed by its subsets of the exposition part. Instead, several transpositions of the superset in combination with its attendant three-tone Figure A2 are arranged here in a way that shows remarkable characteristics of the treatment of sets within Schoenbergian twelve-tone technique, which was developed nearly at the same time. When the German theoretical discourse states that within these bars "*Reihentechnik*" (row technique) determines the compositional background that

would be the antithesis to free atonality within Op. 23, No. 2, it suffers from a lack of adequate terminology.⁶ From the very beginning on, Schoenberg composes sets (and not tone rows in the sense of the word), groups of tones in which there are no hierarchical orders, but every member stands in equal relation to every other member (Schoenberg 1976: 72–96). The graph shows how within every occurrence of Figure A1 the ninth tone is put to the front position, while the other members are used pairwise, building four simultaneous intervals (either seconds or thirds). Altogether, there are six transpositions of A1. Each form is transposed 7 half steps (a perfect fifth) higher, compared to the preceding one. The musical foreground is mainly identical here with the structural background, which is often the case in Schoenberg's early twelve-tone compositions.⁷

The identification of two distinct levels in connection with the reduction to one (or two) “mother sets” leads us to discover its own aesthetic. That approach is distinguished from compositional contexts in which several different sets are involved, which is usually more associated with “free atonality”.⁸

Two more reprise sections follow within Op. 23, No. 2 (see Figure 1c). They are interrupted by another occurrence of the pair A1 and A2 in Bar 14 before the final section again is determined by row technical and set technical procedures that use only one set pair. It may be not by chance that these procedures have finally won the fight within that piece by speaking the last word, in this way quasi predicting Schoenberg's near compositional future.

However, of special interest with regards to the focused aspects are the two reprise sections comprising bars 13 and 15–17. The first reprise moment refers to Part B of the exposition, consisting of the figures B1, B4, and a fragment of Figure B3. The fragment can be clearly explained by the inclusion relation.

After a reminiscence of the end of the climactic passage in bars 10–13 within Bar 14, there occurs a last reprise from Bar 15 on, which soon dissoles into fragments (see the figures at the end in the left hand). Here, as well as in the preceding reprise section in Bar 13, the structural background level has to be considered again as independent from the musical surface level. Schoenberg uses composite segments (see in example B4 bars 13/14) and also changes the appearance of some figures by shortening them (see Figure A3 Bar 15) or double-defining some notes (for example the note A in the bass register in Bar 15 belongs to both figures A4 and A5).

Of some special interest might be the recurrence of this Figure A5, whereas the marked note f1 is not identical with the d1 in the exposition section. This difference is commonly known as a mistake by Schoenberg (see for example Ganter 1997: 125).

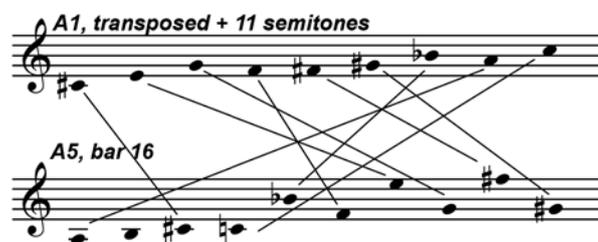


Figure 4. Figure A1 considered as subset of A5

The correct note has to be the f1 – what might be proved not only by looking at the sketches, but probably also by analytical procedures: According to the inclusion relation, Figure A1 (having been considered the superset of the whole composition so far) is a subset of Figure A5 in the version containing the pitch-class f. Figure 4 shows the identity of tone members between the two sets: It becomes clear, when A1 is transposed ten half steps higher. It has to be added, that, in terms of “classical” set theory, sets being larger than 9 notes are of no analytical relevance. Nevertheless, a set of 9 members being a subset of a super set consisting of 10

⁶ Michael Beiche has discussed problems around terminology concerning Schoenberg's theoretical and compositional thoughts and concepts (Beiche 1984). See also Alsmeier 2001: 54, and Perle 1977: 2).

⁷ The *Musette* from Schoenberg's *Suite für Klavier*, Op. 25 has a very similar texture with vertical borders between two occurrences of a set form and might serve as an example to illustrate that fact. Analytical studies including Schoenberg's suite for piano are presented by Georg Krieger (Krieger 1968), Claus Ganter (Ganter 1997), and Eun-Mi Ko (Ko 1998).

⁸ Theodor W. Adorno describes this sound “... flashing like steel furniture from Bauhaus” (own translation, original text: “... *blitzend wie Stahlmöbel aus dem Bauhaus*”) (Adorno 1984: 425).

members is a case of some special construction – be it conscious or not.⁹ It provides a possibility for considering the tonal material of Op. 23, No. 2 and its compositional processes as coherent, with regards to both analytical and aural aspects.

The acceptance of pitch-class set theory beyond the borders of the Anglo-American theoretical discourse took quite a long time. Michiel Schuijjer characterizes those continental discrepancies in the field of post-tonal musical analysis by referring to an anecdote that happened as late as 1999 during the 4th European Music Analysis Conference in Rotterdam: an American scholar asked why the participants of a discussion on methods of analyzing post-tonal music did not talk about pitch-class sets. The French chairman responded that nobody *talked* about pitch-class sets because nobody could *hear* them (Schuijjer 2008: 1f.).

This comment contains two characteristic issues concerning the discussion around set theory: first, it shows the ongoing aversion against this systematic approach that, in comparison to European ones, would lack focus on individual rules to be found in every composition of the classical modern era. Second, it bears some critique regarding the fact that set theory has been designed as an analytical tool concentrating merely on the tonal material and not on aural aspects. Indeed, only in more recent years, set theory seems to have become more open and sensitive to contexts of *hearing* pitch-class sets. Approaches of post-tonal ear training based on the training of hearing pitch-class sets have been introduced, for example, by Michael L. Friedmann (Friedmann 1990), Michael Berry (Berry 2009: 23–44), and Jeremiah Goyette.¹⁰ But while these approaches mainly provide good strategies in aurally distinguishing set classes, only very few convincing investigations have been taken so far in applying those techniques to a concrete musical work. “Audibilizing” segmentation, as it has been suggested in this little study, using Op. 23, No. 2 as an example, is still a field of research being nearly untouched. Such an approach might provide a new path through the pre-dodecaphonic jungle.

References

- Adorno, Theodor W. (1984). Schönbergs Klavierwerk. In: *Gesammelte Schriften*, vol. 18 (= *Musikalische Schriften V*), edited by Tiedemann, Rolf; Schultz, Klaus: 422–426. Frankfurt am Main: Suhrkamp.
- Alsmeier, Judit (2001). *Komponieren mit Tönen: Nikos Skalkottas und Schönbergs “Komposition mit zwölf Tönen”*. Saarbrücken: Pfau.
- Babbitt, Milton (1946). *The Function of Set Structure in the Twelve-Tone System*. Dissertation. Princeton: Princeton University Press.
- Bailey, Kathryn (2001). “*Composing with Tones*”. *A Musical Analysis of Schoenberg’s Op. 23 Pieces for Piano*. Ashgate: Ashgate Publishing Limited.
- Beiche, Michael (1984). *Terminologische Aspekte der “Zwölftonmusik”*. München and Salzburg: Katzbichler.
- Berry, Michael (2009). A New Approach to Post-Tonal Ear Training. In: *Indiana Theory Review*, vol. 27, no. 1: 23–44.
- Covach, John (2018). The Americanization of Arnold Schoenberg? Theory, Analysis, and Reception. In: *Zeitschrift der Gesellschaft für Musiktheorie* 15/2: 155–175. Online: <https://www.gmth.de/zeitschrift/artikel/991.aspx>.
- Eimert, Herbert (1950). *Lehrbuch der Zwölftontechnik*. Wiesbaden: Breitkopf & Härtel.
- Forte, Allen (1955). *Contemporary Tone Structures*. New York: Bureau of Publications, Columbia University Teacher’s College.
- Forte, Allen (1973). *The Structure of Atonal Music*, New Haven and London: Yale University Press.
- Forte, Allen (1978). Schoenberg’s Creative Evolution. The Path to Atonality. In: *The Musical Quarterly* 64/2: 133–176.
- Friedmann, Michael L. (1990). *Ear Training for Twentieth-Century Music*. New Haven: Yale University Press.
- Ganter, Claus (1997). *Ordnungsprinzip oder Konstruktion? Die Entwicklung der Tonsprache Arnold Schönbergs am Beispiel seiner Klavierwerke*. München and Salzburg: Katzbichler.
- Hanson, Howard (1960). *Harmonic Materials of Modern Music*. New York: Appleton-Century-Crofts.
- Holtmeier, Ludwig (1999). Arnold Schönbergs Klavierstück op. 23, II. In: *Musik & Ästhetik* 3/12: 40–51.
- Jelinek, Hanns (1952). *Versuch einer Anleitung zur Zwölftonkomposition nebst allerlei Paralipomena, Anhang zu Zwölftonwerk op. 15*, 2 volumes. Wien: Universal Edition.
- Ko, Eun-Mi (1998). *Das Klavierwerk Arnold Schönbergs. Von der frühen Atonalität zur Dodekaphonie*. Dissertation. Karlsruhe: No publisher.
- Krieger, Georg (1968). *Schönbergs Werke für Klavier*. Göttingen: Vandenhoeck und Ruprecht.
- Lewandowski, Stephan (2014). “Composing with tones” und Reihentechnik. Die pitch-class set theory, angewendet auf Schönbergs Klavierstück op. 23.2. In: *Musiktheorie und Vermittlung. Didaktik, Ästhetik, Satzlehre, Analyse, Improvisation*, edited by Kubicek, Ralf: 313–325. Hildesheim a. o.: Olms.
- Maegaard, Jan (1972). *Studien zur Entwicklung des dodekaphonen Satzes bei Arnold Schönberg*, 3 volumes. Kopenhagen: Wilhelm Hansen Musikforlag.
- Perle, George (1977). *Twelve-Tone Tonality*. Berkeley, Los Angeles, and London: University of California Press.

