

Into the sounding environment
A compositional approach

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Abstract

The focus of the compositional approach presented in this folio is the *sounding environment*. The term *sounding environment* is used in this context to refer to the *whole of our living experience* in the world which we might register as relating to sound. It might include everything that is sounding, seemingly sounding, imagined sounding, remembered sounding, sensed as sounding, composed to sound. It includes thus the actual sound environment, all that is sensed or interpreted as sound and imaginary sounds.

This dissertation accompanies the seven acousmatic and the two sound installation works included in the folio. It is divided into two parts. In the first part relevant ideas and theories both from the literature of electroacoustic music composition and soundscape composition are discussed while in the second the compositional approach to the *sounding environment* is presented as applied to the works.

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Introduction

The focus of the compositional approach presented in this folio is to experiment with the idea of the *sounding environment*. The term *sounding environment* is used in this context to refer to this *whole of our living experience* in the world which we might register as relating to sound. It includes the actual sounds in the environment of a listener, those imagined or remembered and those evoked in the mind of the listener by activities or qualities in the environment. Thus, the environment that *is sounding* is more than just *the environment of sound*, it is also the *environment as sound*

The *sounding environment* can include sounds which we *think* that we hear when we see the leaves of far away trees moved by the wind or also the potential sounding of our hands which are moving silently in the air. These sounds together with those of our imagination and of our dreams are not included in the sound environment we encounter in our everyday lives. In fact the above-mentioned activities do not produce anything literally hearable by humans.

My compositional approach to the idea of the *sounding environment* must clearly be distinguished from the established genre of soundscape composition, as the focus of my approach to the environment is different. This is explained further in chapter 1.2.

It may happen that the sudden revelation of an internal structure and a high dimensional order, which is hidden behind all these seemingly unordered, accidental or chaotic manifestations revealed to us as sound, is possible; the feeling that suddenly the world is tuned and that we are a part of the whole. While living our everyday lives we do not often have the chance to immerse and tune in to this fragile dynamic balance of the flowing universe.

In these compositions I have made an attempt to transfer this sense by means of sound – composing a reduced version of a ‘harmony’, in order to pose a question

and a hope, that there might be the possibility of a thread hidden to our perception, of a higher order and not just an arbitrary sequence of events and actions.

All these events and endless movements in the sounding world might seem not to be interconnected, but might be related through ways and bonds to a cause or will beyond our understanding. Naturally our ability to appreciate any possible hidden order is reduced due both to the complexity of the world and to our species' limitations.

I aim to compose works related to the idea of the sounding environment in the hope that through this process I might catch a glimpse of some potential thread of order in this seemingly or actually chaotic universe. I do not intend these works as attempts to imitate the environment, but essentially as ways to understand my living experience through intuitive, non-linear but systematic composition of works that could possibly transfer into music some qualities of the experience of the sounding environment. Possibly I could consider these as imaginary *re-soundings*, and creative 'replies' to 'questions' that remain unanswered; an encounter with the environment; through the 're-ordering' of my experience within it. Furthermore, other listeners while experiencing the actual sound of these works, due to certain possible similarities with their own experience within the environment and through the emergence of empathy and immersion, might discover hidden connecting threads applied to their own living experience.

Indeed, we have the tendency to search for ways 'to hold onto something' while living in the middle of endless changes in our world and ourselves. Thus it is natural to suppose or imagine possible connecting threads, even between extremes and contradictions. The emergence of these ways of interpretation and appreciation of the works is possible in much electroacoustic music because the sound material used in a majority of works is in an almost direct way connectable with the soundings of our everyday experience. The other side of the story is that this easiness might seclude the listener from the symbolic and aesthetic possibilities of the same sounding structures; usually sounds are part of an

everyday life in which they act as indicators and not objects of conscious appreciation for themselves.

This experimentation takes the form of composed *listening experiences*, that is acousmatic compositions and sound installations. I think of the fixed media works as representations of the listening of an imaginary listener who inhabits a sounding environment. The imaginary listener is acting, re-acting, imagining, dreaming and interpreting the environment. Thus the compositional process could be described as two stages of forming, which are naturally overlapping and interacting: the imaginary listener *within* (and) a sounding environment *outside*.

Furthermore the actual listener in a concert situation encounters a sounding world (the composition) where traces of the ‘other’ (imaginary) listener can be found and further transformed by his/her own listening attitudes, intention and attention.

This thesis is divided into two chapters.

In *Chapter 1* the idea of the *sounding environment* is presented; relevant terms, ideas and theories both from the literature of electroacoustic music composition and soundscape composition are introduced, as well as some ways of *listening* as considered by various authors and composers.

In *Chapter 2* the compositional approach both as idea and methodology as applied in the seven submitted works of this folio is presented.

Chapter 1: The sounding environment

1.1 Definitions – Terminology

1.1.1 *The Environment*

Environment is a term to refer more generally to the plurality of things, living beings, conditions, stabilities and changes, which surround us throughout life. It is the world we live in. We are a part of it, it surrounds us, it is simultaneously known and unknown, at times we might interpret it as a familiar ‘framework’ and soon after realise that it is changing in other directions than the ones we might choose, want or could predict. As Ingold states the environment is relative ‘to the being whose environment it is’ Ingold (2000: 20) and takes on meaning in relation to this being.

[...] the environment is never complete. If environments are forged through the activities of living beings, then so long as life goes on, they are continually under construction. So too, of course, are organisms themselves. Thus when I spoke above of ‘organism plus environment’ as an indivisible totality, I should have said that this totality is not a bounded entity but a process in real time: a process, that is, of growth or development. (Ingold 2000: 20)

The term is used also, more generally, with the meaning of all the environments that we know about whether nearby or faraway - but actually we are not part of them, thus we cannot experience them. Additionally our past experience in the environment contributes to the ongoing construction of its meanings for each of us. From the time scale of the human life there are fast, slow, extremely slow (longer than the duration of our life) changes in the environment of which some we might interpret as almost no change at all.

Our environment is perceived by us also as *soundings*. Only a part of the ongoing activity in the environment is audible by humans and these soundings have been

called aural environment, sonic environment, soundscape, environmental sounds, natural soundscape, the music of nature, etc.

Within the *sonic environment* the changing flow of energy accompanies us from the beginning till the end of our lives, whether we are conscious or not of its presence. Sound can indicate movement and action taking place and time in our environment, can be the medium through which messages reach us, but can also be experienced as pure sound without further reference.

We might be able with training to recognise this part of our experience, which is purely aural, but the experience of living in the environment cannot be truly separated from all other sensorial ‘records’. However any attempt to *extract* the aural has as a result an abstraction/reduction which serves as an interpretation of the lived experience. Thus as the *sounding environment* is created every present moment, an abstracted record of it is registered in our memory, somehow, while as the time and years pass, the superimposed past abstractions/interpretations are interacting, transformed further and some of them forgotten. This might be a common process throughout all our lives. When the sounds arrive at silence (physically) they also leave ‘sonic’ traces on the previous and possibly similar records of our experience and thus all past soundings somehow shape our ongoing experience from living in this specific sonic environment, while the record of it in our memory is also transformed. This process can be very slow and unnoticed. It is not fully understood yet it is possible that even these records which we call memories are formed ‘on the fly’ when we recall them.

Thus the soundings in the environment and ourselves, although in different time-scales, are changing. We all contribute to the composition of the *sounding surroundings* more or less. The environment is not the property of humanity alone or of human and other animals together or of the natural forces and animals (humans included). It is endlessly in a state of becoming through the common efforts of all. It is the world we live within and we shape and share together with all the other creatures on earth.

It is difficult to support the idea that we listen to the sounding of the environment as a musical composition at all times in our lives. It seems that the most common attitude is to ignore all these that are not critical for survival, and all that are not interesting for some reason at each particular moment. Additionally the complexity and density of all the information coming through sound may well be beyond our ability to discriminate and simultaneously pay attention to or even to solely appreciate.

