# Composing with environmental sounds: A project in secondary education

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In recent years, is establishing a cooperation between secondary schools and universities for the development of methodologies that encourage pupils to comprehend their acoustic environment and incorporate it in creative projects[1]. These methodologies are often based mainly or partly on two pillars: the theory of Pierre Schaeffer on the sound objects and the seven criteria for describing them, and the practical approach of Murray Schafer regarding the observations on the acoustic ecology and the soundscapes. These two pillars provide a set of basic criteria with which the pupils can comprehend and describe their surrounding sonic environment, using them, at the same time, in group improvisation and music composition. The seven criteria elucidated by soundscape paradigms can be a helpful tool in our effort to develop the pupils' power of observation through empiricism.

Within this context, a research team from the Department of Music Studies of the Ionian University collaborates with teachers and pupils from a secondary school in North Corfu, Greece, applying similar methodologies during the school year 2013-2014. Groups of pupils and their teachers investigate their surrounding sonic environments, discuss them and recognize their literal and allegorical meanings. They record selected sounds or soundscapes, observe their spectral appearance in their computers and analyze their spectromorphological and spatiomorphological evolution over time. They use simple processing techniques, such as pitch shifting and time stretching in order to transform the recorded sounds and change their meanings and connotations. Eventually, the pupils use this material to compose short pieces. It is important to mention that all sounds are selected, recorded, analyzed, categorized and proccessed by the pupils themselves.

## 1. Content And Meaning

A successful implementation of the project described in this paper requires the pupils to have a basic understanding of the theory of Erwin Panofsky regarding the notions of "intrinsic meaning" and "content"[2]. For this purpose, a discussion was regularly emerging in the classroom on topics such as the physiology of the selected sound sources and their behavioral patterns, the intuitive and the racial aspects of the perception, the social and other necessities that influence the soundscapes and the narrative courses of the recorded sounds and soundscapes. The pupils were thus encouraged to discuss and give answers to the following questions: "What do we understand when we listen to something?" "How does memory engraves narrative paths and how do we understand and recompose the sonic narration?" "Which are the impacts of Schafer's 'schizophonia'[3] on our perceptual processes?"

Each and every sound that travels through the air is related to a causal mechanism that encompasses a) the physiology of the sound body that produces it and b) the necessity for which it is produced at a given moment. Since neither a) or b) exist in a schizophonic transmission it was important to establish in the classroom a narration based on an

abstract rather than a source-bonded perception. Thus, different contents of the recorded material became apparent allowing for new and afresh meaningful approaches.

## 2. The Methodology

### 2.1 The school and the aims

In my personal view, any method that aims at raising the pupils' awareness about their sonic environment and the ways to comprehend and protect it needs to be clear and comprehensible, embodied in a systematic and complete educational methodology, which simplifies and explains empirically the notions of "soundscape" and "acoustic ecology". The sound examples should be immediately recognized and therefore, they should be collected from environments within which the pupils live. The information extracted from the examples needs to be associated with the perception of the sonic environment and, at a later stage, the ideas and practices of music.

The secondary school chosen for the described research project does not offer a music education program. That means that the majority of the pupils had little or no experience with any forms of sonic arts prior to the beginning of the program. The school is located in the village on Agros in the north part of the island of Corfu in a rural area and is surrounded by agricultural and touristic facilities. The aims of the project were a) to investigate, record and comprehend the individualities and particularities of the soundscapes which surround the school and the village, b) to consciously listen to the sonic bodies and sound sources of the school's locations and develop a personal experience of the place through the sense of hearing[4], c) to gain knowledge of the environment and extract cultural significances which may be hidden in the daily visual experience, d) to express through sounds the emotional world of the pupils and e) to describe through sounds conflicts and scenes from the everyday life at school.

### 2.2 The Schaefferian Background

Typological paradigms and the Seven Criteria for describing the sounds by Pierre Schaeffer[5] and Michel Chion[6] were extensively used in order to establish a common terminology and descriptive methodology for the pupils and their teachers. Specifically, the *Criterion of Mass* was used to describe complex or tonal sound textures, the Harmonic Timbre to differentiate those textures, the *Granular Criterion* to investigate the micro-structural components of the sounds, the *Criterion of Allure* to dictate any mechanical, natural or organic oscillations of the sound textures, the *Criterion of Dynamics* to examine the nature of the attacks and the articulation of the temporal evolution of the sounds, the *Criterion of Melodic Profile* to follow the spectral motion and the *Criterion of Mass Profile* to describe the spectral condensations and rarefactions.

