MICROTONAL INTONATION FROM COMPOSER'S, PERFORMER'S AND CONCERT-AUDIENCE'S PERSPECTIVE: THE CASE OF GYÖRGY LIGETI'S *Hora lungă* FOR VIOLA SOLO

Mikrohromatiskā intonācija no komponista, atskaņotāja un koncerta klausītāja perspektīvas: Ģērģa Ligeti Hora lungă altam solo

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Abstract. *The aim of this study is to explore the microtonal intonation, i.e., pitch lowered by a quarter-tone, in György Ligeti's (1923-2006) „Hora lungă" for viola solo. It is examined from three points of view: composer's, performer's, and concert-audience's. The artistic reasons for the use of microtonality in this piece were explored in Ligeti's own and other written sources. The difficulties performer encounters hitting the microtonal pitch on viola (corresponding to the 11th harmonic in the overtone series) were investigated practicing the piece by the author of this paper herself. Two methods of practicing microtonal intonation were tested. Firstly, the out-of-tune ("false") sounding pitch was searched by ear. Secondly, the validity of the second method – listening to harmonics of open C string was proofed, measuring pitch frequencies of open string harmonics in 16 recordings, including the author's. Finally the perception of microtonal intonation by 26 subjects in live concert setting was tested. Pitch frequencies of performed excerpts were also analysed. Additionally, 17 subjects were interviewed about the perception of microtonal intonation. It was concluded that the appropriate way to practice microtonal intonation is to search the out-of-tune sounding pitch by ear, while other method – listening to open string harmonics, could be questionable as frequency measurements of harmonics showed that 11th harmonic deviated largely from the target. Perception test results have shown that both musicians and non-musicians were able to hear by a quartertone lowered pitch in the author's performance. Frequency analysis has shown that microtonal intonation in the author's performance was reliable. From answers in questionnaires and additional interviews it could be concluded that the composer's intention to create the impression of a „strange, magical, nostalgic world" through the use of microtonal intonation worked, although it remains unclear, if the result would be similar without preparatory explanations before the interviews.*
Keywords: *composer, concert-audience, intonation, Ligeti, microtonal, performer, perception, viola.*

Introduction

Violinist and violist Barbara Lüneburg in her PhD Thesis[1] describes the extended techniques, which modern music performer need to have knowledge about. These techniques includes "complex rhythmic or microtonal worlds, graphic notation or improvisation requiring them to compose; or they may become involved with elaborate technical devices such as motion sensors, attached to their body, or instrument, that enable them to extend their expressivity or control electronics" (Lüneburg, 2013: 9).

In fact, every viola player who performs contemporary music encounters a variety of unusual technical challenges. *Contemporary Viola Studies* (2009) composed by Gart Knox, for instance, reveals eight different non-traditional technical aspects in viola playing, such as playing only with one left hand finger, *pizzicato* using nine of our ten fingers (including even the right hand's thumb), or unusual bowing techniques, such as a vertical bow movement. The study Nr. 7 *In between*, in turn, is dedicated to the microtonal quartertone technique. Microtonal intonation is certainly one of the most difficult contemporary viola technique aspects, but apart from Knox's study there are still few methodologies for learning this kind of intonation. It is also unclear, whether the perception of its artistic purpose could be perceived by concert-audience. In preface of his microtonal study Knox writes: "Many viola players' first experience of quartertones will

[1] A holistic view of the creative potential of performance practice in contemporary music (Lüneburg, 2013: 9).

be in (György) Ligeti's Viola Sonata" (Knox, 2009: 5). My first encounter with quartertones also happened exactly in this piece, in the first movement of Ligeti's Viola Sonata, *Hora lungă*.

The aim of this study is to study microtonal intonation in *Hora lungă* from three aspects. It was studied from performer's, composer's and concert-audience's perspective. In this paper the process and methods used to practice microtonal intonation will be described. The artistic reason of the use of microtonal intonation from the composer's and other musicological writings will be taken into account. Finally, the results of an experiment, in which the audibility and the perception of microintervals performed by the author were tested will be presented.

