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Treatment of Sound in Contemporary Art Music
At the Examples of Works by Ukrainian Composers

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ABSTRACT
This article reviews the approaches to work with sound in contemporary art music. These approaches are studied from the point of view of the most widespread conceptions of sound treatment. From many existing ones at our time the attention in the article is paid to two. The first conception is defined as sound creation and includes all methods of composer's work with new (non-musical) sound. The second conception is defined as sound studying and connected with electro-acoustical experiments and spectral compositional technique. The concrete variants of these conceptions realization are demonstrated on the works by Ukrainian composers of the middle generation: "Vocerumori" (2012) by Anna Korsun and "Ars naturalis" (2008) by Oleg Bezborodko.

Keywords: *contemporary art music, sound, noise sound, integral serialism, extended techniques, "Vocerumori" by Anna Korsun, "Ars naturalis" by Oleg Bezborodko*

I. INTRODUCTION

Musical sound was the basis of all phenomena of art music before the beginning of the 20th century. One of the biggest innovations and discoveries that have happened in composers practice the last one hundred years was renouncement from using in their works only musical sound, inclusion to musical opus all existing acoustical phenomena from noise to silence.

Art music of the last one hundred years has impressed and is continuing impressing contemporaries by number of sound ideas which are embodied due to diversity of compositional techniques, new instruments, extended techniques, electronic devices etc. Many compositions are dedicated to the world of sound, its properties and expressive possibilities. However historical distance from our time to the beginning of the 20th century gives possibilities to define some main directions, general tendencies that have appeared from all diversity and multiplicity of composers' search. One of such general tendencies is typical approaches to understanding and interpretation of sound.

Overview of the methods of sound treatment can be found in many musicological works dedicated to art music of the 20th – beginning of the 21st century. Their analyzing may be the task of individual study therefore in this context I am showing only the main directions. J.Chomiński was one of the first authors who presented researching of evolution of composers' creativity from the point of view of sound decisions. In the article "To the problems of compositional techniques of the 20th century" (1956) he proposed the definition of sonoristic [1]. Later in the textbook "Musical forms" (1983) the musicologist presented concept of sonology and listed all exiting at that moment ways of creating of sound in composers' practice: new methods of sound extraction and articulation on traditional instruments; creating sounds with electronic and electro-acoustical devices; transformation material with help of electronic devices; juxtaposition of traditional and electronic instruments; work with combining acoustical and electronic material [2]. M. Katunyan proposed her own systematization of sounds in contemporary art music by origin, creating methods etc. in the chapter of the collective textbook "Theory of contemporary composition" (2007). For example by creating methods the musicologist defined sounds of natural-acoustic instruments, extended instrumental techniques, sounds of humane voice, sounds of electronic origin, concrete sounds, conceptual forms of acoustic material [3]. I. Lindstedt presented the history of including new sounds in composers' creativity [4]. In collection of articles "Sound&Score" (2013) diversity of points of view on research of specific of new sounds and its graphical realization is proposed [5]. The separate group is formed from studies dedicated to researching of extended techniques in the context of their realization in composers and performers activity. Authors of such works among others pay attention to problems of embodiment of new sound (for example Sh. Mabry [6], L. Vaes [7]). Sure, I named only some chosen studies. However even these articles and monographs demonstrate the importance and actuality of researching of art music of the 20th –

beginning of the 21st centuries from point of view of changing which composers make to treatment of sound and methods of its embodiment.

The main idea of this article is definition of some methods of sound interpretation that were formed in composers' creativity of the last century and have had its development at our time. The concrete variants of their realization are demonstrated at the examples of the works by Ukrainian composers of middle generation: Anna Korsun (b. 1986) and Oleg Bezborodko (b. 1973).

II. SOME DIRECTIONS OF SOUND INTERPRETATION IN ART MUSIC OF THE 20TH CENTURY

Methods of creating of new sound were formed and diversified throughout more than last one hundred years. I can ascertain that contemporary composers possess all set of methods which give possibility to create individual, necessary for concrete work sound – from electronic technologies to extended techniques. These methods as I showed above have been analysed in details in musicological studies.