### 2.3 The Schaferian Approach

Aspects of Schafer's theory of the Acoustic Ecology and Soundscape[7] composition were also applied, especially during the recording sessions. Pupils and teachers were invited to categorize the soundscapes in terms of lo-fi or hi-fi[8] characteristics and to extract any perceived sound marks[9] and sound signals[10] that characterize the surroundings of the school.

### 2.4 The method

Pupils were divided into groups of 3-6 individuals. Each group created a short list with a number of sounds and items to record from inside and outside the school (Figure 1 and Image 1).

**Group name: «.....»**

*Titie of Scenario: «.....»*

| Sound File | Is the sound recorded? (YES/NO) | Remarks |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Figure 1**. The form where the sound sources were short-listed by the pupils

**Image 1.** A group of pupils recording at the schoolyard

Since a soundscape consists of the sum of the waveforms transmitted to our audio cortex by the mechanisms of the ear, the pupils decided to choose their sounds based on subjective judgment and personal preferences. However, the basic tools provided by Murray Schafer for describing and categorizing the soundscapes were carefully applied. The sounds were categorized and short listed according to their bio, geo and *anthropo* generic sources[11]. Bio generic sources include all the non-human and non-domestic biological sound sources, including migratory birds, which often fly through north of Corfu on their way to warmer locations. Geo generic refers to sounds that are generated by non-biological sources such as the sea waves or river waters, wind in the trees and rain. Anthropo generic refers to all sounds generated by humans and their activities, including human voices, machine sounds and game activities. The anthropo generic is a dominant category since it includes the vast majority of the produced and perceived sounds, at least for the period of observation. For example, the vast majority of sounds in and around a school are anthropo generic, at least for as long as the school functions. Needless to mention that the school is transformed to a totally different sonic environment as soon as pupils and teachers leave its premises. Figure 2 demonstrates some of the sound sources that there were chosen according to their geo, bio and anthropo characteristics.

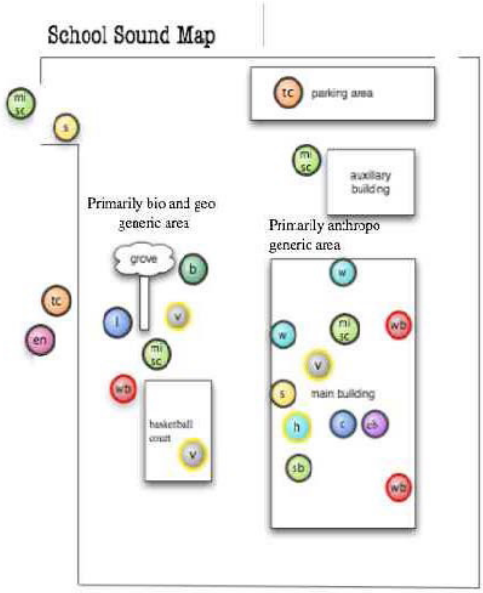


**Figure 2.** The School's Sound Map demonstrating selected sound sources

## 2.5 Keynote Sounds and Sound Marks

The dominant and stable sonic background in rural areas is mainly generated by the voice of the geography and its climate. The pupils, with the aid of their teachers, were invited to recognize the keynote[12] sounds that prevail in their sonic environment and any sound marks that emerge from it. The recognition of the keynote sounds is of paramount importance for the extraction of information related to the source recognition and its meaningful perception. The following experiment supported the argument: the pupils listened to the recording of a keynote sound that consisted of the song of two colonies of frogs. One colony was situated far away from the microphone. The second colony was very near to it. The recording of the distant colony was a drone-like sustained noise with insufficient information regarding its source due to the absence of the attacks of the song. On the contrary, the close colony provided a fully comprehensible recording, easily recognizable by the pupils. Applying the Criterion of Dynamics and discussing about the importance of the attacks, the pupils were able to extract information regarding the source definition, the recognition of the sound's meaning (whether it is the voices of frogs or

something else), the estimation of distance between the source and the microphone, the level of the source's recognition according to the distance and the estimation of the source's spatial placement in relation to the listener's position.

## 4. The Timetable

Since both pupils and teachers could usually dedicate only one of their time hour per week, the realization of the project should be meticulously planned. The teachers, in collaboration with the team of the Ionian University, redacted the following timetable.

1st stage: selection of sounds, soundscapes and sound sources for recording from the school's internal and external environment. Short-listing of the sounds and the sound sources (see Figure 1). Selected sound and sound sources included steps on fallen leaves, chalk on the blackboard, friction of chairs, voices, water tanks, team games etc.