Methods

To discover fully the microtonal intonation in *Hora lungă*, it was necessary to study it, answering three different, but complementary questions:

1) What was the composer's artistic intention to use the microtonal intonation? For this scope Ligeti's and other musicological texts were analysed.
2) What difficulties does the performer meet in the process of learning to perform the microtonal pitch? What methods are suggested in literature? *Hora lungă* was practiced by the author and discussed with the viola professor. Two methods of learning to play pitch lowered by a quarter-tone were tested: searching the out-of-tune sounding pitch by ear and listening to open C string harmonics. Frequencies of harmonics of open C string in 16 performances, including the author's own, were analysed to test the reliability of the second method.
3) Whether and how does a concert-audience perceive microtonal intonation and its artistic meaning? For this scope an experiment in live-concert setting with 26 subjects participating was conducted. Additionally 17 subjects were interviewed afterwards.

1. Searching for the artistic purpose of microtonal intonation in Ligeti's *Hora lungă*

Russian pianist and composer Samuil Feinberg stresses the importance to blend the composer's idea in the performance: "The mind of the composer should become the performer's own […]. Individuality of performance may shine brilliantly only when it is illuminated by the light emanating from the composer's idea[2]„.

Approaching the microtonal pitch deviations in Viola Sonata's[3] 1st movement *Hora lungă*[4], a performer should first answer two questions. What kind of microtonal system is used and what was the composer's artistic purpose to use microtonal intonation?

The intonation in *Hora lungă* is built on the so-called „acoustic scale". It has microtonal deviations from a standard equally tempered scale[5], derived from the natural overtone scale (see Figure 1)

[2] Samuil Freiberg, *The Composer and the Performer* (http://math.stanford.edu/~ryzhik/Feinberg1.html).
[3] Sonata for Viola Solo was composed during the period from 1991-1994.
[4] *Hora lungă* was originaly a "long song", a genre which Bartok recorded in Maramures and Nothern Sathmar counties, Romania, and which he employed himself in the third movement of the Fourth Quartet. These extended songs were improvised around a "family of slow, stereotyped melodic formulas and figures which are strung together", *hora* here referring back not to the dance form, but to the Romanian word for "oration". The *hora lungă* is also known by the urban term *Doina*, which specifically means "melancholly song" (Bauer 2011: 196-197).
[5] When the 12 semitones are equal in size, the chromatic scale is said to be *equally tempered*.

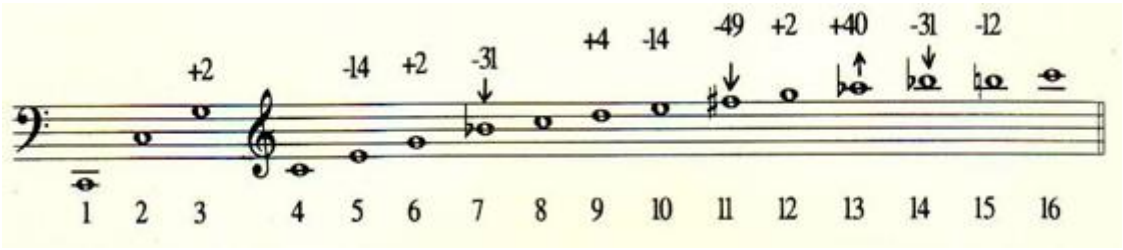


Figure 1. Deviations from equal temperament in natural overtone scale in cents[6] *(Geller, 1997: 18).*

Ligeti uses pitch deviations corresponding to the 5th, 7th and 11th overtones. In the score of *Hora lungă* special arrows are indicating these deviations from standard equally tempered tuning precisely in cents: lowered by 14, 31 and by 49 cents. In *Hora lungă* these microtonal pitches correspond to overtones of an imaginary F string, which would be a fifth lower than the viola's lowest string C. I will focus my study on the pitch B3 (hereafter B3↓¼)[7] which corresponds to the 11th overtone, i.e., by 49 cents or by a quartertone lowered pitch. The pitch B3↓¼ together with the next pitch C4 forms an unusual interval: by a quartertone enlarged standard semitone[8] (149 cents), or we can call it a large microinterval (see Figure 2)[9].