But at the beginning of the third decade of the 21st century it is very important to my mind to try to define the main tendencies of development of composers' creativity of the last one hundred years. Such approach gives possibility to understand this period as certain integrity, to realize forming and development of those phenomena which are typical and traditional for composers' practice of our time. Therefore I propose to pay attention not to concrete methods of work with sound but to main directions of its treatment which include all exiting at the moment methods of work with it (both acoustic and electro-acoustic). In the next text I am considering conceptions of understanding sound that are realized by contemporary composers in diverse ways. From many different ways I would like to limit to my analyzing only to two indicative directions of sound interpretation in compositions which appeared in the 20th century. These conceptions I can define as sound creating and sound studying.

The first type – sound creating – is connected with intention of composers to look for new sounds, timbres, sound effects. Its forming took place at the beginning of the 20th century – the time of active experiments in the sphere of art music. In this period inclusion to composition of noise sounds on equal terms with musical ones, using non-musical things as musical instruments, discovering of electro-instruments, appearance of extended techniques and many other things happened. From the most indicative examples of beginning of this interpretation of sound I can name:

- 1913 – "Risveglio di una citta" by L. Russolo: using noise sounds only;
- 1918–1921 – "Ameriques" (the first edition) by E. Varèse: sirens were added to the orchestra;
- 1919 – "Musikalische Kreis-guillotine" by J. Golyscheff: using dishes, toys etc;
- 1919 – "Musik für Klarinette, Klavier und freihängendes Blechsieb" by H.-J. von der Wense;
- 1922 – "Symphony of sirens" by A. Avraamov: using sounds of city in the large-scale musical action;
- 1923 – "Aeolian Harp" by H. Cowell: using the string piano;
- 1928 – opera "Nose" by D. Shostakovich: using in the Intermission after the second picture only percussion instruments;
- 1931 – "Ionisation" by E. Varèse was created for ensemble of percussion instruments and two sirens.

All of above mentioned innovations of the beginning of the 20th century became widespread in its middle and later. A decisive push for sound experiments was active development of difference technical devices, appearance of recording studios etc. In general, composers' enthusiasm for non-traditional sounds and consequently interest in creation of their own sounds gradually became more and more spreading phenomenon. These ideas were developed by J. Cage, H. Lachenmann, B. Ferneyhough, S. Sciarrino and many others.

Forming of the second type – sound studying – happened in the second half of the 20th century and connected with development of electronic music. Studios of electronic music which opened at this time[1] gave possibilities to composers both to experiment with sound[2] and to study it. Such studying was used as conception of some compositions for example "Articulation" (1958) by D. Ligeti, "Kontakte" (1960) by K. Stockhausen, "Stream" (1969) by A. Shnitke etc. Forming spectral compositional technique in the early 1970s based on studying of physics of sound, using this information in musical compositions became indicative in this direction. "Les Espaces Acoustiques" (1974–1985) by G. Grisey is demonstration of possibilities of spectral technique in the most perfect features.

Sure, both defined methods of sound treatment in art music of the 20th century don't exist as separate,

[1] The most famous: The Studio for Electronic Music of the West German Radio (1951), Studio di fonologia musicale di Radio Milano (1955), L'Institut de recherche et coordination acoustique/musique (1970) etc.

[2] In this aspect the texts by K. Stockhausen are very indicative [8].

self-sufficient phenomena. General composers' interested in phenomenon of sound itself, direction for its individualization, creation of new effects lead very often to combining different approaches in the same work. However in my opinion the defined methods of sound treatment are indicative and even traditional for art musical practice both of the end of the 20th century and of the first two decades of the 21st century. Composers are free in choosing compositional techniques, musical techniques, acoustic or electro-acoustic tools for embodiment of their ideas, but in any case in many works it is possible to trace support of interpretation both of sound creating and sound studying.

In the next analytical studies I am trying to demonstrate certain type of composers' interpretation of sound and to show its influence on conception of work, on choosing technical methods, specific of form etc.

III. SOUND CREATING: "VOCERUMORI" FOR SIX VOICES BY ANNA KORSUN

"Vocerumori" is the indicative example of composition where the author creates original noise sounds and combines them with musical ones[3]. The opus was written in 2012. In 2014 the composer received Gaudeamus Prize for it.