⁹ Forte assumes Schoenberg’s “set consciousness” as early as 1908 (Forte 1978: 133–176).

¹⁰ Goyettes *Post-Tonal Ear Training Suite* is published online here: <https://jeremiahgoyette.com/ptetsuite/> (last visited on 29th of December 2018).

- Schaffer, Sarah (1991). *Analytical Issues in the Segmentation of Atonal Music: An Investigation Based on Selected Pre-Serial Works of Schoenberg, Berg, and Webern*. Dissertation. Ann Arbor: UMI.
- Schenker, Heinrich (1935/1956). *Der freie Satz*, Wien: Universal Edition.
- Schönberg, Arnold (1976). Komposition mit zwölf Tönen. In: Schönberg, Arnold: *Stil und Gedanke*, = *Gesammelte Schriften*, vol. 1, edited by Ivan Vojtěch: 72–96. Frankfurt am Main: S. Fischer.
- Schuijjer, Michiel (2008). *Analyzing Atonal Music. Pitch-Class Theory and Its Contexts*. Rochester: University of Rochester Press.
- Sichardt, Martina (1990). *Die Entstehung der Zwölftonmethode Arnold Schönbergs*. Dissertation. Mainz: Schott.
- Webern, Anton (1930). What is Atonality? Radio interview in Wiener Rundfunk from 23 April 1930. In: Slonimsky, Nicolas (1971): *Music Since 1900*, 1311–1313. New York: Schirmer. First printed in German language: Webern, Anton (1930). Was ist atonal? In: 23 – Eine Wiener Musikzeitschrift 26/27 (1936), edited by Willi Reich: 1–11. Online: http://de.wikisource.org/wiki/Was_ist_atonal%3F, last visited on 29th of December 2018.

„Organizuotas posttonalumas“ ir jo percepcija klausia. Sąveika tarp pirminių ir sudėtinių segmentų A. Schoenbergo pjesėje fortepijonui op. 23 Nr. 2

Santrauka

Straipsnyje pateikta antrosios iš penkių Arnoldo Schoenbergo pjesių fortepijonui op. 23 analizė yra pagrįsta aukščio klasės setų teorijos idėjomis ir koncepcijomis. Remiantis išsamiais Jano Maegard'o analitinėmis studijomis, šios kompozicijos tonų aukštis yra padalytas į tam tikras natų grupes, kurios įvardijamos kaip aukščio klasės setai.

Teigiama, kad kūrinio aukščio struktūrų lygmeniu egzistuoja keli repriziniai momentai, susiję su tuo, jog ekspoziciją sudaro dvi sekcijos, kurias derėtų laikyti nepriklausomomis viena nuo kitos. Vis dėlto šie repriziniai momentai nėra suvokiami vos išgirdus kūrinį, jų suvokimas klausia atsiveria tik teoriškai juos išnagrinėjus. Keliama hipotezė, kad egzistuoja du lygmenys: 1) muzikinis paviršius ir 2) antraplanis struktūrinis lygmuo. Pagal setų teorijos terminologiją, muzikinio paviršiaus sąvoka siejama su visomis natų grupėmis, kurios yra identiškos savo motyvais, akordais ar frazėmis ir dėl to suvokiamos akimirksniu, o struktūrinis lygmuo yra siejamas su komponavimo technikomis, kurios naudojamos prekompozicinėje komponavimo stadijoje. Nei vienas, nei kitas lygmuo nėra mažiau svarbus tiek analitinei, tiek praktinei kūrinio interpretacijai. Jų koegzistavimui reikalingas nuolatinis dėmesys kelia naujus iššūkius tiek instrumentalistui, tiek klausytojui. Straipsnyje stengiamasi išsiaiškinti, kurioje vietoje dominuoja kiekvienas iš šių lygmenų ir kaip jie abu nuolat tarpusavyje sąveikauja. Taigi pirminiai segmentai yra traktuojami kaip reprezentuojantys muzikinio paviršiaus setų struktūras, o sudėtiniai segmentai – kaip reprezentuojantys struktūrinį lygmenį.

Analitinės procedūros leidžia daryti šias išvadas:

- Pjesės fortepijonui op. 23 Nr. 2 aukščio struktūra gali būti visiškai paaiškinta, joje nėra nė vienos natos, kuri nepaklustų komponavimo taisyklėms, kurias, kaip manoma, taikė Schoenbergas. Dėl šios priežasties „laisvo atonalumo“ terminas šiame muzikiniame kontekste laikytinas nenaudingas; siūloma jį pakeisti „organizuotu posttonalumu“.
- Pjesėje randame pasazų, sukonstruotų naudojant technines procedūras, kurios akivaizdžiai byloja apie būsimą Schoenbergo dodekafoninę techniką. Jie skamba kitaip nei šalia esantys pasazai, sukomponuoti kita technika, todėl kuria savitą estetiką.
- Visi kūrinyje nustatyti aukščio klasės setai yra tarpusavyje susiję, kaip priklausantys vienam supersetui. Melodinis motyvas, skambantis dešinės rankos partijoje, funkcionuoja kaip „motininis setas“; visi kiti setai yra „motininio seto“ subsetai.

Šie pastebėjimai nurodo vieną iš alternatyvų, kodėl ir kaip net nepatyręs klausytojas (apie kūrinio struktūrinio lygmens kompozicines taisykles neinformuotas asmuo) randa atspirties taškų posttonaliame muzikiniame kontekste. Panašūs setų teorija grįsti suvokimo kontekstų tyrimai galėtų būti taikomi ir platesniam posttonaliam repertuarui tyrinėti.

Audiation and Improvisation as they Relate to Synesthesia in the Organ Music of Olivier Messiaen

Abstract. The purpose of this article is to explore the relationship between audiation, improvisation, and synesthesia in the music of Olivier Messiaen. “When I hear a score or read it, hearing it in my mind, I visualize corresponding colors which turn, shift, and combine, just as the sounds turn, shift, and combine, simultaneously” (Samuel 1986: 37). The function of audiation, synesthesia and improvisation are manifest in the creative procedure of Messiaen’s in compositions. Messiaen “audiates” in his compositions the sensation of color. Harmonic configurations that Messiaen utilizes his fashioned Modes of Limited Transposition that dictate particular harmonic colors. For Messiaen and other individuals who have the neurological trait synesthesia, music generates within these individuals a perceived wash of colors. The complexity of neurophysiology and information processing within neuronal networks are considered in this investigation. In view of cytoarchitecture, along with the auditory cognition research and theories of Cook and Baldwin and the concept of improvisation, an exploration of the complex reality of audiation, improvisation, synesthesia, and cognition within the music of Messiaen is explored.

Keywords: audiation, improvisation, synesthesia, cognition, messiaen, composition.

Introduction

The aim of this article is to recognize part of the compositional technique of Messiaen through his audiation of sound and color. Messiaen, through his development of the Modes of Limited Transposition and their direct relations to various colors, paints sonic landscapes. Messiaen, being a fine improvisator on the organ, used the instrument and room at La Trinité to realize his audiations. These improvisations became a release of the sonic material that was in his head. Understanding the cerebral processes of improvisation and synesthesia can add a positive dimension to music and a greater appreciation of the compositional method. Synesthesia, in and of itself, is a complex trait that is not fully understood. There is a brief attempt to clarify the cognitive process of improvisation and the synesthesia trait that some individuals possess.

Audiation

Edwin Gordon developed a music learning theory in 1975 that is based on audiation, where individuals see, hear, and imagine music inside their head. Exercises to sharpen music performance and composition were designed for students in elementary music education. Audiation certainly existed prior to this date as practice for musicians and non-musicians, but it was not formalized as a study until this time. “Audiation is the process of assimilating and comprehending (not simply rehearsing) music momentarily heard performed or heard sometime in the past. We also audiate when we assimilate and comprehend in our minds music we may or may not have heard but are reading in notation or composing or improvising” (Gordon 2012: 3). This is the working definition of audiation in this inquiry. This process of “hearing” music in our heads is a common practice when remembering a melody or a musical texture or when a musical squib comes to mind. This concept of adapting or integrating a heard melody is the process of audiation. “In regard to audiating tonal patterns and rhythm patterns in terms of their difficulty level and growth rate in pedagogical procedures, it is recommended that they be considered in accordance with the principles of music learning sequence” (Gordon 1976: 146). At a remedial level both the structures of sonic patterns and rhythmic constructions should be introduced to students on an easy to difficult scale respectively. This gradual introduction to music composition through audiation is crucial. Another very important part of audiation is understanding or realizing music, actual comprehension of music. This analytical quality and inspiration are the roots of composition.

As in language, one function of musical expression is to communicate. The auditory process and the cognition of that process are aligned with music perception and cognition. Gordon states that “We audiate when listening to, recalling, performing, interpreting, creating, improvising, reading, or writing music. Consider language, speech, and thought. Language is the result of [a] need to communicate. Thought is what we communicate. Music, performance, and audiation have parallel meanings. Music is the subject of communication. Performance is the vehicle for communication. Audiation is what is communicated” (Gordon 2012: 5).

These were the basic concepts presented by Gordon and practiced within an elementary school music education model. In 1994, John Kratus conducted rudimentary children’s compositions research with children. Along with the work of Roger Sessions (1970: 76), who describes a composer as a person who has “tones in his head” and other studies by Stan Bennett that revealed that children often compose and revise

their musical compositions without the sound being actually present (Bennett 1976), work behaviors specify that audiation is necessary in any creative musical production (Kratz 1994: 116). These references to audiation reinforce the model of creative musical thinking in which tonal and rhythmic imagery are “enabled skills” (Kostagiolas et al. 2017: 126).