This complexity of our experience is not getting less if we reduce the span of our wanderings to our immediate environment. In our everyday life sounds are indications of change, movement or action in the environment and usually we cannot escape from the sounding results. But it is not only what our 'ears' might hear, it is also what we perceive from all the other senses that composes our whole experience, regardless of our (conscious or not) sensorial focus. Furthermore, we are not only perceiving but we also act, react, imagine, remember and forget. Our listening experience within the environment might include also, inner sounds, the 'unheard' sounds of our memory and imagination, the sounds in a dream state condition and sounds evoked in our mind by activities or qualities in our environment. In order to include all these different qualities of our experience of sound I will use the term *sounding environment*.

1.1.2 The sounding environment

The *sounding environment* will be used in this context to refer to this *whole of our living experience* in our environment which we might register as relating to sound. It might include everything that is sounding, seemingly sounding, imagined sounding, remembered sounding, sensed as sounding, composed to sound. It includes thus the actual *sound*, as well as all that is sensed or interpreted as sound, including imaginary sound. Sometimes it not only envelopes us but we also embody it. We contribute to its construction, either consciously or not. It is all that

seems to be *sounding*. The sounding environment depends on our intention and can include imagined silence. Although it is continuously changing and thus never complete, in its complexity it could momentarily be completed by us when we experience that which is not actual but intentional - our silence.

Thus the content of the *sounding environment* as considered in this work is:

1. The *actual* sounds in the environment which include:
 - a) Everything that is sounding from the same space as the listener - either intentionally, or
 - b) Everything that is sounding as a result of everyday life and activities in the environment,
 - c) The sound that is transmitted into the space of the listener via media, for example a past recording, radio, television, internet, etc. that is *displaced soundings*.
2. All that is sensed or interpreted as *sound*. Sounds evoked in our mind from activities or qualities in our environment which do not actually produce any sound.
3. Imaginary sounds and remembered sounds. Inner speech belongs also in this category of sound.

The term *sounding environment* **is not** used here as a proposition of a compositional form in electroacoustic music and is certainly not another name for soundscape composition. It is the environment with the listener together. The musical works presented here are, in different ways, the result of my interaction with the sounding environment.

Considering the potential contents of the *sounding environment* the fact that it is ever changing and as defined here subjective, meaning that it is related to the person who lives within it, there could exist innumerable approaches to it. By

approach I mean a ‘methodology’ of devising, discovering or accepting ‘quests’ and the potential ways towards them.

1.2 Approaches to the sounding environment

The actual sounding environment has been the field of various different aesthetic and research approaches till now. In this section I will briefly introduce two approaches to it from: a) soundscape studies and composition and b) electroacoustic music. As my work is related in terms of methodologies, ideas, inspiration and common grounds to both fields I find it appropriate to mention some of the ideas accompanying me through the compositions of this folio.

Nevertheless this is not an in depth discussion, it is more an index of others’ ideas and descriptions. Some other approaches have not been included here, either as not relevant or as not approached by me through practical composition.

The environment is a main source of our aural experience throughout life, and in different times and musical cultures – through different ways both conscious and unconscious - has influenced the sonic art of that era. Our interaction with the environment through sound has taken the forms of sound-making, speech and music. Even absolute music as Murray Schafer remarks can be considered as ‘ideal soundscapes of the mind’ (Schafer 1977: 103).

It is not so long ago that technology provided us with the devices to record and reproduce sound, thus with the possibility to study repeatedly and in detail the aural manifestation of the activities in a specific environment, our listening reactions to these morphologies and to use these fragments of ‘reality’ in music composition. Before the invention of sound recording devices we relied on our sensory system alone and on memory to investigate, study and maybe understand at a conscious level the peculiarities, forms and meanings of the sonic

environment. Sounds extracted from the sonic environment have been used from the beginning of electroacoustic music.

The complex morphologies of the sonic environment have been categorised in western culture mainly as *noises*. Luigi Russolo (1916) was one of the first to become aware of the expressive musical possibilities of ‘the sea of sound in which we live’ (Russolo in Brown 1984: 1). John Cage in 1937 (2000) remarked that what we might call *noise* at certain circumstances is ‘fascinating’ if we listen to it. And this fascination gives birth to a desire to use the sounds of the environment as musical instruments.

Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating. The sound of a truck at fifty miles per hour. Static between the stations. Rain. We want to capture and control these sounds, to use them not as sound effects but as musical instruments. (Cage 2000: 25)

Cage who might be the connecting influence between Europe¹, America and the Canadians, in his writings and compositions explores the relation of chance, nature, culture, sounds and environment.

[...] one may give up the desire to control sound, clear his mind of music, and set about discovering means to let sounds be themselves rather than vehicles for man-made theories or expressions of human sentiments. (Cage 1958: 10)

One of the ways John Cage approaches ‘nature’s manner of operation into art’ (Cage 1958: 11) is through letting ‘sounds be themselves’. Although both sonic material and structures derived from the sonic environment had been already in

¹ *Luc Ferrari in an interview he gave to Dan Warburton in 1988 acknowledges that: ‘...the meeting which was the most enlightening for me, in terms of philosophy and aesthetics, was with John Cage’, recalling the days in Darmstadt in the 50s. Later in the same interview he says: ‘Cage spoke about everyday life-...Things we’ve experienced have so much to teach us - that’s what was so extraordinary.’ (Ferrari 1988)*

use in electroacoustic music, the conscious consideration of the meanings and symbols they might bear with them, becomes a central compositional issue only later through the soundscape movement in Canada.

1.2.1 Soundscape Studies and Acoustic Ecology

The term *soundscape* was first used by Murray Schafer (1977) to define the sonic environment:

An environment of sound with emphasis on the way it is perceived and understood by the individual, or by a society. It thus depends on the relationship between the individual and any such environment. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an environment. (Schafer 1977: 274)

As he later recalls at that time he needed a word to describe: ‘this turbulence of pleasure and pain my ears were experiencing from the moment I awake until long after I had closed my eyes at night’ and he used it as a neutral word: ‘to imply all or any acoustical environments’. (Schafer 1993: 104)

In the case of a specific space, the term indicates all the sounds the listener might hear in it. A specific soundscape expands to the limits of hearing of the listener, thus it has spatial borders. It has been used also in a more general sense, to indicate a type of soundscape - for example the sea soundscape, the Vancouver Soundscape, archetypal soundscapes, etc. In this case the focus is on the basic characteristics of this sonic environment independently of the different listening positions and ways of listening, listeners and the myriads of different morphologies of the specific type of soundscape. During the years following the 1970s when the term was first used, it has been used from various different people

and sub-cultures of western culture, with slightly different meanings. In the original definition by Murray Schafer the content of soundscape is general enough to allow its use for various totally different practices, musics and aesthetic preferences.

Schafer is a pioneer in the study of soundings in the environment. His work as well as of his co-workers on the *World Soundscape Project* is of extraordinary length and value. This first approach named as ‘soundscape studies’ in the 1970s is synonymous in our days with *acoustic ecology* and there is a large community of people who continue this research. The World Forum for Acoustic Ecology, founded in 1993, is an international association of affiliated organisations and individuals, who share a common concern with the state of the world soundscape as an ecologically balanced entity. *Acoustic ecology* approaches ‘...sound as a phenomenon that is defined not only by acoustical properties, but by its function as a mode of communicating and conveying meaning’, (Gluck 2003: 1) while *acoustic communication* is a term used by Barry Truax (1984) to introduce a communicational approach to the study of sonic environment.