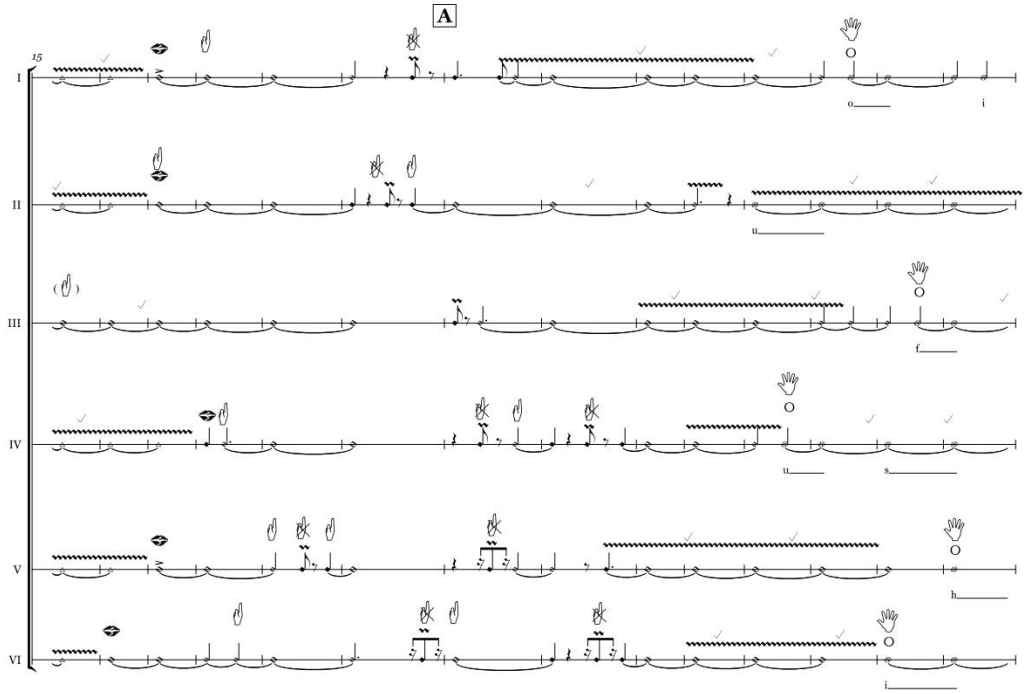
The name of the composition which I can translate as "Voices of noise" (remembering L. Russolo and his Intonarumori) tunes a listener on the sound material used by the composer. It can be divided into two groups. The first group is the noise sounds which are realized in different whistling, whisper, rustle, smacking etc. The second group is the tone sounds i.e. using the sounds with certain and approximately certain pitch (the main are *h, a, gis, g, e, d* with adding microtone chromatics and filling with glissando of the intervals fifth, octave, eleventh etc.).

Sound complexes were specially created for this composition by Korsun. The sound types and types of "mutes" are explained in annotation to the score. The tone sounds include generally accepted singing of sounds with certain or approximately certain pitch on some letters. The composer chooses vowels *a, a/o* and consonant *m* which are easily vocalized and are typical for traditional academic singing. The set of noise sounds is more diverse. It includes air tone, sucking air, voices shot smack like sonant kiss. These sounds are modified due to using special mutes i.e. hands positions (pressing lips by fingers; blowing out or sucking air through open or close hands, fist etc.) that work for forming a set of noise. Non-vocalized nature of noise sounds is stressed by using hissing consonant or their combinations (*s, h, psh, pf, ts, kh* etc.). Syllables with vowel letters (*shi, ho, ha, hy* etc.) are used in such methods of sound extraction that form diverse types of hissing. You can differentiate such sounds only due to vowels used in the syllables.

The sound organization of the noise sections is formed with juxtaposition of different types of noise for example hissing and sonant kiss or hissing and equable sound pronouncing.

A. Korsun, "Vocerumori", mm. 15–28

[3] The characteristic of Korsun's compositions for vocal ensemble is given in article by N. Hnativ [9].