Improvisation is included in Gordon’s list of what is audiated. According to Gordon, improvisation is a process that embraces the act of improvisation. It is curious that improvisation, which is usually an external phenomenon, is part of the audiation process, which is internal. Indeed, as Baldwin (2012: 51) suggests, “Auditory processing requires the interaction of hearing (a sensory process) and interpretation of the acoustic signal (a perceptual-cognitive process).” Herein lies the foundation of improvisation as an audiated process and its facility to composition.

Improvisation

The American experimental composer and philosopher John Cage once said that he did not believe that improvisation was a technique for composing (Brett 2017). Cage’s theory was based on the notion that improvisational material only comes from what the improviser already knows. However, the compositions of Messiaen, profoundly influenced by the improvisation that Messiaen did on the organ using specific pitches, rhythmic elements, and various colors or timbres, were the result of his improvisations that explored novel territories. “Improvisation has played a significant role in Messiaen’s musical life, influencing his approach to composition. Indeed, many of his organ works began as extemporizations. His opportunities to improvise at La Trinité provided Messiaen with a compositional laboratory where he could experiment with rhythm, harmony, and melody” (Benitez 2007: 1). In this compositional laboratory, Messiaen was able to realize the previous audiation of melody and harmony he presented in his organ works. But most significantly, Messiaen’s fixation with time and eternity was realized in improvisation and the organ, with its ability to sustain sound indefinitely. Thus, the improvisations on the organ allowed Messiaen to audiate in the world of time and eternity. “As an improviser, Messiaen recognized that the organ’s seeming power to sustain sound endlessly allowed him to explore relationships between time and eternity by experimenting with duration” (Benitez 2007: 1). This fascination with time led to the development of thematic material within an improvisation, allowing Messiaen to realize an audiated idea of eternity.

As aptly presented in the work of Jackson (2018), musicians who improvise categorize musical structures by developing their functional significance rather than focusing on the localized chord-to-chord progressions. “The improvising musician will see and realize many different representations of music structure including notation with chord symbols that indicat[e] the collection of notes to be played” (Jackson 2018: 68). He continues his discussion regarding musicians, adding that improvisers “have a stronger response to the stimuli with a functional deviant compared to those with an exemplar deviant, as the functional deviant contains novel information, rather than reconfigured information. Result[s] from the behavioral data showed that improvisation experience significantly correlated with quicker and more accurate responses to functional deviants” (Jackson 2018: 69).

The juncture of neural and musical constructions involves cataloguing.

This composite directs one to the prospect of networks with sections of the brain involved in perceptual regulation, such as the anterior cingulate cortex and the medial prefrontal cortex, which are linked to conscious judgment of stimuli, interior incentive and recompense, and conflict checking (Cohen et al. 2000). These positions are specifically situated in intangible neural activity. Expanding the arena to embrace visual stimulus, as much of Messiaen’s music does, relates to color, and those cognition zones are correspondingly locatable. “Functional magnetic resonance imaging (fMRI) activation associated with a visual motion perception task was used to characterize local changes in brain activity at baseline and after training” (Chaieb et al. 2014: 195).

Synesthesia and Cognition

Synesthesia is a perceptual phenomenon in which stimulation of one sensory or cognitive pathway leads to automatic, involuntary experiences in a second sensory or cognitive pathway (Cytowic 2002). Synesthesia is the creation of a sensation that is associated with one bodily sense by stimulation of an alternative sense or part of the body. Chromesthesia, sound to color synesthesia, is experienced by Olivier Messiaen and Mikalojus Konstantinas Čiurlionis, as by many other musicians and artists such as Vincent van Gogh, Alexander Scriabin, Billy Joel, Tori Amos, Duke Ellington, and Franz Liszt. In fact, 4% of the population experiences

some form of synesthesia. Synesthesia is a joining of sensation. Having one type of synesthesia, like color/sound, increases the chance of having a second, third, or fourth type. It is a trait, not a disorder. The hyperconnection of brain neurons is involved with synesthesia.

Cognition can be understood as moments of ordered configurations of small links of neurons, and less emerging purposes can be understood as the consequence of the hierarchical arrangement of small networks. According to Cook (2002: 5), “three behaviors most clearly distinguish human beings from other animal species – language, tool-use, and music – and all three involve functional asymmetry of the cerebral hemispheres.” With magnetoencephalography, both the right and left hemispheres demonstrate diverse areas that are activated with language and musical conditions. The debate over the reality of left-right asymmetries in history has dropped in and out of fashion over more than 150 years (Cook 2002: 8–9). Currently, it is vital for an understanding of human cognition. The supreme complexity of the human mind, to which artificial intelligence is often compared, far outweighs existing artificial intelligence systems. “As complex as the neurophysiology of information-processing in multimillion neuronal networks may actually be, cognition is often considered among the so-called easy problems of the human mind for the simple reason that basic logical functions and memory mechanisms are theoretically well-understood and can be implemented in computers using simulated neurons. ... Even the largest, most complex and most expensive artificial systems do not rival the functions of primitive living brains, so that no practitioner of modern AI would claim that anything approaching the full complexity of ant (much less, human) cognition has been implemented” (Cook 2002: 158).

It is curious that both Messiaen and Čiurlionis had this trait of synesthesia. Čiurlionis, also a painter, clearly brought his painting and imagery into his music. Messiaen appreciated painting, but he was taken by the colors that were formed by the sun shining through stained glass. According to Cytowic (1989: 51), “synesthesia represents a fundamental quality of sensation.” Early development of children can teach us much about sensation and how cross talk within the brain results in a synesthetic experience. Research suggests that “all neonates are synesthetic, only to lose the trait around the age of three months. One possibility for why the cross talk that produces synesthesia exists is that the normally occurring excess connections are insufficiently pruned for some reason and accordingly persist in the adult” (Cytowic 2018: 225).

Cytoarchitectonic organization describes the nature of the brain and the way it is organized by viewing various sections of the brain as responsible for various sensations and cognitive functions. For example, one cytoarchitectonic method illustrates the cortical mantle sectioned into five forms that exhibit a continuous growth in organizational intricacy and variation. This department of the brain would suggest that synesthesia can be localized in a particular area of the brain – taste is in the frontal lobe, whereas color is further back.

Like a metaphor in which seemingly unrelated things have the ability to link other unrelated things, seeing the similar in the dissimilar, sensory coupling, or “cross-talk exists in all brains except most of us are unaware of it. An altered dynamic between excitation and inhibition brings that cross talk to the surface in synesthetes. And synesthesia exists not in any one place but as an event triggered dominate process in a distributed system” (Cytowic 2015). Senses are neither discrete nor compartmentalized.

As Kadosh et al. (2009) suggested, the regular dispersal of linguistic-color associations indicates that synesthesia is recognized in an unlimited number of ways very much comparable to a learning progression. “Current research suggests that synesthesia and cross-modal matching may be a kind of tacit knowledge. Generally, the boundaries between synesthetic and non-synesthetic associations are hard to establish” (Rogowska 2015: 31). For synesthetes, phonemes can stimulate taste or color, and graphemes also can stimulate taste or color. “Metaphors often take the form of cross-sensory associations (Cytowic 2009: 163). Yet non-synesthetes, understand “sharp cheese” or “sweet person” or “what’s your taste in music.” Movies persuade us to believe that the people on screen are talking when really one speaker behind the middle of the screen, three speakers on each side and a subwoofer create the “impression” that speech comes from those on the screen. Inwardly we are all synesthetes, but outwardly we are unaware of the couplings that are happening all the time.

The standard view of how the brain works is based on the idea that there is a linear flow of information to discrete parts of the cortex, and this is coupled with the notion “that there is a hierarchy which makes the cortex supreme, dominating everything else below it” (Cytowic 1993: 18). The second part of the standard view of the brain is the localization of function. “The occipital lobe is concerned with vision, the parietal lobe with touch, and the temporal lobe with hearing” (Cytowic 1993: 19). There is an elaboration of neural building blocks. “This is how discrete faculties supposedly evolve out of a less specialized brain. That is, with increasing phyletic development the senses should become more physically separated. According to this scheme, synesthesia should not exist” (Cytowic 2002: 220). But it does, and this is because, as Cytowic states, there

are cortical columns of various neurons that are constructed in various layers that “connect” with neighboring columns. “These facts of neuronal organization – vertical and largely local – are hard to reconcile with speculations that synesthesia results from ‘connections’ or ‘cross-wiring,’ possibly retained by neoteny, occurring at the border between sensory entities” (Cytowic 2002: 225). It is “these three variables of cytoarchitecture, extrinsic connections, and function that define the cortical area” (Cytowic 2002: 227). It takes more than the standard view of the brain to explain synesthesia. The cross talk between columns of neural networks connecting/communicating with other areas begins to flesh out the workings of synesthesia. The cognition needed to suggest understanding is yet another level of complexity.

Messiaen

In 1986, Claude Samuel spent a significant time questioning and talking with Messiaen. During these conversations, Messiaen spoke freely about his synesthesia. “I am all the same affected by a sort of synesthesia, more in my mind than in my body, that allows me, when I hear music and also when I read it, to see inwardly, in my mind’s eye, colors that move with the music; and I vividly sense these colors, and sometimes I’ve precisely indicated their correspondence in my scores” (Samuel 1986: 40). Messiaen was acutely aware of the audiation he underwent in his compositional process. He stated, “when I hear a score or read it, hearing it in my mind, I visualize corresponding colors which turn, shift and combine, just as the sounds turn shift, and combine simultaneously” (Samuel 1986: 37). Here Messiaen clearly discusses audiation and its relation to synesthesia. These visualized colors correspond to harmonies. “Truthfully, one cannot talk of an exact correspondence between a key and a color; that would be a rather naïve way of expressing oneself because, as I’ve said, colors are complex and are linked to equally complex chords and sonorities” (Samuel 1986: 42). The complex chords devised by Messiaen come from his musical language, which is rather strict in the choices made in composition.