[...] a communicational approach to acoustics deals with the exchange of *information*, rather than the transfer of energy. In other words, it does not deal with sound in isolation from the cognitive processes that understand it. (Truax 1984: 9)

Soundscape compositions have been mostly realised in the electroacoustic medium. Barry Truax (2002) reports that soundscape composition as pioneered at Simon Fraser University since the early 1970s evolved rapidly to approaches ranging from: ‘[...] the ‘found sound’ re-presentation of acoustic environments through to the incorporation of highly abstracted sonic transformations’. (Truax 2002: 12)

The real goal of soundscape composition is: ‘the re-integration of the listener with the environment in a balanced ecological relationship’ (Truax 1996: 59). This re-integration can be achieved through structural approaches, which range:

[...] from being analogues of real-world experience, such as listening from a fixed spatial perspective or moving through a connected series of acoustic spaces, to those that mirror both non-linear mental experiences of memory recall, dreams, and free association, as well as artificial sonic constructs made familiar and possible by modern "schizophonic" audio techniques of sonic layering and embedding. (Truax 2002: 5)

The conscious consideration of the references and meaning of the sounds used in soundscape compositions has also been reported by other authors /composers:

Soundscape composition is a musical form in which sounds are treated as bearers of meaning within an environmental and social context. (Gluck 2003: 1)

Electroacoustic soundscape composition is a technique that treats the acoustic environment as both the subject and the content of a composition, teetering ambiguously on the border between representation and abstraction. (Schryer 1998: 23)

In a soundscape composition it seems that the overall form or parts of it maintain the structures inherent in the recordings of the real sonic environment. At a structural level often works that are characterised as *soundscape compositions* have a tendency to return somehow to the original recordings. An interesting example of this ‘return’ appears in the composition *Cricket Voice* of Hildegard Westerkamp (1996). The piece finishes with the sound of crickets. And the crickets just stop. It is striking how simple and powerful this ending of the piece is, this return to the natural behaviour of crickets, to a reality, in a way. Before

listening to *Cricket Voice* I had never asked myself when, how and why crickets stop or start ‘singing’.

As Barry Truax (2006)² replied to a question concerning soundscape composition in brief: a *soundscape composition* is ‘about something’ and is ‘listener dependant’.

Soundscape composition as Hildegard Westerkamp (2002) states: ‘[...] can and should create a strong oppositional place of *conscious* listening’ (Westerkamp 2002: 52), so that ‘Rather than disorienting us³, such work potentially creates a clearer sense of place and belonging for both composer and listener’ (Westerkamp 2002: 52). Furthermore, Westerkamp (2002) explains the connection of soundscape composition to acoustic ecology, and makes some important observations about the compositional procedures and the composer’s intentions in a soundscape composition, such as that: ‘A fundamental truth about soundscape compositions is that they *emerge*, they can only pre-planned to a limited extent.’ (Westerkamp 2002: 54)

Although my practice appears to have much in common with the practices of soundscape composition, I finally decided not to use the term *soundscape* in this text for the following reasons:

1. The term soundscape, in use since the 1970s, brings with it landscape connotations, and this might result in a visual misinterpretation of the aural. Also a landscape is usually conceived as more static than changing. My principal impression of the environment is that of perpetual flux, of an ever-changing sounding complexity. Thus, if I had chosen to use the term *soundscape* instead of *sounding environment* I would have emphasized this slow changing (even static) aspect.

² *Personal communication in seminar organized by Ionian University, June 2006, Corfu, Greece.*

³ *As in the case of ‘widespread commercial media and leased music corporations, who strategically try to use the schizophrenic medium to transport potential customers into a state of aural unawareness and unconscious behaviour [...]Westerkamp (2002: 52]*

2. Both *soundscape* and the *sounding environment* include the listener, nevertheless in the case of the *sounding environment* as defined here, the inhabitant of the environment might choose to ‘translate’ the *non-aural* by analogy to sound. And this is a part of the compositional processes that I have used in the compositions of this folio.

1.2.2 Electroacoustic music

My intention is to present here selectively some of the approaches which I think might be related to my compositional approach.

One of the main discussions in the field is about the references to the world we live in and our involvement in it as applied in this music. Regarding the materials used in the compositions these references can range from the use of original sound recordings to synthesised sounds heard as reminding us of sounds in the environment.

Emmerson (1986) proposed that we could analyse these works in terms of their position in an axis of *aural* to *mimetic* discourse. As aural discourse he defined materials as ‘abstract and not source-referential’ (Emmerson 2007: 14) and as mimetic discourse, materials that were ‘imitative of, and referential to some aspect of the world not ‘normally’ found in music’ (Emmerson 2007: 14).

Denis Smalley (1992) developed a system to understand sound material, which could be considered as mimetic or representational in electroacoustic music contexts.

The apprehension of musical content and structure is linked to the world of experience outside the composition, not only to the wider context of

auditory experience but also to non-sounding experience (Smalley 1992: 82).

He proposes nine *indicative fields*, which define a combined *network* and the term *surrogacy* (the remoteness from reality) in each of these *indicative fields*. He uses the term ‘source bonding’ for this natural tendency of the listener to search for sources and causes of the sound events: these indicative fields are *gesture, utterance, behaviour, energy, motion, object/substance, environment, vision and space*. Remoteness from reality (surrogacy) can be of first order, second order and remote surrogacy. This remoteness from reality could be also understood as the *real/abstraction continuum* that John Young (1996) describes.

Because they create a sense of detachment from known physical reality these two perspectives ((a) the use of the medium as a virtual sonic world and b) the potential to create distinctions between apparent ‘Reality’ and ‘abstraction’) may be taken as a metaphorical representation of the inner world of imagination, where free and fantastic associations between objects and experiences can take place. (Young 1996: 73).

About the *environment* Smalley (1992) says that musical contexts of an environmental scale can expand the listening space in two ways. Either transporting the listener beyond the listening space or ‘creating a large space for the listener to inhabit’ (Smalley 1992, 1996: 92). Such experiences he remarks ‘are achieved through the relation of indicative content to the spectral texture, spatial orientation, and temporal space’ (Smalley 1992, 1996: 92). He says also that ‘an environmental ‘feel’ can be achieved by combining circumferential orientation with the impression of spatial continuity’. (Smalley 1992, 1996: 93).

Simon Emmerson (1999) remarks that live transformation (of the landscape or space perspective - even of an ‘abstract kind’)

[...] creates landscape functions which our Darwinian ear attempts to relate to real-world experience. The auditory system searches to

establish its frames of reference to *spaces real and imaginary*. (Emmerson 1999: 139).

He proposes an extension of the *indicative fields* to include as well *framing - landscape functions*. Many composers and authors in the electroacoustic era are conscious of the interconnection of real-world sounds and our experiences to music creation as well as to listening attitudes.

Barry Truax (1996: 52) argues that: '[...] environmental sound acquires its meaning both in terms of its own **properties** and in terms of its **relation to context**'. While Luke Windsor (1995: 49) remarks: '[...] musical meaning is not merely an attribute of sound but of the metaphorical structures the listener imposes upon sound'.

Katharine Norman (1996) says about the *real world approach* to composition:

Real-world music prompts a creative state that, while also 'destructing' our normal perception of reality, encourages us to discover it in retrospect, anew. And this process of rediscovery is, I believe, the aesthetic crux of the matter. [...] We, listening to a newly imagined reality, can travel away from both listening, and experiential, assumptions. (Norman 1996: 18)

According to Murray Schaffer (1977: 103) an abstract sonic structure like the compositions of 'absolute music' could be considered as 'ideal soundscapes of the mind'.

Trevor Wishart, (1996: 140) analyses aspects of *aural landscape* and introduces the notion of *aural image*.

He refers also to *imaginary landscape* which results from the combination of unreal objects in a real space while *surrealist landscape* is a special category of landscape of the type 'real sounds/ real space' where the behaviours of the sound sources are surrealistic.

Emmerson (2007) in a retrospection of his own twenty one year earlier introduction of the aural/mimetic axis states that:

Music does not just refer mimetically to the world through such simple means as re-presenting recognizable sounds. More complex dimensions and metaphors have been identified (Emmerson 2007: 14).