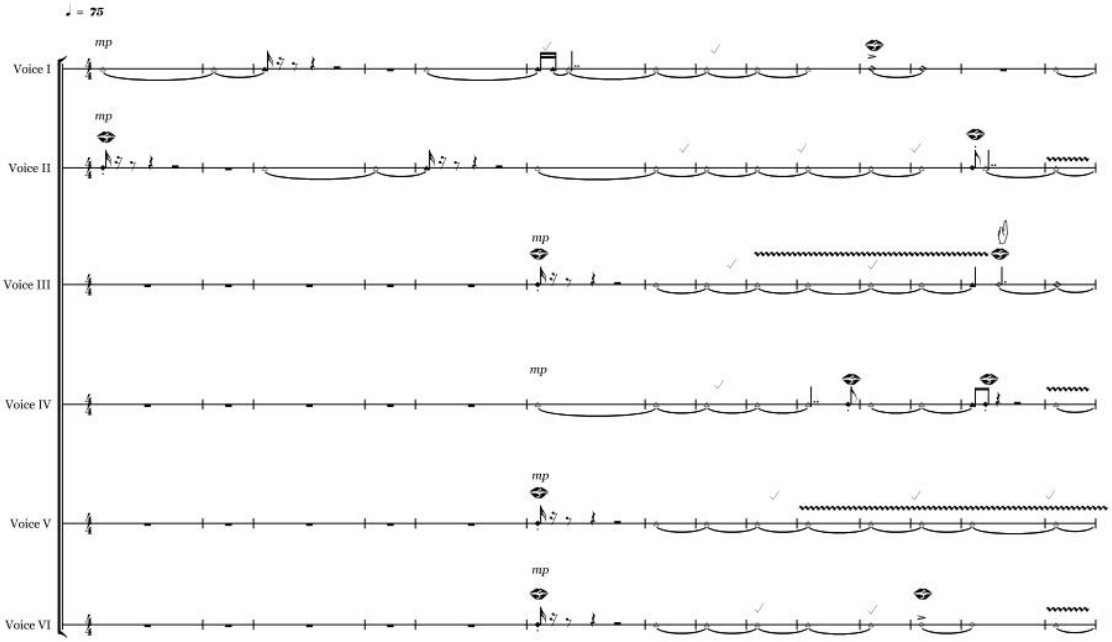
Major minor seventh chord (*e–gis–h–d*) with adding *a* (it appears the first among tone phonemes) is played up in different variants and combination (second, seventh layering; loosening of sounds due to micro chromatic and glissando) in the section where sounds with certain pitch prevail (letters C–H of the score). I.e. the basis of this complex I can understand as dominant seventh in the tonality *A*. It is clear that this logical core is never presented as an indicator of tonality and all the time is changing by variation of sounds. For example *gis* can be presented as *g* quarter tone sharp, *a* quarter tone flat, *g* quarter tone flat; *e* can be presented as swing between *d* quarter tone sharp or *e* quarter tone sharp and itself.

Different dynamics (its boundaries are defined between *ppp* and *ff*) work for extraction and juxtaposition of these or those timbre complexes. For example, dynamical diapason at all the voices in the measures 29–31 fluctuates between *mp*, *ff*, *mf*; dynamical development in the voice I in measure 38 has movement: *mp* > *p ppp* < *mf* (the indicator of metronome is quarter duration equals 75 in both cases). But the fragments with either more homogeneous dynamics markings (from beginning to measure 29 marking *mp* is exposed) or smooth increase of loudness (from *pp* to *f* – letters E, F, G of score) prevail in the composition.

Korsun puts $^{4}/_{4}$ time signature at the beginning of the composition and uses bar lines, their function is directed first of all on the inner organization of performers. Graphical stress of pulsation makes singer's work with coordination in time easier. By ear regularity of pulsation is not perceived; six lines that develop easily, accelerating and slowing, are proposed to attention of listeners. The composer uses diverse durations that underline irregularity and present different types of beat fragmentation (all variants of dotted notes, triples, quintuples etc.) in the rhythmical decision of each voice party. Simultaneous uniting of rhythmically independent voices guarantees flexible and saturated movement of the composition in time. Logic of changing of pulsation coincides with dynamic one. In the large fragments either common pulsation prevails (first 30 measures the indicator is 75) or it changes fast in measure (measures 107–111: 65, 50, 80, 100, 80, 85).

In texture organization of the composition Korsun uses polyphonic texture with active applying of imitation which I can define not by themes (these are absent in this work) but by methods of sound extraction. Voices I and II start "Vocerumori" when voice I makes a hissing sound (sucking air), voice II makes a sonant kiss and from measure 3 unites with the sound of voice I. Other performers enter in measure 6. Voices III, V, VI repeat the sounds of voice II (kiss and hissing) and voice IV imitates the sound of voice I (i.e. enters only with hiss).

