

SOUND AROUND

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Project of Creation and Research: based on the composition of an octophonic music work.

Fundamentals

Inspired by the research of the astronomer and mathematician Johannes Kepler - and as an homage to a native of Graz -, this project aims to explore the capacities of spatial perception and its influence in the esthetical appreciation of acousmatic music.

In his *Musica Universalis* the scientist refers to the ancient concept of movement of the World, and the celestial bodies. This concept relates to music, but in a mathematical sense, not as an audible phenomenon. Nevertheless, the music has the power of turn audible those forces that are inaudible by themselves and that have been always the musical elements: tempo, dynamics, space and even the sound material itself.

Our purpose is to come across these *non-audible* forces of sound and how do we perceive them. Because

Marko Ciciliani¹, holds that "*sound can never be perceived 'as such' but that it is always interpreted, extended and complemented by inner listening processes*" and refers to the relevance of this inner listening in electro-acoustic music.

According to our experience as composer, we think that in the most non-referential electroacoustic music, this question is yet unrevealed, despite of the interesting works of Barry Truax, Murray Schafer and many other important researchers. Beyond the observation of different publics, we have found that the appreciation of electroacoustic music is in general fragmentary. According to James Tenney² research, there will exist perception areas, as temporal units of sound, that he calls areas of "aura gestalt", as structured and significant formal units. The appreciation of an electroacoustic work would respond to this statement, fixing the listener attention on determined areas and neutralizing other less relevant.

So, to appreciate the æsthetic content of a music work, as a whole, the listener must put in action different levels of perception, able to cause *sensations*.

The use of space in the electroacoustic music is one of the important subjects of concern for composers. There is a diversity of views regarding the meaning of space and its expressive role in the musical discourse. Also plenty of articles and theoretical discussions about systems of projection, equipments, configuration of halls etc., but we know very few about the real sensations provoked by space on the auditory, even in the professional ambient.

As so many studies has been made about the phenomenon of *critical bandwidth*, *masking effects*, and different *perception illusions*, the appreciation of Electroacoustic music and more particularly in an acousmatic audition, seems to present an interesting theme of research. The present project focuses on the artistic and psychoacoustic aspects of hearing, on the subjective perception sensations provoked by this music in a regular situation of concert.

¹ Dr. phil Marko Ciciliani "MUSICAL EXPERIENCE BEYOND AUDIBLE SOUND AND ITS RELEVANCE FOR ELECTRO-ACOUSTIC COMPOSITION" (in: http://iem.kug.ac.at/fileadmin/media/iem/projects/2012/icmc12_ciciliani.pdf)

² RISSET, Jean-Claude, 1987 : "A tribute to James Tenney" in Perspectives of New Music, Vol. 25, nros. 1-2

In other words, our project intends to discover the way in which listeners *appreciate* this particular genre of music. It is evident that the results can be varied depending of the different halls and the different *acousmoniums*.

Objectives

The Project will explore the different spatial effects in acousmatic music and their relation with perception. It is not oriented to the neural process of perception in itself but on the way in which listeners *appreciate* sound and music.

The research will approach the aspects of: location of sound objects in different points of the space, distance, trajectories etc. in combination with sound parameters (as brightness, texture, spectra etc). The work will be based on different classes of sound material (granular surfaces, linear flat layers, complex textures, segregated objects); all performed alternatively in different bandwidth.

Other the composition of the work, we intend to do a little experiment concerning public listening. We expect to dispose of one or two weeks for this research.

Development of the work

The message must be understood as a journey through the space of our inner world, full of lights and shadows, joys and sorrows.

1. In a first stage we will proceed to the selection and grouping of sound materials: on the basis of a bank of pre-recorded sound material, we will classify it by different characteristics (timbre, bandwidth, texture, duration etc).
2. Processing: according to the available software and equipments, we will proceed to different treatments of materials in order to create objects and conglomerates of different classes.
3. Creation of spatial patterns (See Provisory mapping-p.4) : in separated mixing sessions we will apply several patterns using the former sound materials.
4. Finally, we will elaborate the complete form of the piece, where the musical discourse will be expressed by the organization in sections of different character, according to changements of time, dynamics, space and timbre.
5. The proposal aims the presentation of the work in concert by an acousmatic projection system.

Research on public listening

As part of our project and the probable communication with students and other researchers at *iem*, we consider the possibility to make some tests of audition, profiting the process of elaboration of the materials for our composition.