And remarks that in the most recent tendencies of the co-existence of both aural and mimetic materials in a wider range of works: ‘the worlds not only sit happily side by side but can strongly reinforce’ (Emmerson 2007: 15).

The recognition (and ‘naming’) of aspects and characteristics of sounds in musical contexts as well as ideas about their perception is critical for the development of listening and compositional methodology. This approach is presented in more detail in chapter 2.

The working environment of a composer of electroacoustic music these days could be somehow described as a lab (or a room in a house) with loudspeakers, various devices to control sounds captured from the environment or sounds synthesised with the use of various synthesis and re-synthesis methods which can all be controlled, programmed and performed from a single object (usually) a computer. What remains the same with earlier times is the ability to play back sounds through loudspeakers in each working environment, thus to listen (if appropriate) to the same sound more than once. This condition might result in the alteration and the differentiation of the listening process. The listening to the actual sounding of the material or of parts of the composition becomes a compositional process on its own.

The different ways we might choose to approach the material we work on through our listening, can become a part of the process.

Yet, this point on earth which is the environment of the composer is a part of a further net of similar points which can be interconnected. Although it is possible

that an idea that we have might change the way we listen - and by that I am referring, for example, to listening in my room through loudspeakers to underwater soundings at the North Pole conveyed to me by means of internet live broadcasting - I am still in my room and I hear through these very same loudspeakers. And whatever else I have in my mind about life under the water is conditioned also by the very real sense of the actual sounds. This greater environment which is possible in our time, is still perceived by us as a part of an actual sounding environment. We might listen, for example, to the previously mentioned broadcast, and the soundings around our studio, inside the room, another live sound broadcast from the Amazon - and all these different sounds are added to the aural 'soundscape' of this very same room. There are of course many theories and ideas about listening. In the next section some relevant ideas on listening are presented.

1.3 Listening to the environment

Listening to the whole of the environment at every present moment seems a utopia. Following the definitions of *hear* and *listen* in common language, I can hear the whole, but not pay attention to the sounds of each different activity as it is unfolding in time and space. It needs practice of attention to follow, for example, two separate listening paths, and more practice to follow three simultaneously while all the other sounding activities are kept in the background of my listening attention. There are of course cases in the environment where the sounds are fewer or almost none, as in the case of an anechoic chamber which is a special case of space, an environment of no reflections - but which is not our everyday environment.

Usually even in the silence of the quiet night in a place with no mechanical sound sources there are enough sounds to stimulate our listening ability. Listening is to follow the sounds attentively and the whole sounding environment is made up of all sounds (real and imagined). Naturally I can hear the ‘whole’ (in this very general sense) in a state of consciousness in which the ‘details’ are not so important, and in which probably all other senses are collaborating in its shaping.

1.3.1 Listening to the sounding environment

It seems that listening is a subjective activity and as such there might be many types and ways of listening. Furthermore, the ways we appreciate the sounding environment are different when we sleep, when we walk, when we rush to catch the train while listening to our favourite music track through headphones, when we climb a mountain, drive a car, get lost in the forest, are on holiday by the river bank, etc.

Listening in general is a complex and creative activity of interpretation in which one directs one's attention to a sound event or series of events or to a larger complexity of sounds. While we listen to the actual sound environment we live in, we are in a specific place but we might also remember other listening experiences; for example the voice of a beloved person coming from nowhere while we are far away apart and doing something else. We cannot separate the hearing/listening process from the rest of our lives.

It seems that the auditory system of human beings is capable of sensing *as sound* a narrow band of frequencies transferred (usually) through the medium of air to our ears. It is also known that we do not use only our ears but our whole body to detect and analyse other vibrations resulting from the same causal sounding event and these are combined with all the other senses to contribute to a multi-sensorial experience. Thus, the soundings and their experience cannot be reduced to the vibrations which reaches our ears alone.

Hearing is but one of the senses. As Steven Connor notes:

The senses are multiply related; we rarely if ever apprehend the world through one sense alone. ... Indeed, we might enunciate a paradoxical principle: that the more we concentrate or are concentrated upon one sense, the more likely it is that synaesthetic spillings and minglings may occur. (Connor 2004: 153)

It seems that in order to understand how we listen one should consider research in physiology, psychology, neurology, acoustics, experience from different professional groups, anthropology, sociology and furthermore personal and also cultural habits and beliefs. Such a detailed study is beyond the scope of this thesis.

An interesting theory expressed by Ola Stockfelt (1997: 89) suggests that *daily listening* is often more conditioned by the situation in which one meets the music than by the music itself. Stockfelt introduces the idea of *adequate modes of listening* within genre-normative listening situations. For each musical genre, a

number of listening situations in a given historical situation constitute the genre-specific relation between music and the listener.

[...] adequate listening hence occurs when one listens to music according to the exigencies of a given social situation and according to the predominant sociocultural conventions of the subculture to which the music belongs. (Stockfelt 1997: 91)

This theory is somehow supported at least partly by Steven Connor (2004) as he states that:

Cultures are sense traps that bottle and make sense of sensory responses, but they are also sense multipliers. (Connor 2004: 156)

According to this theory, listening to the sonic environment from the 'subculture' of the electroacoustic music composer is somehow framed from the previous experience of this music, and normative 'rules' (if any exist) of this culture. It is also framed from the personal experience of the listener, which in turn might be constrained by his/her cultural background. There might be a different approach to the sound of cicadas for a person who was born and grew up in a country where cicadas live, for example. Nevertheless regardless of the cultural and personal background of the listener, which might influence the ways of listening, listening to the environment has some basic characteristics which might be common for most people of a similar culture.

Every day listening is the experience of hearing events in the world rather than sounds per se. (Gaver 1993: 1)

William Gaver, (1993) notices that the distinction between everyday and musical listening is between *experiences* and not between sounds or psychological approaches.

It is possible to listen to any sound either in terms of its attributes or in terms of those of the event that caused it. For instance, while listening to a string quartet we might be concerned with the patterns of sensations

the sounds evoke (musical listening) or we might listen to the characteristics and identities of the instruments themselves (everyday listening). (Gaver 1993: 2)

Both *every-day listening* and *musical listening* modes could emerge while listening to the soundscape. Murray Schafer (1977) makes an analogy from *visual perception* and suggests -

[...] The terms *figure*, *ground* and *field* provide a framework to organizing experience. (Schafer 1977: 152)

But, he believes that this framework is the product of a set of cultural and perceptual habits, in which experience tends to be organized along perspective lines with foreground, background and distant horizon. He also gives us the example of other societies, which never developed the habit of perspective viewing, like Eskimo and (some) Chinese.

Katharine Norman (1996) describes *ordinary listening* as a complex, multi-layered activity of which hearing is but a part.

In going about our everyday listening lives we take several different, but interdependent, stances, which amount to a dynamic construct. References, memories, associations, symbols – all contribute to our understanding of sonic meaning. (Norman 1996: 2)

Further more Katharine Norman talks about *referential*, *reflective*, *contextual* and *self-intended listening*. In *referential listening* we tend to understand sounds as referring to objects or events (we use memory to recall this information).

About *reflective listening* she writes that:

This reflective listening is neither a contemplation of an action invoked, [...] nor a meditation on a sound's extra sonic cultural history, but a creative, enjoyable appraisal of the sound for its acoustic properties. (Norman 1996: 5)

Reflective and *referential* listening are working together: ‘as a means of synthesizing our knowledge and our enjoyment of real-world sounds’ (Norman 1996: 5), while *contextual listening* relates: ‘the material to the context of our individual history’ (Norman 1996: 5) and influences our ‘imaginative wanderings’ and the meanings that sounds provide. *Self-intended* listening is invoked when through intention we make the transition from hearing to attentive listening.