For Lerdahl, musical grammar consists of two components, compositional grammar and listening grammar. Regarding improvisation, “a natural compositional grammar depends on the listening grammar as a source. Otherwise the various musical functions could not evolve in such a spontaneous and unified fashion” (Lerdahl 1988: 101). The relationship between improvisation and composition is complex to say the least. Jackson articulately presented in his studies on music improvisation: “As music improvisation is a practice that requires the practitioner to negotiate a number of harmonic subspaces as they are pressed against the precipice of time, experimenters have the added challenge of coming up with questions that speak to the neural responses to the act of improvising in expert musician and non-musician groups, and the neuro-structural responses of improvisers in improvisatory and non-improvisatory situations” (Jackson 2018: 23).

La Trinité was a workshop of sonic ideas where Messiaen’s improvisations later were controlled and disciplined by the self-imposed methodology employed in his compositional system.

While discussing his Modes of Limited Transposition, Messiaen states, “Mode 2 revolves around certain violets, blues, and violet-purple, while Mode 3, in its first transposition, corresponds to an orange with red and green pigments, to specks of gold, and also to a milky white with iridescent, opaline reflections” (Samuel 1986: 42). These undulating colors that are present in Messiaen’s Modes of Limited Transposition become the framework for his melodic development. With the melodic development, seen by Messiaen as a supreme aspect of music, supported by the continuous shifting of colors formed by his harmonies, he paints a masterpiece of colorful music.

Conclusion

Audiation and its relationship to improvisation, composition, and synesthesia is presented in the research of Kratus. According to Kratus (1994: 16), “I view compositional products as fixed, replicable sequences of pitches and duration and compositional process as the fluid thoughts and actions of the composer in generating the product.” When Messiaen heard music in his head or went to the organ to improvise with his melodic and harmonic colors, these three elements were the building blocks of his organ compositions. The study of cognition as it relates to synesthesia and improvisation, in many ways, is still in its infancy. The complexity of the neural networks and the cross-wiring that facilitates synesthesia along with the use of improvisation to test or examine sonic possibilities is but one possible approach to composition. Understanding the organ music of Messiaen can lead to a deeper understanding of improvisation, synesthesia, and audiation.

Works Cited

- Baldwin, Carryl L. (2012). *Auditory Cognition and Human Performance: Research applications*. Boca Raton, FL: CRC Press.
- Benitez, Vincent P. (2007). Messiaen and Improvisation. In: *Dutch Journal of Music Theory*, No. 2, Vol. 13: 1–14.
- Bennett, S. (1976). The Process of Musical Creation: Interviews with eight composers. In: *Journal of Research in Music Education*, Vol. 24: 3–13.
- Brett, Thomas (2017). *John Cage and Improvisation*. Brettworks. <https://brettworks.com/2017/01/18/john-cage-and-improvisation/>
- Chaieb, L.; Saiote, C.; Paulus, W.; Antal, A. (2014). *The Stimulated Brain: Cognitive enhancement using non-invasive brain stimulation*. Edited by Roi Cohen Kadosh. London: Elsevier/Academic Press.
- Cohen, Jonathan D.; Botvinick, Matthew; Carter, Cameron S. (2000). Anterior Cingulate and Prefrontal Cortex: Who's in control? In: *Nature Neuroscience*, No. 5, May, Vol. 3: 421.
- Cook, Norman D. (2002). *Tone of Voice and Mind: The connections between intonation, emotion, cognition and consciousness*. Philadelphia: John Benjamins.
- Cytowic, Richard E. (1989). *Synesthesia: A union of the senses*. New York: Springer.
- Cytowic, Richard E. (1993). *The Man Who Tasted Shapes: A bizarre medical mystery offers revolutionary insights into emotions, reasoning, and consciousness*. New York: G. P. Putnam's Sons.
- Cytowic, Richard E. (2002). *Synesthesia: A union of the senses* (2nd ed.). New York: Springer.
- Cytowic, Richard E. (2015). *Synesthesia's Challenge to Brain-Inspired Computing*. Lecture by Dr. Richard Cytowic: Cognitive Computing Colloquium. IBM Research, San Jose, CA. <https://cytowic.net/speaking/>
- Cytowic, Richard E. (2018). *Synesthesia*. Cambridge, MA: MIT Press.
- Cytowic, Richard E.; Eagleman, David M. (2009). *Wednesday is Indigo Blue: Discovering the brain of synesthesia*. Cambridge, MA: MIT Press.
- Gordon, Edwin E. (1976). *Tonal and Rhythm Patterns: An Objective Analysis*. State University of New York Press, Albany.
- Gordon, Edwin E. (2012). *Learning Sequences in Music: Skill, content, and patterns*. Chicago: GIA.
- Jackson, Tyreek A. (2018). *The Improviser and the Improvised: The relationship between neural and musical structures, and the role of improvisation*. Ann Arbor: ProQuest.
- Kadosh, Roi C.; Henik, A.; Walsh, V. (2009). Synaesthesia: Learned or lost? In: *Developmental Science*, No. 3, May, Vol. 12: 484–491.
- Kostagiolas, P.; Lavranos, C.; Martzoukou, K.; Papadatos, J. (2017). *The Role of Personality in Musicians? Information seeking for creativity*. Information Research. <https://www.researchgate.net/publication/309636079>
- Kratus, John (1994). Relationships Among Children's Music Audiation and Their Compositional Processes and Products. In: *Journal of Research in Music Education*, No. 2, Summer, Vol. 42: 115–130. https://www.jstor.org/stable/3345496?&seq=1#metadata_info_tab_contents
- Lerdahl, F. (1988). Cognitive Constraints on Compositional Systems. In: J. A. Sloboda (editor). *Generative processes in music* (231–259). Oxford: Clarendon Press.
- Rogowska, Maria A. (2015). *Synaesthesia and Individual Differences*. Cambridge: Cambridge University Press.
- Samuel, Claude (1986). *Olivier Messiaen Music and Color: Conversations with Claude Samuel*. Translated by E. Thomas Glasow. Portland, OR: Amadeus Press.
- Sessions, R. W. (1970). *Questions about Music*. Cambridge, MA: Harvard University Press.

Audiacija ir improvizacija bei jų santykis su sinestezija Oliverio Messiaeno vargoninėje muzikoje

Santrauka

Audiacija – tai gebėjimas matyti, girdėti, išivaizduoti skambesį, kartu tai ir kognityvinis muzikos procesas, kuris yra improvizacijos ir jos ryšių su komponavimu pamatas. Oliveris Messiaenas, kaip M. K. Čiurlionis ir dar 4 proc. visos žmonių populiacijos, naudojo ribotų transpozicijų dermes spalvinių garsovaizdžių tapybai. Būdamas puikus vargonininkas improvizatorius Messiaenas gebėjo ištransliuoti harmoninius, melodinius ir ritminius komponentus, tūnančius jo galvoje. *Méditations sur le mystère de la Sainte Trinité* vargonams (1969) yra garsinių idėjų studija, kurioje užrašytos Messiaeno improvizacijos. Vėliau jos buvo sutvarkytos pagal jo paties nusistatytą komponavimo sistemą.

Cerebrinių improvizacijos ir sinestezijos procesų suvokimas padeda labiau įsigilinti į Messiaeno vargoninių kūrinių subtilybes. Sinestezija ir suvokimas – kompleksiniai reiškiniai, kurie iki šiol nėra visiškai aiškūs. Citoarchitektonika (sistemine neuronų padėtis) nusako smegenų veiklos principus – kokios atskiros smegenų sritys yra atsakingos už skirtingus potyrius ir kognityvines funkcijas. Sinesteziją nulemia anomalinis signalų perdavimas tarp skirtingų neuronų tinklų, atsakingų už įvairius potyrius.

Messiaenas, išgirdęs muziką savo galvoje (taip pasireiškia sinestezijos simptomai), vargonais improvizuodavo melodinėmis ir harmoninėmis spalvomis. Tai ir yra pagrindinė jo vargoninių kūrinių konstrukcinė medžiaga. Suvokimo, sinestezijos ir improvizacijos ryšio studijos yra labai jauna tyrimų sritis, o neuronų tinklų ir sinesteziją nulemiančių jų anomalinių ryšių gretinimas su improvizacija kaip įrankiu garsinėms išraiškoms priemonėms tyrinėti yra tik viena iš daugelio komponavimo alternatyvų. Įsigilinimas į Messiaeno vargoninę muziką gali padėti geriau suprasti tiek improvizacijos, tiek sinestezijos, tiek audiacijos subtilybes.

**“For me the greatest measure of a work of art is
if it makes me feel uncomfortable or excites me sexually”:
A Lacanian Reading of Michael Finnissy’s *Verdi Transcriptions***

Abstract. This project attempts a Lacanian reading of Michael Finnissy’s *Verdi Transcriptions*. In doing so, it explores how the work engages with questions regarding notation and audiative apprehension.

It begins by examining how a contemporary Lacanian musicology might proceed: by reading Lacan through a Jamesonian Marxism to understand Lacan’s concepts as historical effects rather than essentialist descriptors.

Having established this, the study then uses Lacan’s concept of the Imaginary to consider some of the ways in which Finnissy exploits audiative imagination and musical memory. Stylistic conceits are related to musical details to determine the work’s aesthetic effects: that our abilities and tendencies to organise unities through audiation are problematised and deconstructed whilst being employed toward a dramatic interplay between the source material and its development.

Lacan’s concept of the Symbolic is then applied to consider the historical meaning of Finnissy’s notation. The composer’s approach is contrasted with his predecessor Busoni and his contemporary Brian Ferneyhough; this shows the significance of his particular methodology and reveals its subtle understanding of the relationship between tradition, process and originality.

In this way, the study hopes to show the possibilities of a dynamic Lacanian musicology which, through a Marxist historicisation, is able to enhance a work (or our understanding of it) on its own terms rather than cataloguing its elements; similarly, the Lacanian concepts themselves are developed through an encounter which produces new insights into their interpretive potential. Finnissy’s art emerges as a profound reply to contemporary historical forces regarding tradition and the individual, subjectivity and its determination: one where individual insight and originality are produced through their paradoxical rejection.

