EXPERIMENTAL STUDY: INTERACTION OF MUSIC AND PAINTING

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ABSTRACT

The aim of this paper is to explore interaction of music and painting. Installed have been an electronic sound and canvas. During a longitudinal project (2004/2005) a coherently compound duple-work titled "The Analytical Artist" was synthesized (consisting of music by Gerhard Lock and painting by Rait Rosin). Collaboration of authors has been realized on the grounds of the idea of symbiosis. Interaction appeared to total synthesis which caused an analytical approach to perception. A hypothesis about testability of interaction between music and painting has been risen. The method of the study was combined to apply for description of the interaction of expressive qualities of music and painting. In this material interactivity between the auditive and visual fields of arts (music and painting) is clearly shown.

1. APPLICATION

In this study on interaction of multiple fields inside of arts installed have been music and canvas. During a longitudinal project (2004/2005) painting "The Analytical Artist" (oil on canvas 3.20 x 2.70) by Rait Rosin was synthesized with music (electronic sound 13:02) by Gerhard Lock.[1] The idea arosed to investigate analytical approach to author of painting, which has been pushed by works of analytic philosophers Richard Rorty and Richard Shustermann, especially on the basis of Shustermann's works on structuralism and analytical organics. Attention was drawn around the conception "organics". Connected to statement by Hasso Krull (2005: 3) collaboration of authors is based rather on symbiosis of perception instead of proceeding from total synthesis relying on words. Comparing multidimensionality of music to visual art the French philosopher Merleau-Ponty pointed out: "We can no longer call [depth] a third dimension. In the first place, if it were a dimension it would be the *first* one... But a *first* dimension that contains all the others is no longer a dimension... Depth thus understood is, rather, the experience of everything in its place at the same time, a locality from which height, width, and depth are abstracted, of a voluminosity we express in a word when we say that a thing is *there* (quotation after Cogan 1984: 123–124). The problem of arrangement of conscious events while empirical observations occure deals Henri Poincaré. He believes that from two events saved in memory "both of them have not run simultaneously or one of them takes its stand before the second one (Poincaré 1898/2005: 1426). It means that interaction due to sporadicalness of conscious events between two associations may take place.

This study is concentrated to symbiotic qualities of music and painting. Interaction of impulses received on listening simultaneously to electronic sound and watching the canvas is investigated. (1) Electronic sound is analysed by sonic design method (Cogan & Escot 1976; Cogan 1984) using sonogram analysis by AudioSculpt 2.23 (Lithaud 2003). The graphical renotation of pitch structure of music (based on score) is actually enlarged for visualizing of the parameters like dynamics, articulation, instrumentation, timbre, and sound qualities. Extension of analysis principles of sound-fields is taken from (Lock 2004). Sonogram analysis commonly belongs to analysis-synthesis process while modifying electronic sound (see § 3.1). (2) The painting is observed by method of testing the audience. Exhibition-like conditions were made while interaction of music and painting was pointed out and observers have been informed about conditions. Two kinds of conditions were built: (i) listening to electronic sound by headphones, (ii) observing simultaneously of the sound and the canvass. Observers (27) (1) have been realized two-part clicking-test, (2) verbal description was asked. Two-dimensional scaling of results shows (a) expressive qualities of the electronic sound, and (b) accumulation of segmental points (responses of observers). Sonic design and sonogram analysis have been used.