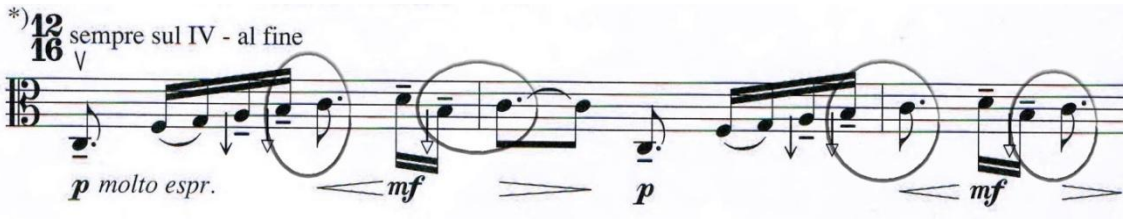


Figure 2. Large microintervals B3↓¼ C4 in Ligeti's Hora lungă (Ligeti 2001: 12).

Searching the artistic purpose of these microtonal inflections, I will consider the point of view of the composer himself and that of other specialists. The musicologist Amie Mary Bauer in her book „Ligeti's Laments: Nostalgia, Exoticism and the Absolute” describes this type of intonation as „microtonal flights of fancy” and she also mentions the eventual influence of Harry Partch's[10] adapted Viola[11] on Ligeti, who became fascinated with its ability to impart a „strange, magical, comletely alien atmosphere” (Bauer, 2011: 196). The violist and composer John Stulz, writing about the „hermeneutic crisis which Ligeti faced, like other composers, in the period of the 1970s”, concludes, that „the solution that finally freed him from his aesthetic prison was the synthesis of a unique language of multiplicity referencing an entire world of ideas ranging from the chaos theory and the French spectral music to the musics of Africa, the Carribean and Conlon Nancarrow. For performers of Ligeti's late music this multiplicity presents a unique set of challenges: how can references be shown in performance? What is the responsibility of the performer-interpreter when it comes to recognizing references? How do you perform an

[6] The cent is a logarithmic unit of measure used for musical intervals. Twelve-tone equal temperament divides the octave into 12 semitones of 100 cents each.

[7] The reason for the interest exactly in this deviation will be cleared in the next section, *Practicing microintervals of "Hora lungă"*.

[8] The size of a standard equally tempered semitone is 100 cents.

[9] The reason for the interest exactly in this deviation will be cleared in the next section "Practicing microtonal intonation in *Hora lungă*".

[10] Harry Partch (1901-1974) was an American composer, music theorist, and creator of musical instruments.

[11] Partch's adapted viola is tuned a fourth lower than the standard instrument. Ligeti discovered Partch's viola during his California sojourn in the early 1970s.

extra-musical concept? And how can we ever expect the audience to understand this language of reference?” (Stulz, 2012). Ligeti himself explains that *Hora lungă* evokes the spirit of Rumanian folk music, which, together with Hungarian and Gipsy music had strong influence on him in his childhood in Siebenburg. But he also reminds that he has not used any direct citations, rather allusions. These songs, as Ligeti described them, are nostalgic and melancholic. In his writings, furthermore, Ligeti mentions that it is possible to understand the sense of *Hora lungă* only in connection with other compositions of that period – the Violin Concerto, the second part of Piano Etudes and *Nonsense Madrigals* (Ligeti, 2007: 307). The common trait of all of them is the search for alternative system for equally tempered tuning[12]. It is also possible to extract information from descriptions of those compositions, suitable for my scope. From etude Nr. 7 „Galamb borong”: „It is the music which exists on an unknown island which can not be found anywhere on a map (Ligeti, 2007: 293)”. From *Nonsense Madrigals*: the idea of the composer’s fascination with „strange non-existing worlds”, deriving from his love for Lewis Carroll’s „Alice in Wonderland” (Ligeti, 2007: 302).

Resuming, let us try to describe the musical world, which Ligeti wanted to create using microtonal intonation:

This is magical, strange, alien, non-existing world on an unknown island, where multiplicity of ideas and extra-musical concepts mees, and allusions to Rumanian, Hungarian and Gypsy folk music melodies are sounding melancholically and nostalgically.