[...] self-intended listening occurs when the imaginative decisions that lead to a creative or analytical consideration of sounds are [...] of our own volition. (Norman 1996: 11)

Pauline Oliveros has developed a system of musical and listening practice called *deep listening* that is intended to: ‘heighten and expand consciousness of sound in as many dimensions of awareness and attentional dynamics as possible’. (Oliveros 2005: xxiii)

Simultaneously one ought to be able to target a sound or sequence of sounds as a focus within the space/time continuum and to perceive the detail or trajectory of sound or sequence of sounds. (Oliveros 2005: xxiii)

Through this practice three types of listening are developed related to the focus of our attention: *focal*, *global* and *multi-dimensional* listening.

Barry Truax (2001) distinguishes three basic types of listening and levels of attention: a) *Listening-in-search*: A very focused way of listening in which one listens for some specific sounds, or voices, b) *Listening-in readiness*: while attention is somewhere else the listener can react to specific sounds, voices and signals, c) *Background listening*: we are not listening for any particular sound.

Denis Smalley, combining the four listening modes proposed by Pierre Schaeffer with Schachtel’s ‘modes of perceptual activity’ proposes three types of relationships to sound: *indicative* in which the sound is a message or carries

information about the environment; *reflexive*, where the basic emotional responses to the sounds are dominant, and *interactive* in which structural hearing is possible and is closely connected with Schaeffer's *reduced listening*. Furthermore he notes that these 'relationships are subject to perceptual shifts'. (Smalley 1992, 1996: 82)

In *reduced listening* the listener is trying to 'throw away' the connections with any sound-producing source and focus on a sound's structural elements and forming. The sound thus becomes an object for various transformations many of which are relative to the potentiality already embedded in it.

Francisco López (2001) describes what he calls *profound* or '*blind listening*':

Whenever there is such a stress on the representational/relational aspect of nature recordings, the meaning of the sounds is diminished, and their inner world is dissipated. Counter to this trend, I believe in the possibility of a 'blind listening', a profound listening that delves deeply into the sounds and is free as much as possible from such constraints. This form of listening doesn't negate what is *outside* the sounds but explores and affirms all that is *inside* them. (2001: 163)

The number and the spanning of the above mentioned ways of listening, some of which naturally overlap, is an indication of the importance given to listening from the wider community of western music theoreticians and practitioners. In many ways listening is considered as a subjective, intentional approach to sounds, which can have many forms and ways, shifts and changes and which can be a part of the *compositional process*, too.

When we become aware of the sound of flowing water and we focus our attention on it – there are several ways, levels or approaches to it. For example we might feel as if we travel on and into the water – because when we *tune in* to this sound, we might become like resonant spaces where the flowing water is reflecting. One might feel also as if the sound becomes a vehicle, the medium with which we fuse. Through listening and sensing we become the sound. This moves beyond listening.

Reciprocally when we perform with our body larger complex movements within our environment, like walking for example, then we combine different rhythms

and it seems that there are at least two areas of equilibrium. In the first, transparency allows the simultaneous movement of different streams which coexist without collision. In the other, a type of fusion between the streams might happen. When we listen to the complexity of our everyday life, all these coexisting flowing streams are sounding around us; both independency and fusion in their perception coexist, but at different levels of attention, empathy, remoteness, transparency, and collision. Listening can be sensing while continuously changing focus between transparency and fusion; an interplay between holistic and focused awareness of the sounding environment. This type of 'listening' is also a way to become aware simultaneously of the greater whole, the local and our self within (the seemingly internal)

My concern however is that we might overuse the term *listening* for a process where listening might be just the 'conductor' of all the other senses which combined result in such experiences as 'to become the water'.

Listening is discussed here not only as an objective but also as a subjective, intentional and creative process, even metaphorical - to 'sense' or imagine the other than sonic environment as *potentially sounding*.

I am suggesting that we can listen to the non-sonic environment as if it is in a way 'sounding' - the imagined sounds, the seeming sounds, those that are by analogy like or similar to sound. This type of '*listening*' could be considered as a type of 'translation' of the other than aural information coming from our senses *as if* they were sounding. One might consider this as a type of creative 'sonification' (or *echopoesis* - ηχοποίησης in Greek). Listening with the intention to 'grasp' the essence of the non-sonic in order to reveal the sounding potentialities of the non-aural in the environment.

This type of *echopoetic* '*listening*' has been practiced and applied to the compositional process in *Jyoti*, *Reverberations* and *Prayer* and is discussed in relation to the compositions further in Chapters 2.2 and 2.3.

Chapter 2: The compositional approach to the sounding environment

In *Chapter 2* the compositional approach both as ideas and methodologies as applied in the seven submitted works of this folio is presented. Section 2.1 is presenting some basic structural elements of the actual sounding environment. In section 2.2 the general methodologies applied in the compositions are presented and in section 2.3 the compositions of this folio are presented individually.

2.1 The Elements

The aim of this section is to address basic structural elements and functional factors of the *actual sound environment* as they were considered during the compositional approach. It is not in any way a model, not even a sketch of it. Additionally only a small part of the literature around the sonic environment is addressed here. The area is multidisciplinary and probably the research on any ‘objective’ conclusions is still in its very beginning. My intention is to solely refer to those descriptions by others which were considered in the compositional approach.

Figures 1 and 2 illustrate the possible changing perspective and context of the actual sonic environment while the listener moves or the acoustic field of the sound source is changing.

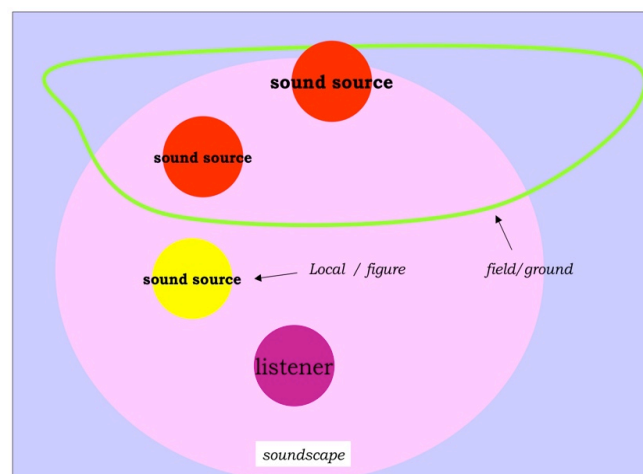


Figure 1 Sonic environment instant A

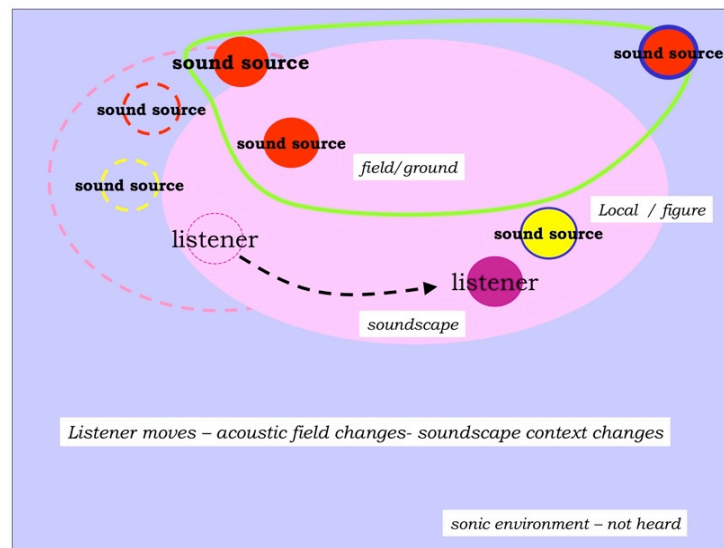


Figure 2 Sonic environment instant *B*

In Figure 1 we see an instant of the sonic environment of a listener that consists of two sound sources on his/her left (red) and one more (yellow). These could be perceived as field/ground (the red ones included in the green outlined shape) and local/figure (the yellow one). In the next instant (Figure 2) the listener has been moved to a new position (we see the older one with the dotted lines), two sound sources from the previous instant have been silenced (with dotted outline), and two new sources have been added. Inside the green outline we can see what the listener experiences as background, in the pink circle we see the specific soundscape of its instance and the blue surround is the larger environment in which the audible is situated.