2. METHOD OF INVESTIGATION

2.1. Theoretical Basis of the Study

In multidisciplinary field interaction of multiple arts has been studied in different cases: links between poetry and music, music and dance, music and painting, and illusive perception of vision or sound have been investigated. Music as the stimuly for

[1] A suite of paintings "The Analytical Artist" and "The Pragmatic Artist" belongs to B.A. defended in Estonian Academy of Arts on May 8, 2005 by Rait Rosin.

perception is analysed with theoretical severity. (1) Multiple works on interaction of verbal text and music is a large-scale study field in cognitive music theory using separate analysis methods. Poetic content revived argues how music matters as well as music, words and dance do interact (Burnham 2001). Reflection on links between poetics and music has been observed in modern music education: how it is possible to unite the two disciplines in powerful educational encounters has been shown (Katz & Thomas 2000). (2) Perception of music and dance has been scrutinized. Simultaneousness of choreographical drawing (design) and music structure shows the perception of musical components as impulses while moving the body: musical structure is verified by choreographical design (Krumhansl & Schenk 1997). Verification serves as a parallel synthesizing interaction of music and painting to understand. In this work components of electronic music are calculated in quantified terms using digital methods of analysis. A semi-structured interview technique was used for analysing qualitative data (see Clarke, Parncutt, Raekallio & Sloboda 1997). Observers were asked to examine and describe the structure of the painting in interaction with electronic sound. Two category headings were prescribed: (i) segmental points in music and painting, and (ii) changes observed in perception of painting. According to original idea the electronic sound accompanying the visual process with painting synthesized to the sound interacts the changes in perception (Krull 2005). Accordingly the investigation has been devided into four steps: (1) random testing of segmentation of the electronic sound (by clicking of segmental points), (2) testing of electronic sound and painting simultaneously (with certain duration of the electronic sound 13:02), (3) sonogram analysis and sonic design of electronic sound, and (4) random free verbal description of changes in perception of the painting for its summary nature.

2.2. Observing the Music and Painting

For observing we needed quantitative data (cognitive segmentation) separately: (1) of the electronic sound only, and (2) listening simultaneously to the electronic sound and watching the painting. Experts (27) were musicians and non-musicians of several professions (included B.A. and M.A. level music students): composers [11], performers [7], musicologists [4], non-musicians [5], included advanced music experts [9], as well as scholars of literature [1]). Two specific features discriminated the collection: (i) all participants were supplied with preceeding experience in listening to music received during the studies or in professional musical life, and (ii) in common the skills regarded to fine arts were short-time watching a single work of art or exibitions. All the participants came from the same European cultural background excepeted 1 observer (Japanese). The observers range in age from the late twenties to the early forties. Gender distributed: female [18], male [9]. In the first experiment the eyes were asked to be closed, as well as contrary in the second experiment attention was stimulated to watch the painting.

2.3. Final Conversation

For gathering the qualitative data a semi-structured interview technique (see Clarke, Parncutt, Raekallio & Sloboda 1997) was used. The information was collected from face-to-face conversation. Observers in this experiment did not have any questionnaire in advance. Considering to importance of verbal responses a direct interview after the 2 x 13 minutes audio-visual experience were preferred; therefore the interview took place immediately in the same room. In the way different views were collected on interaction of music and painting.

3. DISCUSSION: DATA FOR ANALYSIS

3.1. Sonogram analysis and Sonic Design of Electronic Sound

3.1.1 Sonogram analysis and Modification of Original Sound

Original sound was taken from a renaissance woodwind instrument *cornamuse* (Munrow 1976: 49, LP2). Regarded to ADSR model the sound of this instrument is characterized by a sharp and intensive attack. The choosen sample (C4, 927 ms) of original stereo soundfile was denoised and extracted into separate files (according to left and right channels) using WaveLab audio-editing program (see Figure 1). Filtered out was the first partial (fundamental, ca 260 Hz) transposing it into a frequency approximatly 1047 Hz, which was than time-stretched up to a duration of 14 seconds (see Figure 2). Modified original sound sample (from now regarded as initial sound) have been used as source for sound synthesis.