2. Practicing microtonal intonation in *Hora lungă*

David McGill, principal bassoon of the Chicago Symphony Orchestra and teacher at Northwestern University’s Bienen School of Music is well aware of difficulties, which musicians meet during learning: “The process of opening the ears to the sound we make is a constant struggle. Our idea of what we wish to produce often obscures the reality of the sound coming from the instrument (Mcgill, 2007: 271)”.

Ligeti himself has described the microtonal pitches in *Hora lungă* as out-of-tune (*falsch*) sounding pitches (Ligeti, 2007: 310). When author studied *Hora lungă* with viola professor at Jāzeps Vītols Latvian Academy of Music, exactly this terminology was used. The professor approved the intonation as succesful when microtonal pitches sounded out-of-tune. However, this worked well only with the largest microtonal deviation, that of 49 cents or a quartertone. The pitches with smaller deviations of 31 and 14 cents resulted to be very hard to hear. This is the reason why it was decided to focus the study of microtonal intonation in *Hora lungă* on the pitch B3↓¼ (see Figure 2).

Besides the out-of-tune strategy for learning microtonal intonation, there is also an advice to learn it from listening to natural harmonics on viola’s C string (DeStefano, 2010: 22). This, however, could be a questionable „learning technique”, according to frequency measurements in 16 performances of *Hora lungă*[13]. In the majority of performances where 2^{th}, 3^{th}, 4^{th}, 5^{th}, 6^{th}, 7^{th}, 8^{th} and 11^{th} overtones played on C string were measured, the 11^{th} overtone (which should be lowered by 49 cents compared to an equally tempered standard), turned out to be about 20 cents higher in average (see Table 1). This deviation is significant, but the reasons for that are still unclear for the author of this article[14].

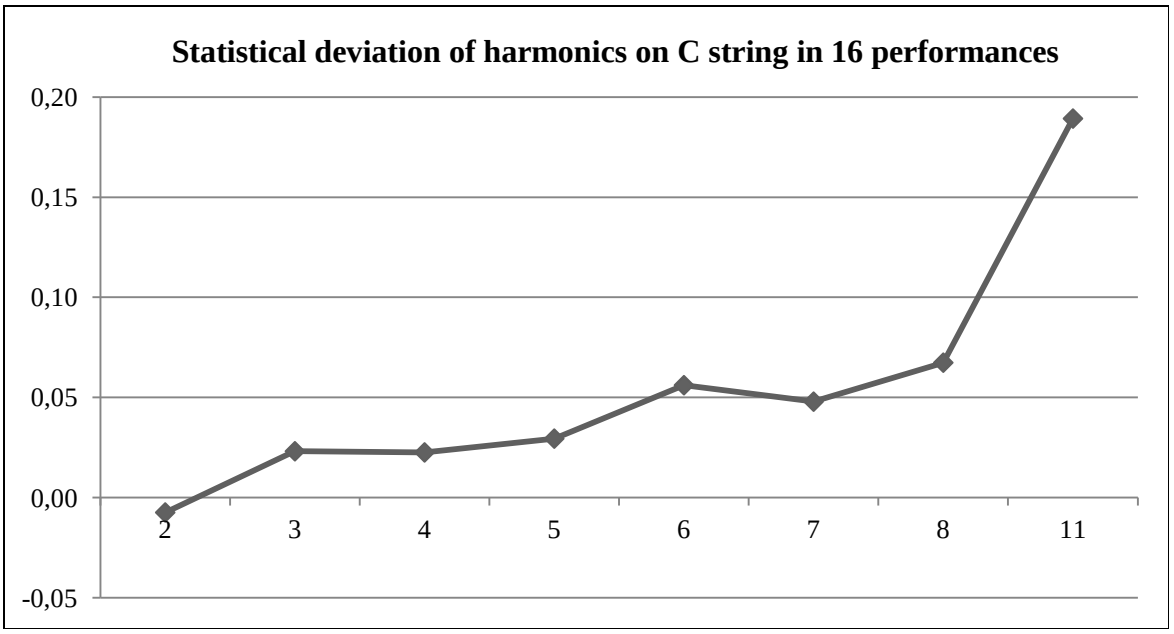
[12] Ligeti also mentions that this search begins already in *Atmospheres* (1961) and *Requiem* (1963-65) (Ligeti 2007: 304).