Keywords: Michael Finnissy, *Verdi Transcriptions*, Giuseppe Verdi, Jacques Lacan, Frederic Jameson, Karl Marx, Imaginary, Symbolic, Real, Music, Piano, Transcription, Postmodernism, Marxism, Psychoanalysis, Lacanianism, Ian Pace, Sean Homer, Dylan Evans, Theodor Adorno, Roger Redgate, Brian Ferneyhough, Slavoj Žižek, Bert Olivier, Kenneth M. Smith, Reilly Smethurst, The Beatles, Alexander Zemlinsky, Jean Sibelius, Luciano Berio, Immanuel Kant, Martin Heidegger.

1. Introduction

Michael Finnissy’s *Verdi Transcriptions* is a work for solo piano composed between 1972 and 2005 published first as a premature 1995 torso and now as a completed cycle of four books. The piece is marked by a use of quotation in that, instead of generating material through audiative imagination, processual logic, aleatorical operation or otherwise, the composer begins by taking an excerpt from the works of Giuseppe Verdi as a found object which is then transformed through various compositional processes (Ian Pace 1997; 2005). Finnissy (2005) himself places such an approach in a tradition of procedures which stretches from Duchamp to Warhol and, in its exploration of the implications of a culture where the weight of canonical memory effects its own atemporal negation, incorporates a number of extra-musical concerns into its structural mechanics. In the consideration of these, this study hopes to show the possibilities of a redeployed Lacanian musicology: by historicising the concerns of Lacan and Finnissy through a Jamesonian Marxism (Frederic Jameson 1981; 1991) whereby Lacan’s concepts denote the emergence of superstructural symptoms rather than essentialist categories of human experience. An attempt to reflect on the possibilities of musical significance, this study is indebted to Ian Pace’s (1997; 2005) penetrative analyses of Finnissy’s music, as well as interpretations of Lacan’s diverse thought by Dylan Evans (1996) and Sean Homer (2005). Though for reasons of scope this study contents itself with an enquiry into the unfinished 1995 publication, the meditations and conclusions were derived from considerations regarding a performance by Pace (2016) of the 2005 work to which, being on features of the work’s core philosophical and stylistic concerns, it is held they are equally relevant.

2. On Lacanian Musicology

Lacan’s almost complete silence upon music has not deterred a body of work emerging which Kenneth M. Smith (2011: 353–354) has championed as an effective new branch of music criticism. In a survey of existing approaches and manifesto for his own, Smith serves inadvertently to summarise the two primary issues with this field: on one hand, the misapplication of concepts, which he minimises, and on the other, the contextual impropriety of their use, which he repurposes as a strength. The former, “that Lacan’s ideas are employed on an ad hoc basis in order to explicate compositional ideas” (Smith 354), refers to the indiscriminate reification of the Lacanian orders of the Real, Imaginary and Symbolic into mere empirical descriptors: Lacan’s vitally Heideggerian project of stressing the process over the object is undone, with these concepts becoming instead

formal categories of aesthetic organisation through which a composition's elements can be catalogued. Thus when David Schwarz (1997: 23–27), in his work on The Beatles' (1969) "I Want You (She's So Heavy)", or Smith (2010) himself on Zemlinsky's (1921) use of quartal harmony in *Der Zwerg* attempt to locate the Lacanian Real in an element which clearly functions within an artwork's system of signification, the concept of the Real, though useful within that particular critique, becomes otherwise meaningless. Reilly Smethurst (2017) makes this point rather more forcefully, going so far as to contend that a serious Lacanian musicology will only be founded by an entire rejection of Smith's approach (264), which he (248) portrays as being marked by the false conflation of Lacan with Žižek and a fundamental confusion regarding the concepts' meaning.

What unites these opposing arguments is their attempt at fixing an encyclopaedic stability. Indeed, both Smethurst's prescriptive return to the texts themselves and Smith's naive systematisation of their relevant components find contemporaneous parallels across the humanities. Such anxieties should be read more generally against what might banally be termed the end of Postmodernism, and the crises this implied for certain modes of thought. In Sokal and Bricmont's 1997 work *Intellectual Impostures*, a useful determiner of that shift in periodisation, Lacan is the first figure to be interrogated and exposed as the flagship Postmodern charlatan. The conclusion offers a critique of "the extreme privilege [Lacan and his disciples] accord to 'theory' (in actual fact, to formalism and wordplay)" (34), claiming that Lacan's use of a discourse neither logical nor entirely poetic in its function left it implicated as "nothing less than a new religion" (35). Leaving aside the obvious irony of one (pair of) writer(s) critiquing another's reasoning through argument by implication and false dichotomy, their nomination of a Lacanian "Secular Mysticism" (34), when decontextualized from its somewhat absurd origins, provides a practical new perspective for engaging with this philosopher: that is, Lacan as a secular "structural effect," and Lacan as the dynamic, creative origin of a body of theory that, in its recent, more Catholicised use through the lens of Žižek's (1992) simplified pedagogy (or, indeed, through the prospect of intra-disciplinary fixing), threatens meaninglessness by way of standardisation. Concepts which are themselves dependent upon a Marcusean multi-dimensionality become useless when reified into empirical categories itemising various structural instances, and impoverished when fixed to a certain application.

This brings us to the second of the two problems implicit in Smith's (2011: 354) advocacy: the de-historicised relationship drawn between Lacan's ideas and, via Wagner and Schoenberg, an essentialist "human relationship to music." Of course, this is a problem that with Lacanian theory itself rather than any misapplication: criticisms of Heidegger's failure to historicise *Dasein* fall equally upon Lacan's psychoanalytic development of that phenomenological tradition. It might seem obvious that Lacan's divided subject, his essentialist notion of alienation, let alone the uncanny felicity of his thought to the art-form of cinema, would figure him as a defining critic of the late capitalist condition. And yet applied Lacanianism commonly implements historically determined concepts in the analysis of pre-modern works. With reference to the previous point regarding the assimilation and de-radicalisation of these concepts, it is vital to maintain that modes of thought which insist upon the construction of perspectives should continue to emphasise temporal context as a vital constituent of that which constructs.

Therefore, reading Lacanian theory via Lacan's own insistence on a "materialism of the signifier" (Evans: 107; Lacan 1988: 40–52), in that his conception "involves a certain materialism of the elements in question, in the sense that the signifiers are well and truly embodied, materialized" (Lacan 1993: 289), and through Jameson's (1981: 66) dictum that "we can think abstractly about the world only to the extent that the world has become abstract," allows us to resolve both these issues: firstly by seeing psychoanalysis and Lacanian thought as contingent upon the development of the subject under capitalism, as Jameson (1981: 61–66) argues in *The Political Unconscious*, and secondly by figuring Lacan's body of work at the intersection of the ideological logic and utopian promise that Postmodern culture constitutes. Again following Jameson (1991: 25–27) we can define that culture through what he terms a "Lacanian Schizophrenia" to chart both the basis and impact of Lacan's work across society at large. If, then, Lacan's "Secular Mysticism" can be seen as the ideological-utopian expression of this historical moment, it can form both the backdrop against which to examine Finnissy's music, and the tools with which to do so: Lacanian analysis, as a central paradigm of the Jamesonian interpretation of the Postmodern condition, can be applied to Finnissy's approach to show how the latter, struggling with the same socio-historic antagonisms as Lacan, contains and transcends those within his artwork.

3. The Imaginary

Before turning to the mechanics of this, a brief summary of this study's understanding of Lacan's concepts shall be hesitantly offered in the interests of introductory clarity. Lacan's human condition is that of an essentially alienated individual which then creates a fictional, alienating unity through an Imaginary identification with its mirror image, which is then in turn divided by its inscription into the Symbolic order of language; what Lacan then terms "the Real" is that which corresponds to the leftover elements of this process, the pre-Oedipal immediacy of life, symptomatically experienced only through trauma at moments of Symbolic opening or disintegration (Evans; Homer; Lacan 1977; 1988; 1993; 2006: 6–50, 75–81; Steven Z. Levine 2008; Žižek 1989). Vital to this investigation is, specifically, the relationship between a fictive Imaginary unity on one hand, and, on the other, a Symbolic determination which both frees us from that alienation whilst simultaneously fixing our subjectivity through the restrictions of its discourse.

To begin with the implications of the Imaginary order which, to emphasise, Lacan (1993: 146) defined by its constitutive alienation: in that disparity of experience is replaced by externally given unity. Because of this, Evans (82) argues that as an extrinsic fiction overlying complex actuality, the realm of the Imaginary indicates and provokes the processes of false consciousness and reification. This leads Bert Olivier (2005: 142), in his excellent outline of the possibilities of a Lacanian musicology, to show that, because the Imaginary constitutes the human tendency to hypostatise processes into objects through our "alienating identification with various Imaginary constructs" such as, for example, political ideology, we can critique musical motifs which invite the listener's identification through this concept. Crucially, he (151–152) extends this idea to show how such motifs may themselves "function as auditory loci of identification for listeners" which "tempt one to adopt a position which is alienating in so far as it effectively precludes further, or subsequent, positions of identification with different (perhaps liberating) 'sound-images,'" arguing that "to be 'caught' in the web of an identification of this kind at the level of the Imaginary is tantamount to what Lacan describes as being enclosed in the rigid 'armour of an alienating identity.'" Though the example that Olivier gives here is of Sibelius' (1905) *Finlandia* with reference to its functions of nationalist ideology, we can invoke Adorno to show the same process at work in the culture industry's exploitation and subsequent transformation of art music under late capitalism. In a work fundamental to Jamesonian (1991) analysis, Adorno (2006: 134) explains how, through uncritical listening habits fostered by the technological developments which determine music as background noise, musical style has become reified and separated from its content. Thus, in his analysis of Stravinsky, he argues how certain works reveal the irreconcilable breach between the subject and that in music which stands opposed to it as an objective element: the idiom... The subject that in music is prohibited from speaking of itself ceases actually to 'produce' and contents itself with the empty echo of an objective musical language that is no longer its own... Through the rigorous manipulation of the hollowed-out musical language, reduced to wreckage ... a second, phantasmagorical and regressive musical language [is brought into existence].