3.1.2 Synthesis of Initial Sound

Initial sound constitutes the basic material for compositional process using multitrack program Vegas 4. During the synthesis the initial sound was multiplied and agglomerated; partly reversed, partly transposed by few cents downwards (see Figure 3). Using chorus effect (simultaneous multiple transposing down into different pitches) the initial sound became "multivoiced" forming a vertical "accord". According to Puckette this phenomenon would be called polyphony: "We usually call each copy of a "voice" in keeping with this analogy, although the voices needn't be playing separately distinguishable sounds" (Puckette 2005: 92). In case of the sound in this experiment we exactly find this phenomenon realized. Noise filtered out from the initial sound also have been used. Finally the initinal sound was transposed into an extreme deep register (remaining ultra sound; A1, ca. 53 Hz)

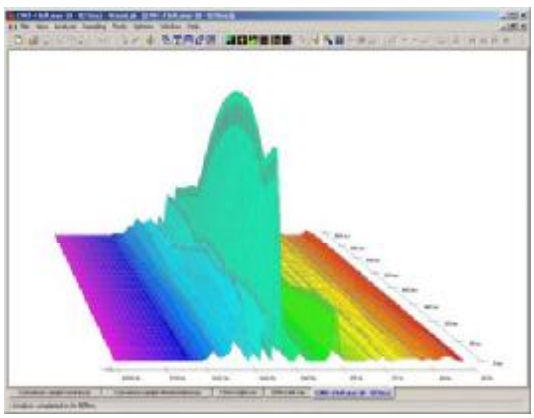

Figure 1. Left channel of denoised original *cornamuse* sound on logarythmic scale. The three-dimensional spectrum drawn by WaveLab 5 shows inequality of the intensity of partials: the most intensive partial is the third partial (790 Hz). (The maximal value for third partial of the sonogram threshold by AudioSculpt is -56.2 dB).

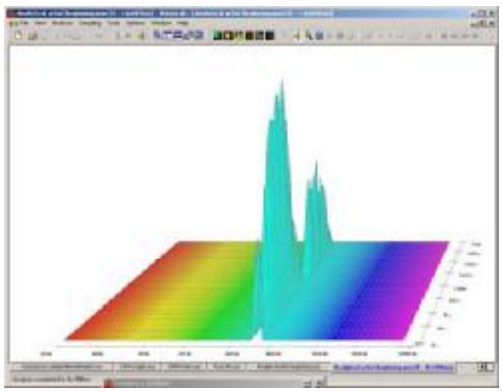

Figure 2. Initial sound transposed and stretched up to 14 seconds. Pitch value 1049.3 Hz. (The maximal value for initial sound of the sonogram threshold by AudioSculpt is -24 dB).

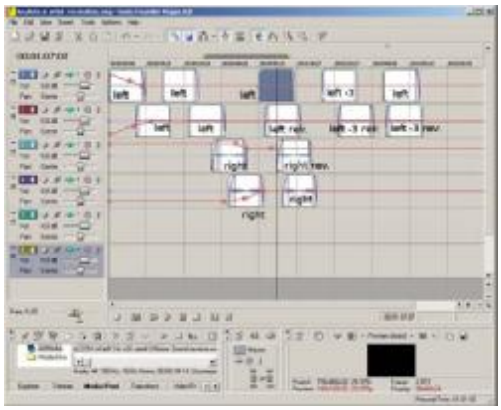

Figure 3. A Vegas-session demonstrating configuration of some regions derived from initial sound or its modifications using tracks 1–4. Two upper tracks contain multiplied regions of initial sound (or its modification) came from the left channel, two lower tracks contain multiplied regions of initial sound or its modification (reverse, pitch-shift down) came from right channel of original stereo sound sample. Red lines (panorama-graph) symbolize changing between left and right channel. Blue lines (volume-graph) symbolize loudness level which actually is not modified. Present session shows recreation of the beginning of the electronic sound for demonstrating the basic principles of compositional strategy. Original session was lost in a hard disc crash.

3.2. Experimental Data of Perception

3.2.1 Quantitative Data: Perceptual Segmentation of Electronic Sound and Painting

A panoramic view of quantitative data was furnished: two-dimensional mirror-diagram was made for visualizing the quantitative data.

The lower section of diagram informes about results of listening process to electronic sound only.