[13] I used software *Praat*.

[14] The detailed presentation of the results of these measurements are in preparation for the upcoming publication.

Table 1

Deviations of natural harmonics on C string in 16 performances



3. Studying the perception of microintervals in live performance

The importance of the third aspect of this study – listener, is well explained by McGill: “Music making must be shared by one person with another in order to be complete, just like a conversation, where an idea is put forth and then absorbed by another person. Performing is shared communication. It is the time when we show our hard-won understanding of composer’s message to the listener” (McGill, 2007: 204-205).

There were three main questions which naturally followed, studying microtonal intonation in *Hora lungă*:

1) Are microintervals audible to non-musicians?
2) Could it be, that microintervals will be perceived as out-of-tune?
3) Could actually microtonal intonation in *Hora lungă* induce a listener into something like the before discussed *strange and magical atmosphere on an unknown island*?

With the aim to answer these questions, a perception experiment in live concert setting was conducted. Performer was an author of this article. In the midst of the concert, before playing *Hora lungă* entirely, the audience (26 subjects) was asked to take part in three perception tasks. Afterwards most of them (17) additionally gave short interviews[15].

First task. 3-bar excerpt from *Hora lungă* in two versions (repeating each two times), was performed:

1) version „a” – pitches with microtonal deviations non included;
2) version „b” – including pitches with microtonal quarter-tone deviation (see Figure 3 and Figure 4).

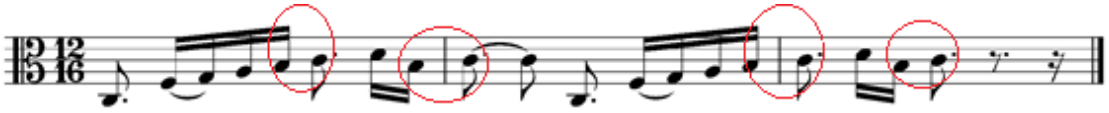


Figure 3. Excerpt from Ligeti’s Hora lungă without microtonal deviations (version „a”).

[15] The intonation of performance in experiment was also analysed with software *Praat*. The results indicated a clear difference between the sizes of intervals in microtonal or standard version (Ivane 2014: 411-418).

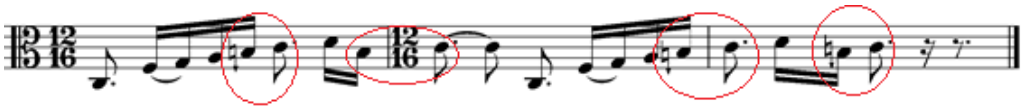
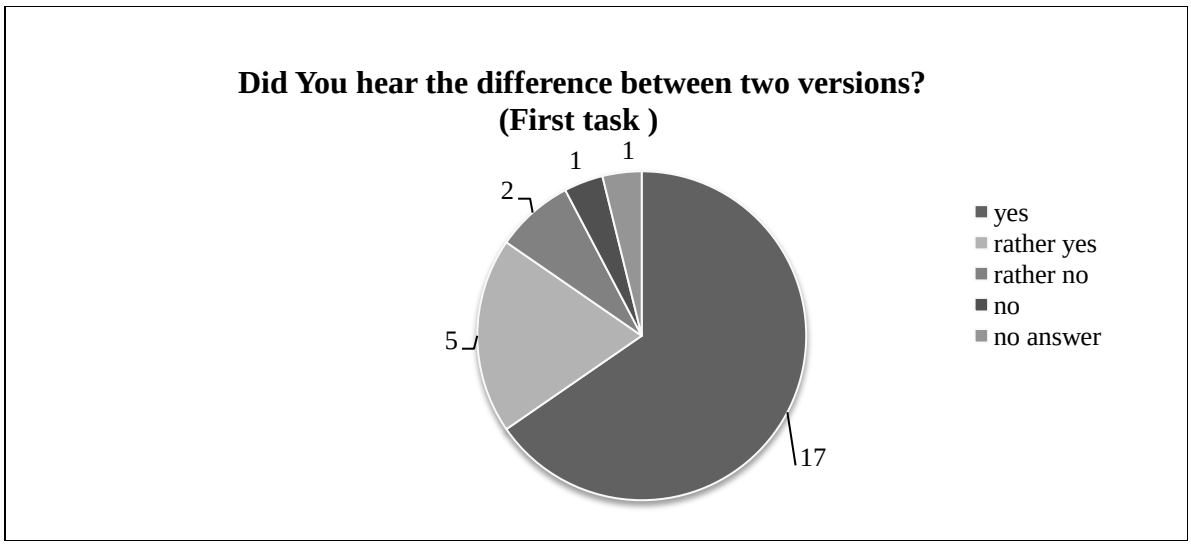