2nd stage: recording of the selected sounds and sound sources. Three groups consisting of one professional musician or sound artist, two students, one schoolteacher and a short number of pupils were simultaneously recording at different areas of the school.

3rd stage: first editing. Two University students trained the pupils to the necessary techniques (with the use of suitable software) for sound file management and editing. It was an important moment since the pupils were asked to decide which part of the recorded raw material would be rejected and which would be used.

4th stage: creation of scripts related to the recorded sounds and sound sources. The schoolteachers argued that the creation of scripts is important since they provide a frame and a narration for the sonic composition. The scripts were usually describing routines of the everyday life at school. They often contained descriptions of emotional behaviors. Sometimes the scripts were short texts in abstract and almost poetic forms, such as the following:

*While the class was listening the chalk and dragging chair a fuss exploded there.*

*After descending the stairs the rest of the children begun murmuring.*

5th stage: first attempts to compose an imaginary soundscape or short piece of music using the recorded sound material.

6th stage: first attempts to transform the recorded sound material by applying simple but dramatic processing techniques, such as pitch shifting and time stretching. Other effects, including filters and reverb units were also used. At this stage the pupils were invited to rethink their scripts since both the content and the meaning of their sounds were altered due to the dramatic transformations and the application of the effects.

7th stage: second writing of the scripts. The pupils completed their compositions and discussed critically their work.

## 5. Conclusions

A critical evaluation of the project leads to the following remarks and conclusions:

1. Fragmentation. During the 5th stage the pupils demonstrated a preference in creating short and fragmented sonic structures. They adopted clumsy techniques of montage to edit condense sonic sequences.

2. Absence of super-position. During the 5th stage the pupils did not apply any mixing or super-positioning techniques. They favored montage at the expense of mixing.

3. Time shrinkage. During the 2nd, 3rd

and 5th stages the pupils showed impatient behaviors. They often did not wait for the sounds to fade out naturally during the recording sessions. During the compositional process they passed from one sound or sound structure to another without a sense of development or evolution.

4. Alerting sounds. During the 1st and 2nd stages the pupils demonstrated a preference in warning and alerting sounds such as the school bell, phone ringing, sirens, car breaks and horns etc.

5. Narrow acoustic horizon. During the 1st and 2nd stages the pupils selected and recorded foreground sounds from their narrow acoustic horizon. Perspective and distant sounds were either intentionally or forgetfully omitted.

6. Noise dominion. Although the pupils live in a rural area, they generally preferred noisy sounds.

(1) Relevant papers were presented at he "Colloque sur l'enseignement des musiques électroacoustiques" in Brussels, 22-23.11.2013. Organized by Musiques & Recherches.

(2) The "intrinsic meaning" or "content" "…takes into account personal, technical, and cultural history into the understanding of a work. It looks at art not as an isolated incident, but as the product of a historical environment." Source: www.wikipedia.org. Also, in Panofsky's Studies in Iconology (1939).

(3) "Schizophonia" is a term coined by R. Murray Schafer to describe the splitting of an original sound and its electroacoustic reproduction.

(4) For example, pupils were asked to discover where a sound is coming from with their eyes closed, and whether this task is easier for sounds coming from specific directions. They were also encouraged to judge if one ear is as good as two in locating sound sources.

(5) See Schaeffer 1966.

(6) See Chion 1994.

(7) See Schafer 1993 and 1977.

(8) "R. Murray Schaffer introduced the concept of a hi-fi and lo-fi soundscape. In a hi-fi soundscape, we can clearly perceive sounds and their orientation (location and distance) within the acoustic space. In a lo-fi soundscape, the sonic space is confused, individual sounds lose their identity, and masking (for example by constant traffic noise) is common." Source: http://www.ears.dmu.ac.uk/. See also footnote 7.

(9) "A term derived from 'landmark' used in Soundscape Studies to refer to a community sound which is unique, or possesses qualities which make it especially regarded or noticed by the people in that community. Soundmarks, therefore, are of cultural and historical significance and merit preservation and protection." Source: http://www.ears.dmu.ac.uk/. See also footnote 7.

(10) "Compared to noise, which is unwanted sound, a signal is any sound or message which is meant to be listened to, measured or stored. In soundscape studies, sound signals are always treated in relation to their ambient or keynote context, since they complement that context in the same way figure and ground are related in visual perception." Source: http://www.ears.dmu.ac.uk/. See also footnote 7.

(11) See Krause 2012.

(12) In soundscape studies, keynote sounds are those which are heard by a particular society continuously or frequently enough to form a background against which other sounds are perceived. Source: http://www.ears.dmu.ac.uk/. See also footnote 7.

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