A. Korsun, "Vocerumori", mm. 1–14



The examples of imitations you can also see in the part where tone sounds prevail (letters C–H of the score). Introducing of tone sounds takes place in the voices due to insertion of sounds *a* or *g* on staccato in a frame of breaks in other voices (mm. 61–65). Other example is quarter tone swinging of sounds with ascending movement (mm. 87–98). However in general I want to note that polyphony prevails in the composition due to simultaneous juxtaposition of different types of sounds extraction and rhythmical patterns.

So, in above-stated analysis I made an attempt to show the specifics of using of the sounds. In order to understand the reason of using of two types of sounds, it is necessary to trace their interaction throughout the composition.

The composition has a ternary form. In the first part (from the beginning to letter C, 60 mm.) noise sounds with episodic inclusions of tone ones (sound a^2 in voices I and II, mm. 40–46) are expounded. The presentation and development of material take place in traditional method: exposition of two main complexes (hissing and sonant kiss); rhythmical and timbre diversity and complication of hissing complex (from letter A); appearance of tone sounds in culmination; closing phase is rhythmical and timbre unity of material (from letter B) which function is completion and preparation of the next phase of the composition. The second part is built mainly on using tone sounds. At the beginning of this part (letter C) short (staccato) flashes of sounds with a certain pitch on the background of noise sounds appear and gradually the main logical core is manifested (major minor seventh chord, mm. 66–80). The next stage is microtone variation of these sounds and movement to culmination (letters E–G). The culmination (letter H) coincides with the beginning of the third part of composition. In this part Korsun uses both tone sounds and noise ones (with prevalence of the last). The culmination is realized by using of both types of sounds; complicated rhythmic combinations; frequent changing of sound extraction methods, of dynamic markings, of methods of articulation. I.e. I can mention the whole set of traditional tools that are characteristic for such type of section in any composition. The final part (from letter J and to the end of the piece) is directed to the effect of sound dissolution in silence via alignment of rhythmical patterns, unification of methods of sound extraction, deceleration of movement, dynamic mark *pp*.

So the structure of "Vocerumori", the methods of sound material exposition and developing are more rooted in European music practice of preceding centuries than specificity of sound material. But in general sound innovations proposed by Korsun demonstrate not only her composer technique but directed to the listener, to forming his or her spontaneous emotional answer to the sound, to experience excitement and solace emotional conditions.

IV. SOUND STUDYING: "ARS NATURALIS" FOR FLUTE, CLARINET, VIOLIN AND PIANO BY OLEG BEZBORODKO

"Ars naturalis" (2008) was created by the order of German ensemble Musicfabric which presented the premiere of the work.

The idea of the composition is connected with conception of sound studying, it is the work with

overtone series. At this context it is impossible to avoid associative comparing of "Ars naturalis" with the famous "Partiels" (1975) by G. Grisey that is based on the studying of sound *E*. However if spectralists create their compositions on thorough acoustical analysis (for example in "Partiels" specter of *E* of contrabass and trombone is demonstrated) Bezborodko chooses other method. Overtone series is only the starting position of the composition's idea. The author uses only its well-known structure and doesn't pay attention to specifics of individual timbres, specters, correlation of harmonic and non-harmonic partials of specter etc. The main rules of material organization get their source in integral serialism[4]. Order of partials appearing, tempo and rhythmic rows, general structure of the composition are connected with principles of this technique.