Figure 4. Excerpt from Ligeti's Hora lungă with microinterval B3↓¼-C4 (version „b”).

Listeners gave their answers in apposite questionnaires, stating whether they have heard or not any difference between two versions. They had to choose between: yes / rather yes / rather no / no. More than a half of listeners (17), have answered „yes”, but 5 chose the answer „rather yes” (see Table 2). From these 17 listeners only two were professional musicians.

Table 2

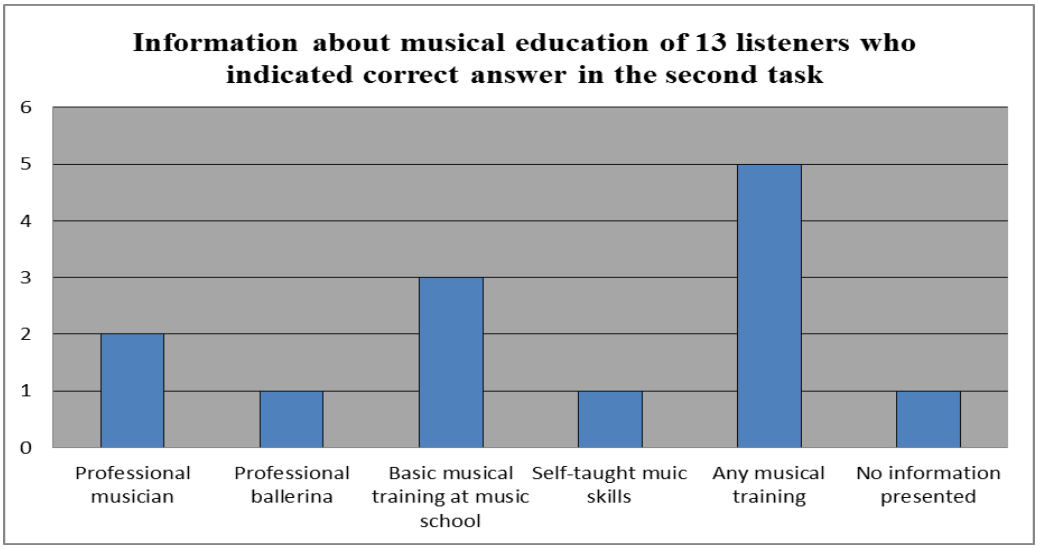
Answers to the first task



Second task. I played the same excerpts, in order b/a, but without informing the audience about it. Listeners had to choose a correct answer for the heard versions from these options: (a) a/b; (b) b/a; (c) b/b; (d) a/a; (e) I don't know. Thirteen listeners have answered correctly. Only two of them were professional musicians who also declared to have absolute pitch. Five or six of them were without any musical training, one had self-taught musical skills, three had basic musical training from music school, one was a professional ballerina (see Table 3).

Table 3

Musical training of subjects who gave correct answers in the second task



Third task. After the two tasks the *Hora lungă* was performed entirely. Subjects were asked to complete the questionnaire describing their feelings about the effect of microtonal intonation[16], choosing between such descriptions as „unpleasant”, „wrong”, „strange” or giving their own description. Summarising the answers, 19 of 26 listeners chose the description „strange” for microtonal intonation. Only one subject described it as „unpleasant”. But in interviews after the concert some more listeners confessed that the sounding was not pleasant.