On the time axis (x) responses are repeated in two different modes: (i) observers do cognisize the changes in the sound on the dominant segmental points of the time scale (between the maximum 9:02 (see Figure 4) and minimum 0:03 from the total time-scale 13:02) or (ii) segmental points congregated on boundaried plateauxes on the scale.

The upper section of the diagram shows data for observing music and painting simultaneously. Horizontal axis is continuation (total duration-time) of electronic sound and vertical axis shows accumulation of responses.

A realtime duration ~8:30–~10.00 is analysed visualizing a climax-point accumulating human perceptional responses and the analysis shown in Figure 4.

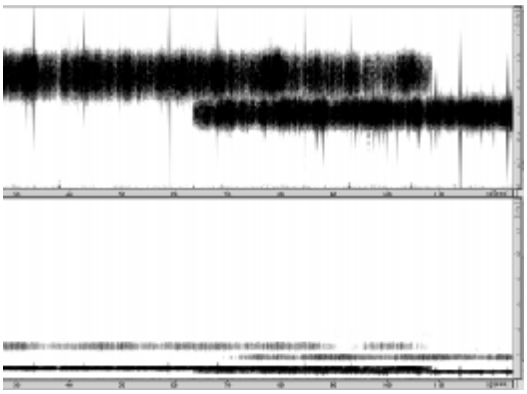

Figure 4. Sonogram analysis: duration ~1:30 on horizontal axis (real-time duration ~8:30–~10:00). Sonogram treshold for black-white scale is from -60 dB to -100 dB. The figure shows (i) dynamic-changeable sound-field frequency boundaries 1.07–0.73 kHz for upper field and 0.70–0.45 kHz for lower field, (ii) retaining components of noise from filtered initial sound. Two channels of the stereo sound-file (left channel in the upper, right channel in the lower part) are presented in different resolutions. Right channel shows broader frequency scale (0–14 kHz) than the left channel (0–1.4 kHz).

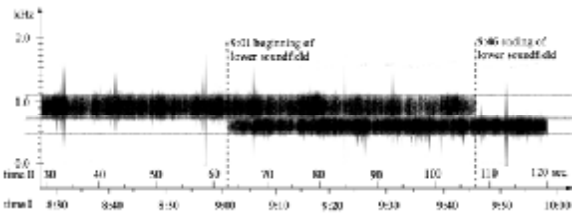

Figure 5. Extract of Figure 4 as basis for sonic design. Overlapping of dynamic-changeable sound-fields. Time I is the real-time of electronic sound, time II is analysis time for sonogram.

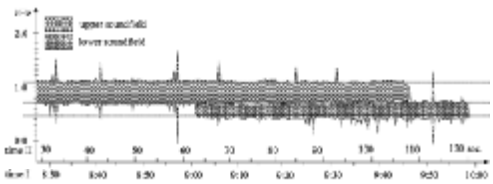

Figure 6. Generalized sonic design of Figure 5. Dynamic character of surface is symbolized by patterns. Widening and tightening of ambitus is aproximately shown by changing shape of contour drawing.

3.2.2 Interaction between Music and Painting

Hypothetical interaction between music and painting have been studied through perception of (i) music only, (ii) painting, (iii) music and painting simultaneously. Recieved data was structured by mirror-diagram. Responses to music only are shown on the lower time-scale, and to music and painting simultaneously on the upper time-scale in opposite horizontal axes. A dot indicates one response, vertical accumulation of responses makes segmental points (according to the vertical scales on the right). Accumulation in horizontal and/or vertical direction indicates segmental plateaux (see Figure 7).

Impulses of perception were caused by (a) changes in electronic sound qualities (short impulses; pulsation of sound; continuing, beginning or ending of sound events: dynamic fluctuation of fields), and (b) changes in perception of painting (see § 3.2.3) depending on time-dimension given by the duration of electronic sound (observing the music and painting simultaneously). The multi-dimensionality of sound in general and especially synthesized electronic sound have been considered by a countless number of researchers.