By situating the effects of the Lacanian Imaginary within the context of Adorno's critique of late capitalist culture we can appreciate how certain distinguishing features of a composer's characteristic sound-world come to act as a unifying sound-image which alienates the rich complexity of their practice, with historically determined styles supplanting the very interventions within those styles which gave the composition meaning.

It is precisely the persistence of this socio-historic Imaginary unity which Finnissy exploits in his transcriptions through the extra-Symbolic effects of the choice of compositional source material: that is, their absent persistence as Imaginary wholes. This study argues that: through the audiation of canonical memory ensured by the subsumption of the source-music into the culture industry and the resultant alienating unities produced by this, the traces of the Verdi material work to engender a ghostly presence which haunts the music in an absent conceptual obligato. This mis-hearing and mis-remembrance works with the various emergences of untransformed quotation to create an uncanny instability through which one can never be entirely sure what is being heard. This in turn serves to problematise the very unity which maintains this illusion. In doing so, the listener's interpellated habits of alienating audiation are surpassed for an immediate experience of the music on its own terms. Take by way of an example the opening of the piece (Finnissy 1995: 1–2), where the material is at its most abstract and transformed (Pace 2005). Despite the brutality of the register, density of the clusters and complexity of rhythmic transformations, the tertial harmony and dotted rhythms, when heard through the work's programmatic conceit as a horizon of expectation, are enough to create the audiative illusion of hearing something beyond what is being played even – indeed, especially – where it does not exist. The Lacanian idea of the 'lack' as being constitutive of identity is here affirmed in that, as with the paradoxical

alienation of the mirror stage, it is the individual's lack of unity which determines that very unity. It is this which creates the primary drama of the piece, with the physical immediacy of the music existing in counterpoint with the Imaginary unity of the works it is derived from. The complexity of such an interplay works to deconstruct those listening habits from which it emerges, opening up a space for novel, personal encounters with the work and its source material.

This problematisation of audiation by both projecting and interrogating an extra-musical Imaginary unity through Symbolic means extends throughout the work. It is obviously at its most pronounced when the implications we have just looked at manifest themselves as more direct quotations. Section V (23–28), for instance, consists of an Ivesian counterpoint between the functionally harmonic source-music and its abstract commentary (Pace 2005); it is here the piece is most obviously working in the Postmodern tradition of quotation and satiric superimposition as Berio (1968) in *Sinfonia*. However, in contrast to the orchestral colour and dramatic vocality available to such a piece, the texture of the piano and registers employed here impel the relative insistency of the commentary to create a form of depth perception: between the quoted Verdi, its Godowskian re-writing (Pace 2005), its blurred outlines and its erased absence which then (as we have seen) works to project its own phantasmal continuation. This weaponisation of Imaginary unities into the agents of their own deconstruction is further supported by analysis at a technical level. For instance, Finnissy (1995: 8–11; 47; 52–53; 58; 75; 98–99) combines two lines in a single register so that they resist audiation into two mutually exclusive unities, instead interrupting and problematising one another in a manner that can be seen as relational to and exemplifying of the source material and its serial transformations. Similarly, the composer (30; 48; 50; 99–102) will often split a single line up across multiple octaves, taxing our ability to audiate it as a single unified whole. A similar effect is achieved through the use of a textural pointillism (18–22). Our learned, alienating tendencies to audiatively organise these lines into separate Imaginary unities are challenged by the deconstructive power of these processes, forcing us to a more direct and immediate confrontation with the music itself. It is striking that this is ultimately the product of the work's referentiality; such a dialectic can continue to be traced through another aspect of Lacanian theory, as we shall see.

4. The Symbolic

Lacan's concept of the Symbolic order further illuminates concerns regarding influence and originality within the *Verdi Transcriptions*. For Finnissy, transcription and composition do not form neat categories of difference but, in his contemporary historical moment, become radically commingled. As he states in an interview with Christopher Fox and Ian Pace (1997: 2–3):

Transcription is not simply 'writing down', but creating webs of allusions, playing with sub-texts, cultural codes; it's a discourse on the 'already extant' if you care to try to differentiate it from 'free' composition ... I don't [see my work as merely a form of representation] but I'm never sure when the composition starts and when the transcription as such stops. Because I don't have a particular fetish any more for generating original material, I often, even in pieces I don't acknowledge as transcriptions, take the material from somewhere else because how can you have an original idea in something as socially determined as music? All the notes have been used before, so at best you can deceive yourself that you are starting from scratch, but you never are. I wouldn't say that if I started a transcription, deriving the material from Machaut, Beethoven, Wagner, that I view the composition with that material any differently. Composition remains the same business of discovering what the object is and revealing what your perceptions are, what your insights are about the object.

Alongside an exemplification of the Lacanian transition from the Imaginary to the Symbolic, we can here read Finnissy's comments as articulating the final position of the move from the Kantian transcendental subject and its unification of experience, to the Heideggerian subject that perceives a limited part of an external world, to the Lacanian turn whereby that world itself becomes a pre-given Symbolic expanse of what Lacan refers to as the big Other, the system of signification which speaks through us (Homer 44–45): as Lacan (1977: 207) argues, "a signifier is that which represents a subject for another signifier." What is interesting about Finnissy's compositional approach is how originality is seen to emerge through an intersection between the composing subject and the trans-subjectivity of the compositional process, in that it is the product of a historically determined tradition of Symbolic discourse. Though the big Other of the Symbolic may be a "radical [anteriority] which mediates our intersubjective relationships" (Evans 202), the possibility of their mediation and construction points the way through and out of that confining interiority. Thus Olivier (145–146) holds that the only way to avoid entrapment within the Imaginary's illusion is in fact through a renunciation

of the possibility of any homegrown originality: by adopting the subjective position of the Symbolic register rather than the alienating ego-position of the Imaginary. For Finnissy, this means that, while we cannot audiatively imagine a musical idea without it being in some way interpellated through the social determination of the big Other of the Symbolic order, we are able to go beyond the confines of our determined subjectivity by enlisting the Symbolic: that is, for composers, the processes which extend beyond the limits of our socially determined imaginative and Imaginary abilities.

In order to fully appreciate the significance of this turn we can compare Finnissy's approach with that of his forbear Busoni. In his trailblazing work *A sketch of a new aesthetic of music*, Busoni (1962: 85) presents the unity of the musical idea as the Real of the late Romantic aesthetic. The composer's audiative imagination is seen to be the Romantic locus of authentic, pre-Symbolic insight which is necessarily qualified through its inscription into the Symbolic order. Notation, on the other hand, is presented as the transformative filtration of that individual unity into a determined textuality. Busoni (84) argues that such a unity can only be restored through the insight of the performer into the extra-notational concerns which the work must still contain. This foregrounds a theory whereby creative, living processes become paradoxically dependent upon their objectification into a notational document, with the Romantic individual forming the cipher between truth (the inspiration) and knowledge (its inscription). These paths can be represented thus:

$$\begin{array}{c} \text{Process} \rightarrow \text{Object} \rightarrow \text{Process} \\ \text{Real} \rightarrow \text{Imaginary} \rightarrow \text{Symbolic} \rightarrow \text{Imaginary} \rightarrow \text{Real} \end{array}$$

Finnissy intervenes in Busoni's procedure to replace audiative imagination with canonical memory as a means of acquiring this same insight into the extra-Symbolic. Busoni's anxieties regarding the restrictive conditionality of transcription here become the location of a post-Structural attempt at originality through an inversion of the original formula:

$$\begin{array}{c} \text{Object} \rightarrow \text{Process} \rightarrow \text{Object} (\rightarrow \text{Process}) \\ \text{Symbolic} \rightarrow \text{Symbolic} \rightarrow \text{Imaginary} \rightarrow \text{Real} \end{array}$$

We can see this at work in Finnissy's use of a notation which contains the negation of its own constrictive tendencies. That is, Finnissy's notational language which, though inherited rather than devised, and determined by systemic means realised through a system of traditional, determined and trans-subjective language, still, in its demands upon the performer, effects a process which reaches beyond Symbolisation. As Roger Redgate (2018) argues, Finnissy (1995: 31; 67–73; 100–109) deliberately “blurs precision” through, for instance, long complex irrationals interwoven with grace notes, or lines of grace notes, and complex rhythms which reach across the full length of the keyboard: such a notation produces the chaotic effects with which its constrictive dictates are transcended. Crucially, this is accomplished through those constrictions rather than in their evasion in a vague experimentalism. Notice the historical transition here: the location of emancipatory power moves from the individual composer as Romantic artist to the canonical material as found object; and from the individual performer to the score-text itself. Arguably, if anything can be said to define New Complexity it would be this particular concern with leveraging notation against itself to open up individual insight within a world of nigh-total determination. Of course, in factors of definition differences become all the more crucial: Finnissy's approach to this issue distinguishes him from his contemporary Brian Ferneyhough in his use of notational complexity as formal signifier rather than general aesthetic of the work. Redgate explains how:

From a performer's point of view, they couldn't be more different. With Ferneyhough's music, working through the notation and grasping the complexity of it is a vital part of forming an interpretation. Finnissy's music doesn't have the layers of complexity that Ferneyhough's does. The notation isn't about the complexity: it's about changing the perspective of the musical image for the performer and the listener.

These shifts in the focus of the performer's approach to the material, and the resultant effect upon the listener, are used to shape the form of the piece: parallel to the work's revelation of its source material in an uneven but distinct programmatic trajectory runs Finnissy's problematisation and accentuation of this through a chaotic indeterminacy. This is effected by a complex notation which, as we have seen, works to reveal and emphasise that which exists beyond Symbolisation.