The progression of this research will be realized in several steps, in more and more complex combinations till the complete work.

- Classification: once the material organized in classes (item 2 of development of the work), we propose to the respondents of the tests to hear it and to qualify it in some way. There will be objects, surfaces, textures and conglomerates able to be recognized separately by its contrast, dynamics, density or other distinctiveness. We will give freedom for the choice of terminology, tending towards the sensitive aspect, more than the technical.
- Limits of perception : Taking into account the conditions of *high frequency limit* and *threshold of hearing*, the experiment will be made in a reduced range of frequency bandwidth and amplitude levels, below the standard limits of perception. (Even if the final work will go over those limits). Also to favour the process of binaural audition in the localization of sound sources, the experiment is related to a configuration of loudspeakers distributed by pairs of stereo sources.
- Perception of space : Some of the questions that we intend to find out are the relations between, for example: velocity of spatial movement and distance of the source; conditions and time of sound fixation in memory; recognition of different timbres in cross-space movements; direction of sound trajectories and perception of dynamic; etc. ³ We are sure that this first experience will provide many other possible findings.
 - We will explore the different possibilities of treatment of the space in an octophonic configuration, creating an allocation mapping, in order to test all the potential ways of perception. All these alternative movements will be projected separately or interwoven, in separated sessions and using the different spatial patterns, created before (point 3 of development of the work), to observe if the participants are able to describe the sensations or appreciation that they prove. We expect to dispose of an octophonic system of loudspeakers, and an appropriate hall for the hearing of the examples.
- Evaluation: we will set up a chart to note the responses in each new hearing. (See provisory evaluation chart-p.4).


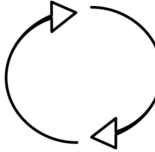
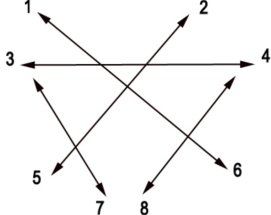
Release

We estimate the possibility to publish the conclusions of this project in the revue on line ACT. <http://www.fundestellos.org/3.TheRevue.htm>

³ The investigations of Alois Sontacchi and Robert Höldrich on the perception of virtual distance, will be very useful to improve some aspects of the present project. ("Investigations on control and perception of virtual distance using loudspeakers". presented at VECIMS 2003 -Lugano, Switzerland, 27-29 July 2003)

Provisory mapping

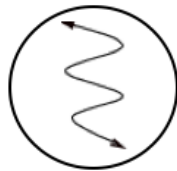
All possible combinations between:

Trajectories in serpentine in both directions.		Circular and half circle trajectories in direct and opposite directions		Multiple diagonals	
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On the basis of coupled stereo channels according to the circular French configuration, we will proceed to organize spatial patterns like, for example:

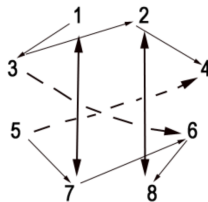
Two different sound layers:

1. Describing a fast movement in zigzag, between lateral loudspeakers (1-2/3-4/5-6/7-8).
2. A circular slow movement (1-2-4-6-8-7-5-3)



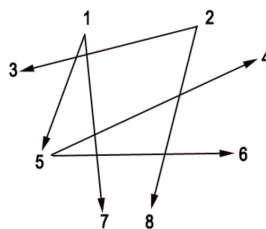
Three layers:

1. Interrupted cross trajectories between channels 3-6/5-4, alternating with
2. Trajectory moving between front and back pairs of loud speakers (1-2/7-8)
3. Spring trajectory between couples: 1-3/2-4/5-7/8-6



Six layers:

Three pairs of sounds that start together, from a point, running then separately into different directions. For example: Object 1, beginning in channel 1, goes to 5 and 7; Object 2, starts at channel 2, then goes to 3 and 8; Object 3, starting at channel 5, goes to 4 and 6.



Provisory evaluation Chart

*The participants will give a subjective description of the sounds they hear and then they must choose a name for each sound, in order to classify them into the chart.

Sound Materials	Distance	Speed	Space : two to six layers, alternatively	Description of sound materials	Recognition of Layers and spatial trajectories
1. 2. 3. etc.	2 m 5 m 10 m	30 ms 1 sec 5 sec	directions: zig zag / circles/half circles/side trajectories etc., fix points; others	1. 2. 3. etc.	(2 to 6)