From those who chose to give their own description for microtonal intonation, some valuated it as out-of-tune. One subject also gave a precise indication that „some of the pitches were lowered”. One subject without any musical training described the version „b” (microtonal) as „more moving”. There were also such descriptions as „an interesting kind of musical expression”, „sad”, „depressing”. These four subjects, who gave their own descriptions, had also distinguished correctly two versions in the second task.

Interviews. From after-concert interviews with 17 listeners it was possible to get the description of the effect of microtonal intonation in my performance as „harsh” or „non melodic”. There were also given such associations as hearing „somebody who stumbles deliberately while walking”. Several of listeners stated that microtonal intonation had an unpleasant effect only in the first two tasks, but no more in the whole performance of *Hora lungă*. One subject stated, „if there is a warning before the performance, everything is fine”. One of the professional musicians summarised: „This kind of intonation helped me to get in the atmosphere which the composer had intended”.

Results and conclusions

Microtonal intonation in Ligeti's *Hora lungă* was studied in practising process, concluding that the method of hearing the out-of-tune pitch works well, but only in case with by a quarter-tone lowered pitch, not with slighter deviations. The method of listening to open string harmonics turned out to be questionable, because the frequency measurements of open string harmonics showed quite large deviations of the 11^{th} overtone. The artistic meaning from literature research followed to be a creation of a *strange, magical, nostalgic and melancholic atmosphere on an unknown island*. The perception and performance was also studied in an experiment in live-concert setting. The results showed that microtonal quartertone pitch deviation or by a quartertone enlarged semitone B3↓¼-C4 was well perceived by musicians and non-musicians as well. This could be also supported by the recent results in the brain research which showed that musically untrained subject brain reacts unconsciously to by a quartertone altered „out-of-tune” pitches under both passive and active experiments (Brattico et al., 2006: 162-174), demonstrating also our culture-dependant musical knowledge that is implicitly acquired by exposure (Krumhansl, 2000). From this study it has been concluded that microtonal intonation could create both the out-of-tune effect and to help the listener to enter the particular aura which Ligeti intended, especially if audience get prepared before.

Kopsavilkums. *Viens no laikmetīgās mūzikas atskaņošanas tehniskiem izaicinājumiem ir mikrohromatiskā intonācija. Altistiem pirmā saskare ar mikrohromatisko mūziku parasti notiek Ģērģa Ligeti (György Ligeti) sonātes altam solo 1. daļā Hora lungă. Mikrohromatiskās intonācijas māksliniecisķā nozīme tika meklēta Ligeti paša atziņās un citos rakstu avotos. Iestudēšanas procesā tika izmēģinātas divas metodes. Savukārt ar mikrointervālu uztveramību tika eksperimentēts dzīvā koncerta ietvaros. Papildus atziņas tika gūtas, arī intervējot koncerta klausītājus. Pētījumā tika noskaidrots, ka piemērots veids, kā apgūt mikrointervāla atskaņošanu, ir netīri (falsch) skanoša skaņaugstuma meklēšana. Varēja pārliecināties, ka ceturtdaļtoņa atkāpe ir droši sadzirdama gan mūziķiem, gan nemūziķiem. Intervijas ar klausītājiem pārliecināja, ka mikrointervāli atskaņojumā spēj gan radīt*

[16] The frequency analysis of intonation of my performance was also performed. It indicated that although there were deviations from the target microinterval (149 cents), in general they were always larger than a standard semitone (100 cents), thus confirming the ”out-of-tune” sounding compared to equally tempered standard. For a detailed discussion of results see my previous publication (Ivane 2013: 411-418).

netīras intonācijas iespaidu, gan realizēt komponista ieceri par „neparastu, maģisku” atmosfēru. Šobrīd gan nevar apgalvot, vai tas būtu izdevies, ja klausītāji eksperimenta gaitā nebūtu saņēmuši informāciju par atkāpēm no standarta vienmērīgi temperētas intonācijas.

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