Schafer (1977) makes a general distinction between two types of soundscapes: the *Hi-fi* environment: one in which sounds may be heard clearly without crowding or masking and the *Low-fi* environment: one in which signals are overcrowded, resulting in masking or lack of clarity. Furthermore he proposes a categorisation of soundings heard according to the function within a community as:

1. *Sound event*

The smallest self-contained particle of a soundscape. It differs from the sound object in that the latter is an abstract acoustical object for study, while the sound event is a symbolic, semantic or structural object for study, and it is therefore a non-abstract-able point of reference, related to a whole of greater magnitude than itself. (Schafer 1977: 274)

2. *Soundmark*

[...] a community sound which is unique or possesses qualities which make it specially regarded or noticed by the people in that community. (Schafer 1977: 274)

3. *Sound signal*

Any sound to which the attention is particularly directed. In soundscape studies sound signals are contrasted by *keynote sounds*, in much the same way as figure and ground are contrasted in visual perception. (Schafer 1977: 275)

4. *Keynote sound*

[...] are those which are heard by a particular society continuously or frequently enough to form a background against which other sounds are perceived. (Schafer 1977: 272)

He remarks that: ‘often keynote sounds are not consciously perceived, but they act as conditioning agents in the perception of other sound signals.’ (Schafer 1977: 272)

He further speaks of *acoustic space* which he defines as the:

The profile of a sound over the landscape. The acoustic space of any sound is that area over which it may be heard before it drops below the ambient sound level. (Schafer 1977: 271)

About the ecological balance of the *natural soundscape* there is an interesting morphological statement, which is based on the observations by Bernie Krause (1993) named as the *Niche Hypothesis*:

Acoustical spectrographic maps transcribed from 2,500 hours of recordings confirmed (that): animal and insect vocalisations tended to occupy small bands of frequencies leaving “spectral niches” (bands of little or no energy) into which the vocalisations (fundamental and formants) of other animals, birds or insects can fit. (Krause in Wrightson 2000: 11)

Brian Gygi (2001) defines as *environmental sounds* these naturally occurring sounds, which are non-speech and non-music. His study is focused on the factors involved in the identification of *environmental sounds* and below is a short summary of the experimental results of his research.

1. The most important frequencies for identification of environmental sounds are in the 1200-2400 Hz region, however, environmental sounds seem to have a greater amount of information in frequencies above 2400 Hz.
2. Environmental sounds can be severely high- and lowpass filtered and still be identifiable.
3. As with speech, the ability to recognize environmental sounds is extremely robust despite removal of spectral information.
4. Environmental sounds have a multiplicity of acoustic cues available to listeners, due to their complex spectral-temporal composition. (Gygi 2001: 167)

2.1.2 Structural elements

The morphologies of the *sonic environment* in general terms could be divided into two types of ‘components’ which combined might give us the sense of being in an environment. There are sonic structures, which have a long cycle of evolution and we usually perceive them as a slightly changing entity - usually predictable by the inhabitants of the environment - a continuum. This sonic continuum is mixed up with sonic elements, which are almost unpredictable and usually are perceptible as

events, actions and gestures in meso-time level. The continuum is functioning both in micro- and macro- time level and is composed from myriads of parallel and possibly interconnected interactions in which we focus our attention, or not. What is foreground is a matter of attention.

The following elements are combined only in the sense of a raw ‘sketch’ of a composed sounding environment and are based on the idea that usually in the environment we perceive sounds as *events*. It is not so often that a sound object appears suddenly in the bus for example, although it can happen. A sound texture then could be considered as composed of smaller gestures. An event can be fragmented, and we could have sequences of events and after that streams. Many streams can result in ‘noise’⁴. Between noise and many streams is the area of microsound. Although I have used granular synthesis in these works microsound was not the focus of this approach, thus these types of sound morphologies are included conceptually here between many streams and noise.

Elements

Fragments of sonic events

Sonic events

Sequences of events

Superimposition and thus interaction of sequences of events

Stream of events

Many streams of events

Noise.

⁴ *As noise at this point I mean dense complexity.*

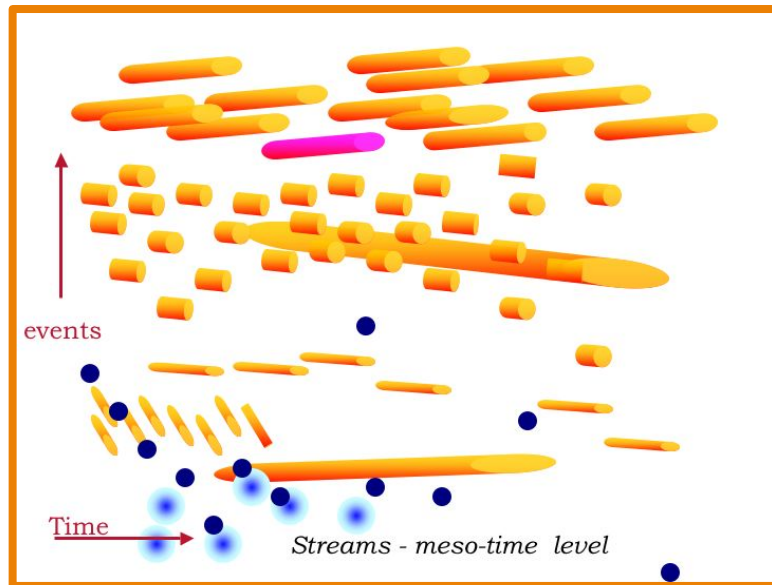


Figure 3 Streams of events

One could structure these basic elements according to:

Density, changes of density, types of movements of events, sequences, streams, layering of streams, noise and silence, stability, types of spaces created, position of the sound sources, their movement in space (fixed position in space, area of movement), etc.

In Figure 3 we can see an instant representing streams of events having different densities. It is a kind of imaginary score of a possible coincidence of the sound flux.

The combination and varieties of the above elements could signify: actions of other inhabitants, imaginary or remembered context, environment – background, etc.

For example the change of speed in simultaneously sounding different streams of events can create the illusion of movement.

2.2 Methodologies and practicalities

Every composition presented in this folio has its own focus, methodology and development. Apart from the fact that they are all focused on aspects of the sounding environment, each of them is somehow the result of a different ‘encounter’ with that environment.

There are however some common threads in all these works regarding the methodology, the ideas and the processing. These common threads will be presented and discussed in the following section.

2.2.1 Out in the fields

2.2.1.1 Recordings

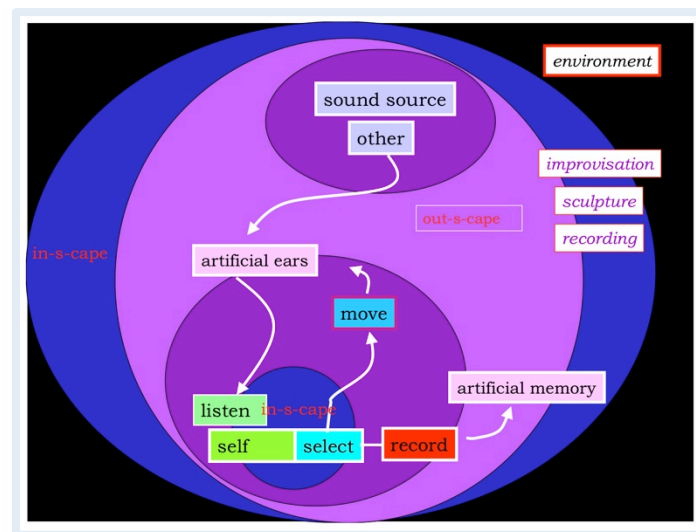


Figure 4 Recording in the fields

Figure 4 is a representation (designed early on during this research) in which we can see the listener while recording just one sound source. It is simplified. Nevertheless, we can see the recordist (myself) who listens through headphones (artificial ears) and the ‘other’ (the sound source). The recordist’s actions can be

listen, select (how to listen and what to record), *record* to the machine (which is the artificial memory) and *move* (change position in relation to the sound source).