5. Conclusion

The possibilities for further investigation within this reading are extensive, particularly with regard to Finnissy's approach to musical temporality; however they remain out with this particular project. Though limited, this study hopes to have demonstrated the possibilities of a Lacanian musicology which, through a Marxist tradition, serves to illuminate and enrich aspects of Finnissy's music rather than enlisting the work in a demonstration of Lacan's ideas or reducing those ideas to an index of the work's elements. Such a method has shown how the *Verdi Transcriptions* achieves originality and immediacy through a subtle use of tradition and referentiality in a unique answer to the Malthusian repletion of the late 20th century and the early 21st, one distinctly at odds with contemporary approaches which uncritically employ quotation for novelty or mere plurality. Of course, it would be foolish to imply that such a reading could ever be exhaustive: Finnissy's music, both wise and ludic, reaches past the possibilities of academic discourse, psychoanalytical, Marxist or otherwise, to engage with the issues that language cannot. Though this study has aimed to show the implications of some of them, the music's insights are, ultimately, its own. Or, as Finnissy (Fox and Pace: 21) argues in the quote that forms the title of this paper, art is measured by something other than musicological judgements.

References

- Adorno, Theodor (2006). *Philosophy of New Music*. Minneapolis, University of Minnesota Press, translated by Robert Hullot-Kentor.
- Beatles, The (1969). "I Want You (She's So Heavy)". In: *Abbey Road*. London: Apple.
- Berio, Luciano (1968). *Sinfonia*. London: Universal Edition.
- Busoni, Ferruccio (1962). Sketch of a New Esthetic of Music. In: *Three Classics in the Aesthetic of Music*. New York: Dover Publications, Inc: 73–102, translated by Dr. Th Baker.
- Evans, Dylan (1996). *An Introductory Dictionary of Lacanian Psychoanalysis*. London: Routledge.
- Finnissy, Michael (1995). *Verdi Transcriptions*. London: United Music Publishers Ltd.
- Finnissy, Michael; Fox, Christopher; Pace, Ian (1997). Conversations with Michael Finnissy. In: *Uncommon Ground: The Music of Michael Finnissy*: 1–42. Aldershot: Ashgate Publishing Limited.
- Finnissy, Michael (2005). *Verdi Transcriptions*. In: *Michael Finnissy, Verdi Transcriptions: Program Note for Performance at Great Hall, King's College London*, Friday December 9th, 2005. <http://openaccess.city.ac.uk/6505/>
- Homer, Sean (2005). *Jacques Lacan*. Abingdon: Routledge.
- Jameson, Frederic (1981). *The Political Unconscious: Narrative as a socially symbolic act*. London: Methuen & Co Ltd.
- Jameson, Frederic (1991). *Postmodernism, or the cultural logic of late capitalism*. Durham: Duke University Press.
- Lacan, Jacques (1977). *The Four Fundamental concepts of Psycho-analysis*. London: The Hogarth Press and The Institute of Psycho-analysis, translated by Jacques-Alain Miller.
- Lacan, Jacques (1993). *The Psychoses: The Seminar of Jacques Lacan*. Hove: Routledge, translated by Jacques-Alain Miller.
- Lacan, Jacques (1988). *The Seminar. Book II. The Ego in Freud's Theory and in the Technique of Psychoanalysis. 1954–55*. Cambridge: Cambridge University Press, Translated by Sylvana Tomasselli.
- Lacan, Jacques (2006/2002). *Écrits*. London: New York, Translated by Bruce Fink in collaboration with Héloïse Fink and Russel Grigg.
- Levine, Steven Z. (2008). *Lacan Reframed*. London: I.B. Tauris.
- Olivier, Bert (2005). Lacan and Critical Musicology. In: *International Review of the Aesthetics and Sociology of Music*. No. 1, June, Vol. 36: 135–158.
- Pace, Ian (1997). The Piano Music. In: *Uncommon Ground: The Music of Michael Finnissy*: 43–135. Aldershot: Ashgate Publishing Limited.
- Pace, Ian. (2005). *Michael Finnissy, Verdi Transcriptions: Program Note for Performance at Great Hall, King's College London*, Friday December 9th, 2005. <http://openaccess.city.ac.uk/6505/>
- Pace, Ian (Pianist) (2016). *Verdi Transcriptions (2005)*, by Michael Finnissy, performance, 1st December 2016, Deptford Town Hall, viewed 1st December 2016.
- Redgate, Roger (2018). Personal Interview, 5th November.
- Schwarz, David (1997). *Listening Subjects: Music, Psychoanalysis, Culture*. London: Duke University Press: 23–37.
- Sibelius, Jean (1905). *Finlandia, Op. 26*. Leipzig: Breitkopf und Härtel.
- Smethurst, Reilly (2017). Say No to Lacanian Musicology: A Review of Misnomers. In: *International Journal of Žižek Studies*. No. 3, Vol. 11: 248–270.
- Smith, Kenneth M. (2010). Lacan, Zemlinsky, and "Der Zwerg": Mirror, Metaphor, and Fantasy. In: *Perspectives of New Music*. No. 2, Summer, Vol. 48: 78–113.
- Smith, Kenneth M. (2011). The Tonic Chord and Lacan's Object a in Selected Songs by Charles Ives. In: *Journal of the Royal Musical Association*. No. 2, Vol. 136: 353–398.
- Sokal, Alan; Bricmont, Jean (1998/1997). *Intellectual Impostures: Postmodern philosophers' abuse of science*. London: Profile Books Ltd.
- Zemlinsky, Alexander (1921). *Der Zwerg, Op. 17*. Vienna: Universal Edition.
- Žižek, Slavoj (1989). *The Sublime Object of Ideology*. London: Verso.
- Žižek, Slavoj (1992/1991). *Looking awry: an introduction to Jacques Lacan through popular culture*. London: The MIT Press.

**„Didžiausias meno kūrinio matas man yra tai, ar jis verčia jaustis nejaukiai, ar jaudina seksualiai“:
lakaniška Michaelio Finnissy „Verdi transkripcijų“ analizė**

Santrauka

Straipsnyje atskleidžiamas lakaniškos muzikologijos potencialas. Čia nesiekama, remiantis analizuojamu muzikiniu kūrinio, išaiškinti, apibrėžti ar pakoreguoti prieštaringas Jaques'o Lacano mintis, taip pat supaprastinti lakaniškas idėjas, kad būtų galima panaudoti jas kaip analizės objekto inventorių. Analizė vykdoma atmetant ir priešpriešinant esamas metodologijas, prieš tai pažvelgus į Lacano idėjas per Frederico Jamesono (g. 1934) marksizmo prizmę. Tokia procedūra išplečia lakaniškų interpretacijų potencialą, nes idėjos išlieka atviros, dinamiškos, priklausomos nuo konteksto.

Čia atskleidžiami „Verdi transkripcijų“ aspektai, kurie taikant kitokius analizės metodus liktų nepastebėti. Tai suteikia pagrindą tolesnei šio kūrinio bei kitų to paties laikotarpio susijusių muzikinių tekstų analizei. Michaelis Finnissy manipuliuoja mūsų istoriškai susiformavusiais psichologiniais įpročiais audijuoti garsinę medžiagą ją suskirstant į aiškius atskirus vienetus. Pasinaudodamas tuo jis sukuria dramatiškus, satyriškus komentarus apie mūsų santykį su muzikos istorija. Jo sudėtinga notacija paliečia opius, su subjektyvumu, tradicija ir originalumu susijusius klausimus.

Reikia pažymėti, kad Finnissy sukuria originalią, individualią muzikinę estetiką per jos pačios antitezę. Norėtume tikėti, kad šios įžvalgos padidins marksistinės krypties požiūrio svarbą, praplės lakaniškos muzikologijos horizontus ir galiausiai išryškins drąsaus, materialistinio Finnissy meno reikšmingumą.

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Maja BOSNIĆ (1985, Belgrade), PhD in Music Composition, is composer of contemporary conceptual music. She is drawn to impossible missions, absurd solutions, limited material, playfulness, uncertain outcomes, treating instruments as ready-made objects of expression and treating real life objects as music instruments. Her first composition lessons took place at the Irish Composition Summer School in Limerick and the Festival of Young Artists in Bayreuth in 2003. One year later, her official composition studies began with prof. Milan Mihajlović at Academy of Arts in Novi Sad (Serbia) and then continued with prof. Roger Redgate at the Goldsmiths University in London (UK), where she received her PhD diploma in 2015. Having been selected for numerous workshops and masterclasses, she had the opportunity to work with many great composers, such as: Simon Steen-Andersen, Chaya Czernowin, Ashley Fure, Johannes Kreidler, David Helbich, James Clarke, Ian Wilson, Nicola LeFanu, Martin O'Leary and Kevin O'Connell. In 2010, in Belgrade, she founded Zabuna, the association that works towards stimulating production and development of contemporary experimental music and organizes various concerts and seminars. Her works *Zabuna on Stage* were performed throughout Europe with the support of Ministry of Culture of the Republic of Serbia, Secretariat for Culture of Belgrade and European Cultural Foundation. She also holds Masters' degree in Music Pedagogy with major in Music Analysis, supervised by prof. Miloš Zatkalik, from the University of Arts in Belgrade.

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Bert VAN HERCK is full time faculty member at New England Conservatory, teaching theory and composition. He holds a PhD from Harvard University where he studied with Magnus Lindberg, Julian Anderson, Chaya Czernowin, Brian Ferneyhough, and Helmut Lachenmann. With Hans Tutschku, he studied electroacoustic music. In the fall of 2006 he was an exchange scholar at Columbia University, working with Tristan Murail. Besides his compositional activities, his interest in music theory has led to presentations at international conferences on the music by Oliver Knussen, spectral music, and the music of Magnus Lindberg. Recently he presented his research on Scriabin at EuroMAC 9 in Strasbourg, and is currently working on an article contributing to the forthcoming Oxford Handbook on Spectral Music. His compositions have been performed in several countries and festivals, including the Gaudeamus Week, and ISCM World New Music Days in Sweden and Australia.