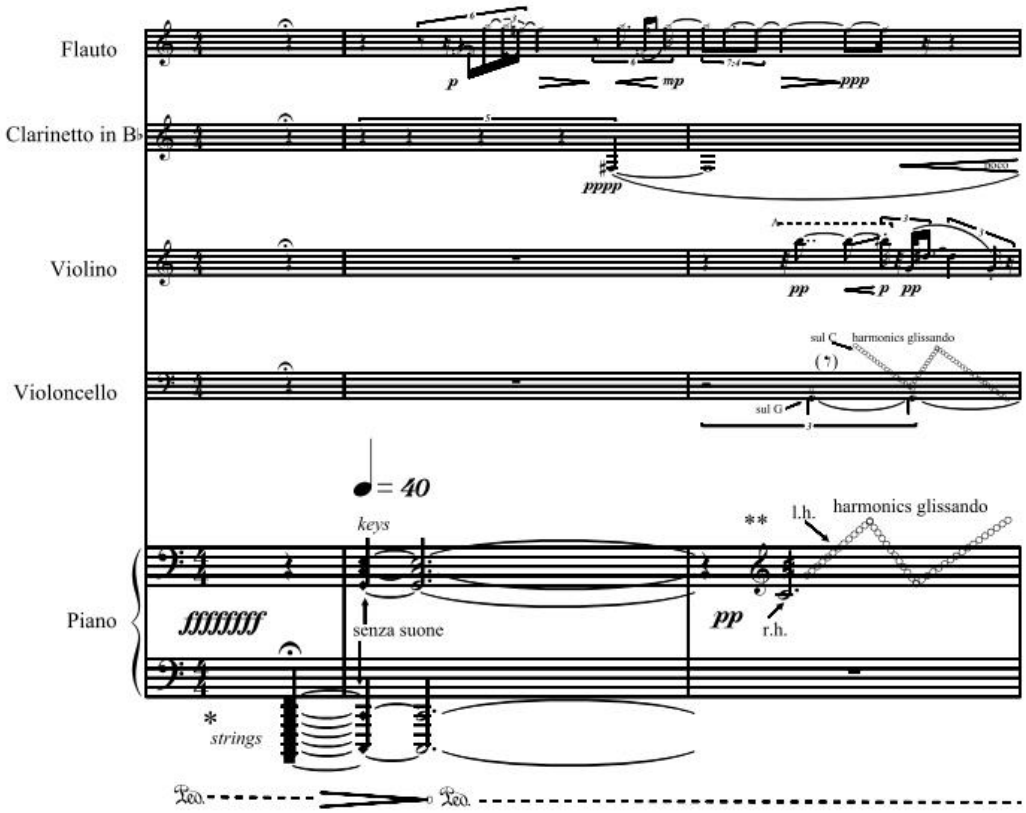
The composition consists of twelve segments. They are separated from each other by change of tempo that are fixed by metronome signification: 40–63–80–120–54–110–100–132–144–72–90–48. If this row is ordered by a gradual increase in numbers we will have the next sequence: 40–48–54–63–72–80–90–100–110–120–132–144. In original scale of tempos, which was created by Bezborodko especially for this composition, every next signification of metronome was formed by the principle of addition. Every number was increased by 0,4: 7.2, 7.6, 8.0 etc. Respectively the row looked like this: 40, 47.2, 54.8, 62.8 etc., however approximate signification was used in the score. The order of tempos in the composition submits to the wave principle with culmination in the golden ratio point. If we give serial number to every element of tempo row: 40(1)–48(2)–54(3)–63(4)–72(5) etc. according to the change of tempos in the composition we will have the next number series: 1–4–6–10–3–9–8–11–12–5–7–2. This number series determines the laws of "Ars naturalis".

The changes of tempo divide the composition, as I said above, into twelve segments, each of them has own basic tone. Respectively sounds with required serial number were selected from chromatically scale. In this way the sequence of basic tones of every segment was formed: 1(*c*)–4(*es*)–6(*f*)–10(*a*)–3(*d*)–9(*as*)–8(*g*)–11(*b*)–12(*h*)–5(*e*)–7(*ges*)–2(*des*).

Every segment is divided into twelve sections. Their duration is defined by numbers of quarters that are connected with basic number series: the first section – one quarter; the second – four; the third – six etc. I propose as an example the beginning of the work. Here we have the first section (first quarter in measure one), the second (three quarters in measure one and the first quarter in measure two) and the beginning of the third (three quarters from six):

O. Bezborodko, "Ars naturalis", mm. 1–2

[4] The composition analysis is based on introductory notice to the score and comments by Bezborodko in our conversation.



The composition begins with cluster which is projection of sound in all complexity of its structure. The next expounding of material frees up hidden partials and gives them independent life. The choosing of sounds which appear in every section is connected with their number in overtone series and basic serial number. In the first section only sound of one pitch may be present; respectively in the second section sounds of four different pitches may be present etc. They are chosen with help of the mathematical action of addition of numbers from basic series. I would like to remind this series: 1–4–6–10–3–9–8–11–12–5–7–2. Accordingly the structure of sound material will be the following: 1st partial, 5th (1+4) partial, 11th (5+6) partial, 21st (11+10) partial etc.