During the years of this research I have been recording both intuitively and systematically. This has, as a result, generated a large number of hours of recorded sound material which has not been used directly in the compositions. When I started this research I was recording on mini-disk and dat tape and later on hard-disk recorders. The microphones and the recording set-ups I have used are various and different (see Appendix IV). Each of these recordings is by itself a different listening approach within an environment and some of them are '*listening improvisations*'. I will present the general methods I used, as it is not possible to talk about each of them within the limits of this text.

I. Recordings of moving perspective.

That is recording while listening through headphones and moving slowly in the environment with the microphones. The system microphones and headphones are somehow an extension of my listening, both in terms of focusing on a particular sound source, and of amplification of 'smaller' sounds which otherwise would not be recorded loud enough to be useable in further processes or on their own. I have performed quite a lot of recordings using this technique, either trying to balance myself within the environment as a whole, or trying to record the sounding of different approaches (recordings of movements) to a fixed sound source. Probably, this is not a new technique, but an 'instrument' which I have used to perform such actions and to record them.

II. Recordings of fixed perspective.

That is myself and the system microphones and headphones are in a fixed position and direction in the environment. I used this approach: a) to record longer duration fragments of the environment from a fixed position while I was listening carefully from the headphones; b) to leave the recording system alone somewhere, so that my presence did not interfere with the inhabitants of the area - this was used solely for recordings of birds and bees; c) in windy conditions in order to avoid the characteristic sound of wind on the microphones I hid the microphones

in found ‘windshields’ - in bushes, stones, small protective holes, etc. This proved also an interesting way to apply ‘found’ filters in the recordings; d) place the microphones in areas where I could not easily place my ears - for example during the composition of *Rustlings* I placed the microphones in the listening position of the oak trees.

III. Inventions, unexpected situations and discoveries.

It seems that it is a rule of recording in the field that something will go wrong, something will be forgotten, the batteries will stop operating, the wind will start blowing exactly at the moment that it shouldn't, a car will pass from the nowhere, etc. Outside - and also inside - an environmental recording cannot be fully predictable. Thus even if it is not his/her intention one has to improvise and find solutions from the nearby available resources. The other very important thing is that miracles and discoveries can happen any time, anywhere - and after some time one learns to be prepared and to listen in to the environment, either while recording in ‘artificial memory’ or just in memory.

There is a recording of such a rare coincidence which I used almost as it was recorded in the stereo fixed version of *Αντηχήσεις (Reverberations)*. It is Sunday morning, it is raining and I have placed the microphones outside the window and suddenly the bells of the church start to play very loud on top of far away thunder, which as soon as the bells stop suddenly comes near and louder almost on top of the roof of the building to continue as a reply to the bells, a ‘thundering replying gesture’. This type of sequence was a coincidence but it sounded as if someone did this on purpose (cause-effect). So I used that in the piece as a record of a rare coincidence which was not composed but found.

IV. Listening while recording and listening after.

Soon after the first recordings I realised that, even with the extension of my hearing through headphones, there were activities and sounds in the recordings which I had not noticed during the recording session but discovered them after.

For example in *Rustlings* in 2:51:778 there is the sound of the wings of a bird flying up through the foliage of the oak tree. This sound was recorded (sound example no. 1) with the microphones inside the tree, and me down but very close. I remember myself listening very carefully through headphones with closed eyes, and I was listening for the rustlings of the leaves. I wanted to record this almost unheard smooth gesture of the wind on the leaves - and it was a good day for this. The bird which flew away five minutes after the recording started should be at most one meter away from me, and I did not sense its presence, nor did I hear the sound produced by its flapping wings. Back in the studio, listening to the recording, I was amazed. And this is how I realised how many details of sounds we never hear in our every day life - and that indeed even attentive listening is an interpretation of the actual soundings in a given time and space.

V. Listening while recording without headphones

This was an approach I used later, having in mind that: as I am just recording and not performing or interacting with the environment right now, I do not need to listen at all times through headphones. It might be interesting to compare later my listening without headphones with the recording. Indeed this proved to be a useful device for my listening practice on the soundings around, as I was creating two listening paths of the same experience to consider later: my listening without equipment and artificial additions, and a good recording. Thus I allowed myself the freedom to listen more creatively in the field, too. Soon, I started to use this kind of recording even for performing with the microphones on hand, trying to imagine what the microphone 'listens to' now.

2.2.1.2 Sound walks

The sound walk is a practice that was introduced by the World Soundscape studies team in Canada. It is a basic practice of experiencing without the aid of technology the soundscape and also (and as such has been applied) a simple

powerful practice of re-discovering the sonic dimension of our environment, as well as our listening within it. I was introduced to the practice of sound walking by Hildegard Westerkamp in a seminar which she gave in July 2006 in Corfu, organised by the Music Department of the Ionian University. I knew what a sound walk was from theory, and also from performing listening walks alone for years, but I had not imagined that it was different, even if you are a conscious listener to the environment for so long, when you do this as member of a group and you follow the directions of someone else.

In a sound walk the two basic conditions which allow the emergence of various listening ways are:

- a) There is someone who chooses the route, the tempo of walking, durations of walking and of stops, the beginning and the end of the walk. This is very useful because it allows the team to get guided, that means in this case that they do not occupy their minds with decision making, at least about the route. Also it is very interesting to listen together with others in a non-concert situation.
- b) The participants do not communicate using speech.

Soon after I started to perform sound walks with my students and thus I had also the experience of leading several sound walks in various conditions, with different people. I think that this practice was important in my own research in the sounding environment, at least at the level of the practical approach.

2.2.1.3 Listening Paths

During the composition of these works I consciously tried various ways of listening, having as target the environment as a whole, listening and keeping notes on the ways of my listening. That is how the idea of *listening path* was born in my mind. Every listening experience creates somehow a 'path'. The path that the listening attention shapes while wandering or 'focusing' between the different soundings of the environment. It is a metaphor. The idea was that the whole of the

sounding environment might be experienced, to a certain degree, through the creation of several listening paths within in. This of course needs time. Additionally the re-listening of a sound recording at the same time-space where a listening performance had happened was a device to compare and transform the listening experience.

Rustlings is a composition in which this method and ideas were applied more consciously, but the idea of listening paths (which can be the result of a sound walk) was there earlier in *in-s-cape III*. In a way it is the most simple metaphor for our whole life experience - that we cross a path, create a path, follow a path, and so on. It is not something new, it is a very old and common idea which I intuitively applied in my compositional approaches.

Furthermore the very real working environment and the tools I used for the forming of the works presented in this folio was (as in most cases) an important factor of my experience. I am referring to the smaller (both in size and degree of unpredictability (most of the time)) environment of the studio. More general details about equipment, operating systems and tools are included in Appendices.

In the following section only some general practices and approaches are presented, applicable in most of the works presented.

2.2.2 Into the studio

The interfaces used for the realisation of the ideas are sometimes important in the sense that they allow or not the creation of ‘paths’ towards a target: from the ideas (of soundings or of other ‘substance’) to the work.