The segmental structure of the mirror-diagram shows segmental plateaux rather than segmental points for both music only and music and painting simultaneausly. Because the character of the electronic sound is mostly fluent and non-contrasting, responses were often doubtful. But also some clear changes in the electronic sound appear, to which much of the observers' responses undoubtfully refer synchronnousness of segmental points in the mirror-diagram. Perception of changes in the painting depends on the maturity (origin, background, intent) of the individual observer and can not be measured automatically. We can only judge the relation of segmental points and segmental plateaux concerning simultaneosly appeared sound events.

Studying the segmental structure of the mirror-diagram with regard to hypothetical interaction confirmes that segmental points (and subsequent segmental plateaux) often occour simultaneously in music, and music and painting. In this paragraph the most obvious segmental point for music occured in time 9:02 has been discussed. The hypothetical impulse for climax-point of accumulation of responses is visible on the real-time unit 9:01 (see Figure 7) which is counterpointed by a (less intensive) segmental point as well as subsequent plateaux in music and painting simultaneously. It is evident that segmental point reported in music is recalled by overlapping of two sound-fields seen as climax segmental point (9:01, 9 dots) at the beginning of the lower field, and a segmental point (9:46, 3 dots) at the ending of the upper field (see Figure 7). Because of the parallelism of responses (represented by segmental points and plateaux in both music and music and painting simultaneously) we conclude that the event in music may cause an interaction between music and painting. But the idea of interaction is complicated by spacial component of perception. The same Figure 7 as informant shows that segmentation points in painting (upper scale of diagram) are dispersed while interaction seems to be considered to consciousness as well as to subconsciousness of individual observer.

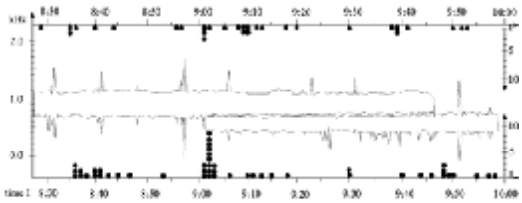

Figure 7. Extract of two-dimensional mirror-diagram.

3.2.3 Interpretation of Qualitative Data

Finally, an interview study was made, which enlights the agents for perception. All the 27 persons were interviewed regarded to perception of music, painting, and interaction of painting and music. Participants were asked: (1) did they listen to the music only, (2) did they look at the painting only, (3) did they find simultaneously the tracks of both the music and painting, and they were asked (4) to amount what impression had produced the painting separately or in interaction with music, or (5) to amount what impression had produced the music separately or in interaction with painting.

Verbal information was interpreted qualitatively: utterances were recorded and results subsequently classified and ranged. Following responses have been understood as (1) processual and/or (2) mental events. In processual case no trivial views were found, but individual conclusions: (a) interaction of music and painting just seems basical [e. g. "changes in music stressed the sight to move from one painted detail to another", "the painting owned a measure of depth and there emerged an extreme outlook", (b) transition from one perceptional point to another is smooth and realizing of changes in painting and in music are mainly sporadical [e. g. "transitions are vague enough, it is laborious to decide the true instant"], or (c) it is sporadically fragmentary [e. g. "often the perception of painting has been disturbed by music and it was not heard"]. As regarded to mental events (a) ability to memorize the sound qualities [e. g. "when came a low frequency, I saw the background of painting"], (b) the speed of segmentation [e. g. "it was difficult to decide the events of perception"], and (c) changes of perception of the fragments on the painting [e. g. "I was free

from the sound, but I wondered what the components were on the painting and music", "the first reaction was synchronous", "the painting adds reality to music"] were characterized. Observers have been noticed that the prolonged time dictated by electronic sound (13.02) was a novel experience for watching a work of art. The time seems to be a general agent for interaction.

Figure 8. The original painting (digitalized) "The Analytical Artist" (by Rait Rosin).