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Mark Konewko hold both a Doctor of Philosophy and Masters in Business Administration from Cardinal Stritch University. He studied under Dr. Lodine and Dr. B. Lynn Herbert at DePaul University completing a Masters of Music in Organ Performance. He continued his studies on the carillon with Todd Fair, Jacque Maassen, and Bernard Winsemius at the University of Utrecht; Amersfoort, The Netherlands.

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Dr. Stephan LEWANDOWSKI studied composition and music theory at the Hochschule für Musik Carl Maria von Weber Dresden. From 2006 to 2012 he worked as a freelance lecturer in music theory at the Musikhochschule in Dresden, and from 2012 also at the Musikhochschule Franz Liszt Weimar. In 2012 he finished his dissertation on the combination of Schenkerian theory and pitch-class set theory as an analytical approach. In 2012 he received a permanent post at the Musikhochschule in Weimar, in 2012/2013 and 2016/2017 leading the centre for music theory. From 2013 to 2015 he also held a substitute professorship in Dresden.

Andrius MASLEKOVAS (1985) is a freelance Lithuanian composer and researcher, primarily interested in qualitative aspects of music. Andrius has studied with such composers, as Marius Baranauskas, Raminta Šerkšnytė, Henrik Hellstenius, also attended workshops and private lessons with Johannes-Maria Staud, Yannis Kyriakides, Rytis Mažulis, Staffan Mosenmark, Ørjan Matre, Mārtiņš Viļums, Adam Melvin and others. His compositions were performed and recorded by various ensembles, orchestras and choirs in Lithuania and abroad, amongst which Lithuanian National Symphony Orchestra, "St. Christopher" Chamber Orchestra, Vilnius municipality choir "Jauna Muzika", State Choir "Vilnius", ensemble "Synaesthesia" and many others. His composition "Calligraphies of the Last Rays" for clarinet, viola and piano was released in an annual promotional CD of Lithuanian new music "Zoom in 11" (2015). His composition "SARASWATI MANTRA" was awarded the second prize in choral composition contest "VOX JUVENTUTIS 2008", composition "Incantation of the Freezing Haze" for flute solo received a special prize in wind instrument composition contest held by Lithuanian Composers' union in 2014. As a researcher Andrius holds an Artistic Doctorate. He has defended his doctoral thesis "Structural and Pre-structural Compositional Aspects of Sonoristic Music" at Lithuanian Academy of Music and Theatre in 2016 and published several articles related to the subject of it. During 2014–2015 he was a coordinator and a board member of two annual international conferences "Principles of Music Composing" held in Vilnius.

Sigitas MICKIS (b. 1969) studied piano at the National M. K. Čiurlionis School of Art. He holds the Master of piano performance (1993, under Prof. Raimundas Kontrimas) and Master of composition (2008, under Prof. Rimantas Janeliauskas) from the Lithuanian Academy of Music and Theatre (LMTA). Currently he studies the artistic doctorate under Prof. Habil. Dr. Gražina Daunoravičienė and Prof. Vaclovas Augustinas at the LMTA. In 2015 he took part in the *Principles of Music Composing* conference; the report-based article *Parametrical Judgment of Cognitive Melodic Realm: Technological Aspect* was published in the conference collection. In 2016 the article *Research of Creative Phenomena in Music Composition: Theoretical Model* was published in *Lithuanian Musicology*, vol. 18. In 2017 Mickis presented stand report *Creative Composing of Rhythm: Rational Contexts of Expression (Cognitive Model)* on the 17th International Music Theory Conference *Principles of Music Composing: ratio versus intuitio*. He is an Associate Professor of Music theory and solfeggio at the Academy of Music of Vytautas Magnus University and is a supervisor of master thesis at the LMTA. In 2014 Mickis composed music and produced a soundtrack for the animation-feature film *Gustavo nuotykių* (The Adventures of Gustavas). In 2015 his opera for children *Zuikis Puikis* (Rabbit the Haughty) was staged at the Lithuanian National Opera and Ballet Theatre. In 2016 his piece for chorus *Žmogus Tamsoje* (The Man in the Dark) was awarded the 3rd prize at the *Vox Juventutis* contest. Mickis is the keyboard player and arranger in the projects *Paskutiniai Brėmeno muzikantai* (The Last Musicians of Bremen), *Musė* (The Fly) and *Laivas restoranas* (The Ship-Restaurant).

Roger REDGATE is a composer, conductor and improviser and is Professor of Composition at Goldsmiths, University of London, where he is Director of the Contemporary Music Research Unit. He graduated at the Royal College of Music, where he won prizes for composition, violin performance, harmony and counterpoint, studying composition and conducting with Edwin Roxburgh and electronic music with Lawrence Casserley.

A DAAD scholarship enabled him to study with Brian Ferneyhough and Klaus Huber in Freiburg. From 1989 to 1992 he was Northern Arts Composer Fellow, where he lectured at Durham and Newcastle Universities. He was invited as guest composer and conductor at the *Darmstädter Ferienkurse für Neue Musik* between 1984 and 1994 where he received the *Kranichsteiner Musikpreis* for composition. He is conductor and artistic director of Ensemble *Exposé* with whom he has recorded and broadcast for BBC Radio 3, Radio France Musique, Dutch Radio, RAI (Italy), Swedish Radio, Hessische Rundfunk and Südwestfunk and recorded many CDs including music by Paul Archbold, Brian Ferneyhough, Michael Finnissy, David Gorton and Edwin Roxburgh. He has worked in the fields of jazz, improvised music, film and television (including programmes for the BBC and Channel 4), and performance art. His compositions have been performed extensively throughout Europe, in Australia, the USA and China, and he has received commissions from the BBC, the French Ministry of Culture, Fondation Royaumont, The *Darmstädter Ferienkurse für Neue Musik*, The European Commission, The Huddersfield Contemporary Music Festival, the Venice Biennale and Ensemble 21 New York. He has published articles on music and culture and the music of Brian

Ferneyhough and Michael Finnissy, including a chapter in the book *Uncommon Ground: The Music of Michael Finnissy*.

CD recordings of his works are available on the Alma Classics, Coviello, Oboe Classics, NMC, Metier, Edition Zeitklang and Microtonal Projects labels and *Single Combat*, improvisations (electric violin and turntable) with Matthew Wright, is released on Migro Records. His compositions are published by Editions Henry Lemoine, Paris and United Music Publishing Ltd.

Aistė VAITKEVIČIŪTĖ is Lithuanian composer and a beginning researcher of a young generation. She got her master degree of composition at the Lithuanian Academy of Music and Theatre and she is running doctoral studies at the moment there. The focus of her research is timbre and its function in the second half of the 20th century. Aistė Vaitkevičiūtė's interests encompass such fields as cultural and mentality studies or philosophy. She also has a bachelor degree in Cultural History and Anthropology of Vilnius University.

Martin VISHNICK, PhD, MSc, LLCM(TD), ALCM – guitarist, composer, researcher and teacher. As a performer concert tours have taken Martin all over the globe, where he continues to promote his albums with radio and concert appearances; this includes varied Classical guitar and Electric guitar concerts and engagements. His Wigmore Hall and Purcell Room debuts were back in 1981. Commissions include music for the theatre, concert hall, film and media. First published work was *Four Pieces for Solo Violin* Edwin Ashdown (1977).

Martin also teaches guitar and composition. His former appointments include Junior Music School at The London College of Music, Thames Valley University, head of guitar and composition, and St Helen's School, Northwood, Middlesex. Moreover, from 1995–2008 he was 'Composer in Residence' at St. Albans School, Herts.

LLCM(TD), ALCM Guitar from London College of Music 1974, the subsequent composition studies with Richard Stoker (at RAM) 1977. He holds an MSc in composition at University of Hertfordshire 1998, and a research PhD from City University 2015. The research comprises two contrasting volumes, a survey of current practice and didac-

tic elements. In both volumes, the focus is on exploring the complex processes of musical creation and reception. Martin is now concentrating on propagating post-doctoral research, testing theories and principles expounded in his PhD Dissertation.

Alastair WHITE is a Scottish composer and writer currently undertaking a PhD in Composition at Goldsmiths, University of London. Past engagements include the opera festival Tete-a-Tete, the international festival STanza, The Scottish School of Contemporary Dance, The Scottish Poetry Library, and the feature film "Treasure Trapped". This year he signed to PARMA Recordings and created the opera WEAR, an immersive sci-fi which combined New Complexity with High Fashion to critical acclaim. He speaks internationally on his research interests and his work on Elliott Carter is due to be published by the Società Editrice di Musicologia later this year.

Miloš ZATKALIK, a composer and music theorist, professor at the University of Arts in Belgrade. For several years visiting professor at universities in Novi Sad, Kragujevac and Banjaluka (Bosnia and Herzegovina). Lectured by invitation at universities in Canada, Norway, Germany, the USA, Slovenia and Australia. Research interests include analysis of 20th-century music; relationships between music and literature; psychoanalytic aspects of music analysis. Recent publications include a book on post-tonal prolongation; he is currently writing a book on goal-oriented processes in post-tonal music.

Raimonda ŽIŪKAITĖ is a Lithuanian composer, based in Vilnius. Raimonda graduated from National M. K. Čiurlionis School of Art as a choir conductor, 2010–2016 earned her bachelor and master degrees in composition at Lithuanian Academy of Music and Theatre (R. Kabelis composition class). In 2012 she studied at University of Music and Performing Arts Vienna. Currently she is pursuing a doctor's degree in composition at Lithuanian Academy of Music and Theatre under the guidance of Prof. Habil. Dr. G. Daunoravičienė and Assoc. Prof. Dr. M. Viļums. Since 2013 Žiūkaitė researches neo-Riemannian theory based consonant (minor-major) triads and their application in composition.