So in the first measure on the first beat the first partial C^1 sounds (section 1, number 1). In the second section (number 4) sound *e* (fifth partial which is created by addition the number 4 to 1 – serial number of partial C^1), $f^{1\sharp}$ (eleventh partial is the sum of number 6 and serial number partial *e* – 5), f^2 (twenty first partial=11+10), g^2 (twenty forth partial=21+3) will be used. Such principle of choosing sound material is spread throughout the composition. Distribution of durations, correlation between number of partial and its speed, dependence of speed and pitch of sounds on signification of tempo etc. is added to this principle.

According to the idea of the composition which is described by the composer in the introduction to the score ("correlation and coexistence of two categories important for music /as any other/ creation – the natural and the artificial" [10]) choosing and forming of the rules of interaction of all levels of organization of musical material takes place. Bezborodko uses set of methods to form specific "natural" sound of the composition. Extended techniques which influence specific of sound are actively used: tone and noise sounds, tone sound with elements of noise (this variant is used in part of flute in mm. 1–2). These techniques give possibility to make timbre of the work more diverse, to receive certain "natural" effects. For example, in m. 1 in part of flute it is imitation of noise additions that are typical for high partials sound; using of harmonics glissando in m. 2 in parts of cello and piano is directed to demonstration of partials themselves etc.

Thus, "Ars naturalis" is organized on the laws of integral serialism. But using the overtone series and only its sounds demonstrates composer's interest to the inner structure of the sound, complementary tones etc. All these elements present the conception of the sound studying.

V. CONCLUSION

Art music of the 20th – beginning of the 21st centuries differs from other epochs by new attitude to sound and methods of work with it. There are many ways and possibilities to create new sound in contemporary art music, among them – extended techniques, original methods of traditional musical techniques combining, preparation and amplification of musical instruments and human voices, electronic synthesis etc. All these methods are in technical arsenal of contemporary composer who uses them according to the main idea of his or her work.

In this article I proposed to consider the idea of new sound in contemporary music not from the point of view of techniques of its creation but from individual conception of composition that determines approaches to sound interpretation. From many types of sound conceptions that appeared in the 20th century I paid attention only to two.

The first – sound creation – is connected with composers' intention to diverse sounding of musical works, to look for new timbres and expressive possibilities. This tendency was formed at the beginning of the 20th century and connected with using noise sounds, non-musical things instead of musical instruments, invention of new instruments etc. Conception of sound creation is very significant for many compositions that appeared last one hundred years from L. Russolo to H. Lachenmann, S. Sciarrino, B. Furrer and many-many other composers. As an example of realization of this conception was proposed the analysis of "Vocerumori" by A. Korsun. The name of the composition itself directs to work with noise sounds. The author creates the set of specific sounds that have their expounding and development throughout the piece. They are air tone, sucking air, voices shot smack like sonant kiss. These original sounds change due to using of system of "mutes" (hand positions) and syllables. The group of noise sounds juxtaposes with the group of tone ones. The composition is based on changing and combination of these two sound groups. So, conception of "Vocerumori" is directed to creating original sound material as L. Russolo did it at his time.

The second type of sound conception is sound studying. It was formed in the middle of the 20th century and connected with active development of electronic music. Composers had possibility to study the acoustic qualities of sounds, to create new sounds, to form ideas of works based on these acoustic qualities. The most indicative for this direction is spectral composition technique. The conception of sound studying was presented at the example of "Ars naturalis" by O. Bezborodko. The most interesting in this composition in my opinion is combination of the idea of overtone series and integral serialism. The sound material is based on overtone series. But all the other components – from choosing of sounds order, rhythmic and tempo rows to structure – depend from number series. Thus in "Ars naturalis" the composer uses the idea of sound studying on the level of work's conception but the decision of choosing and organizing of sound material is based not on spectral but on integral serialism technique.

So, sound in contemporary art music plays very important role not only as material of compositions but as conception, which directs the methods of authors' work. The approach to sound from the point of view of conception of its using, proposed in this article, gives possibility to define some general tendencies which were formed in the 20th and have been developed in the 21st century.

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