4. CONCLUSION

Quantitative analysis (sonogram) shows that synchronousness of segmental points marking the perception of painting and segmental points marking changes in electronic sound concernes impulses derived from the sound.

Although it is evident that segmental points (see Figure 7) in electronic sound affect on perception of painting and it is known that moving of eyes on the painting has a zigzag direction (likewise accorded to utterances of observers in this work), however inference from order of fragments of painting in perception is not available.

However, different questions remain: Does a part of responses depend on the mentality? Are the responses fixed on changes or is it a posterior aftereffect?

To what extend the painting only would be percepted? Does the temporal dimension (of music) regularly influence onto human perception of fine arts? To what extent is substantial the maturity (origin, background, intention) for perception both the music and painting?

Do the expressive qualities (pitch, timbre, loudness) function as impulses for interaction or is the latter an independent quality?

5. APPENDIX

Electronic sound "The Analytical Artist"

6. REFERENCES

1. Burnham, S. (2001). How music matters: poetic Content revisited. In Nicholas Cook & Mark Everist (eds.). *Rethinking Music*. Oxford University Press, Oxford.
2. Butor, M. (1998). Writing for musicians. Peter Dejans (ed.). *Inter disciplinas ars*. Collected Writings of the Orpheus Institute. Leuven University Press, Leuven (pp. 9–31).
3. Clarke, E., Parncutt, R., Raekallio, M. & Sloboda, J. (1997). Talking fingers: an interview study of pianists' views on fingering. In *Musicæ Scientiæ*, Vol. I, 1, Spring 1997 (pp. 87–107).
4. Cogan, R. & Escot, P. (1976). *Sonic Design: The Nature of Sound and Music*. Prentice-Hall, Englewood Cliffs, NY.
5. Cogan, R. (1984). *New Images of Musical Sound*. Harvard University Press, Cambridge.
6. Cook, N. (1998). *Analysing Musical Multimedia*. Clarendon Press, Oxford.
7. Katz, S. & Thomas, J. (2000). Many Seeds, Different Flowers. The Music Education Legacy of Carl Orff. In Andre de Quadros (ed.). Callaway International Resource Centre for Music Education, Nedlands.
8. Krull, H. (2005). *Rait Rosin, Analüütiline kunstnik / Pragmaatiline kunstnik*. Estonian Academy of Arts, Tallinn. Manuscript. In Estonian.
9. Krumhansl, C. L. & Schenk, D. L. (1997). Can dance reflect the structural and expressive qualities of music? A perceptual experiment on Balanchine´s choreography of Mozart´s Divertimento No 15. In *Musicæ Scientiæ*, Vol. I, 1, Spring 1997 (pp. 63–85).
10. Lithaud, A (2003). *Audio Sculpt 2: User's manual*. IRCAM, Paris.
11. Lock, G. (2004). *Muusikaline materjal ja selle käsitlus Lepo Sumera Viiendas sümfoonias*. Estonian Academy of Music, Tallinn. Manuscript. In Estonian.
12. Maus, F. E. (2001). Concepts of Musical Unity. In. Nicholas Cook & Mark Everist (eds.). *Rethinking Music*. Oxford University Press, Oxford (pp. 171–192).
13. Munrow, D. (1976). *Instruments of the Middle Ages and Renaissance*. Oxford University Press, Oxford. LP 1 Middle Ages, LP 2 Renaissance. EMI Records, SBZ-3810.
14. Puckette, M. (2005). *Theory and Techniques of Electronic Music*. University of California, San Diego.
15. Poincaré, H. (1898). La mesure du temps. Revue de métaphysique et de morale, t. 6: 113. (2005) Aja mõõtmine. *Akadeemia*, 7 (lk. 1426–1439). In Estonian.
16. Rossing, Th. D. (1990). *The Scirnce of Sound*. Addison-Wesley Publishing Company, Reading, Massachusetts.

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