An interpretation of the complexity of the sounding environment *as soundings in layers*, might be influenced by the use of multichannel recorders, and their software implementations. Additionally and in parallel, the practice of listening to the same recording⁵ more than once although it might be a way of re-experiencing the first ‘listening’ and discovering ‘hidden’ details, refining and expanding thus the limits of potential experience it might result in the reduction of the possible ‘listening paths’ of this fixed recording. This process could be conceptualised as the passing from a polysemic sound object⁶ to a less polysemic one. Repetitions in the actual world are not exactly the same. A recording is the ‘capturing’ of a past process which probably will not be repeated again as such, but which with the technological means of our era is possible to be repeated, again and again. What is the same in this case is not the recording with the ‘original’ but the recording with its repetition.

In order to allow myself limited freedom from the tools and from the offered ways⁷ of interaction with the sound ‘material’, I experimented in the creation of new ways (for me) of interaction. This means that in addition to the use of already established ‘tools’ I constructed some ‘hand-made’ algorithms⁸ mainly in Max/MSP which allowed me to explore other paths to the work from those

⁵ *Recording is used here both for recordings and recorded sounds which have been the result of a generative process using a sound synthesis algorithm, for example, as long as it exists on a fixed medium. (a sound file on a hard disk)*

⁶ *or ‘sound matter’ according to Francisco Lopez.*

⁷ *I am referring to the general interface of most mixing software such as Pro Tools, etc.*

⁸ *Mostly designed in Max/MSP programming environment, or Pd, with the use of various controls, often including a ‘real world’ sounding object.*

already offered. These handmade tools are not in any way new synthesis algorithms or interfaces of a more general value. They have been constructed in the given time I had, for the purposes I needed them, because it was easier for me to make a simple tool to interact with than to follow a complicated path of connections and transfers of files or data from one software to another.

For example there are some sound materials used in the compositions of this folio which were the results of my interaction with a single number box controlled by a mouse. In *in-s-cape I* most of the note-based sound materials I have used are edited recordings of improvisations on an ‘instrument’ which allows a two voice polyphony in a way that every time I press a key on a midi keyboard I change (from the 2 sine waves), the pitch that corresponds to the note I pressed one step back.

The filter

One of these types of interactive algorithms is a modification of the fft-filter included in the Max/MSP examples (*forbidden planet*), designed by Cort Lippe and Zack Zettel. I constructed an interface which allows a kind of crossfade from one instant of the fft filter to another instant. This module allows the user to save several instances of the fft-filter (designed using the mouse). The input of the filter can accept any audio signal source (microphone, soundfile from hard disk, other audio from Max/ MSP), and the output can be either routed to any other sound module, or to be recorded to the hard disk. The user can change in real time: a) the duration of crossfade between two instances of the filter, b) when the crossfade will start and c) between which instances of the filter the crossfade will happen. Figure 6 pictures some of the instances I have used in the improvisations, and Figure 5 the Max/ MSP patch.

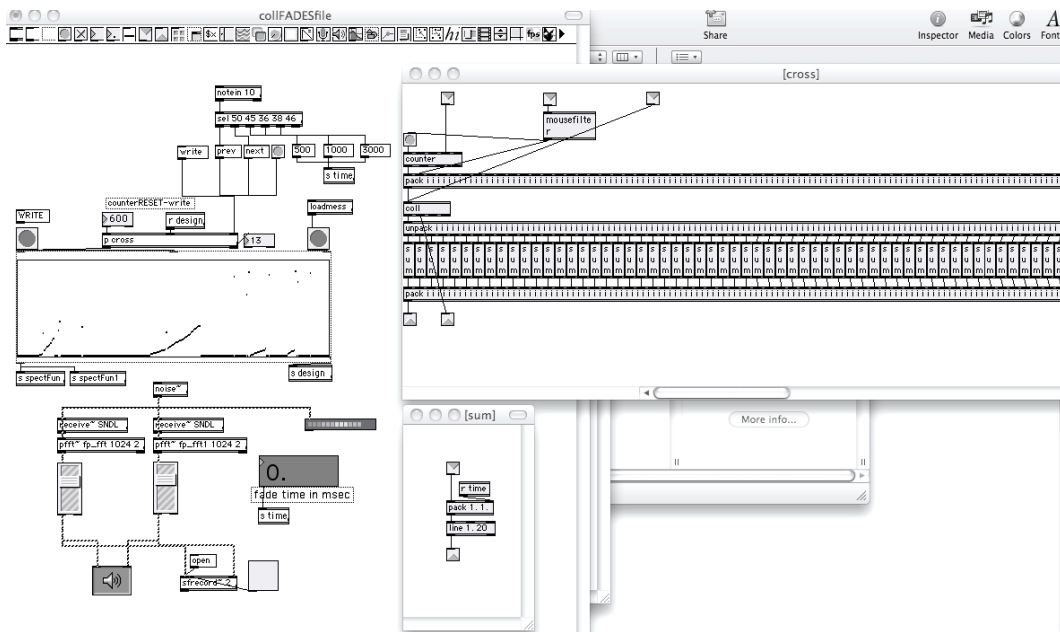


Figure 5 Max/MSP patch colIFADES

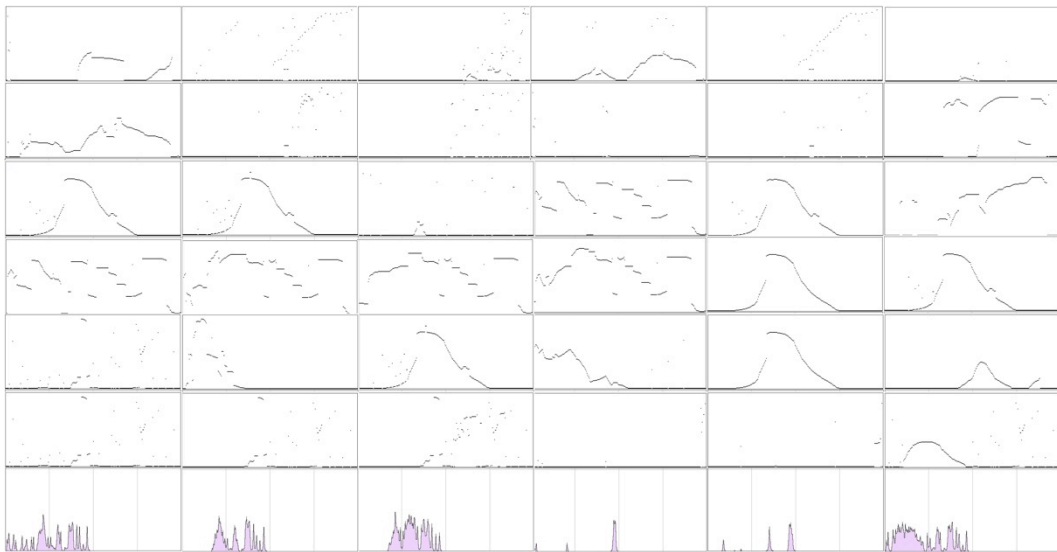


Figure 6 Some instances of the fft-filter

As a large part of this work was with transformations of recorded sounds, which naturally were processed with various and different software tools in different

operating systems, the only way to keep track of their transformations was to take notes in a kind of *'family tree'* hand drawings and also to give them names according to the source and the transformations. Very soon the name become too large so I was giving another name to the file, according to its sounding or the idea or the family of sounds it was closer to. This re-naming was also a useful tool in order to change my impression of the very sounding. There are of course sounds which never found a place in a work, and also sounds which were found in another time and year, and I do not know their origins for sure. This is the category of *lost and found* sounds.

Considering the previous mentioned approaches while in the studio environment, which are a small part of the whole, I might say that it is by itself a journey sometimes with a precise target, and sometimes a wandering in the dark.

2.3 Compositional Approach

In this section the individual compositions are presented, in chronological order of their composition. The basic ideas behind each, some graphical scores, drawings, photos and the reference to some sound examples are included in the text.

The compositions, the sound examples, and the additional materials (audio and visual) are included in the DVD and CD submitted together with this written part.

Their contents are presented in Appendix IV.

2.3.1 in-s-capes

in-s-cape I (stereo acousmatic, duration: 14:30) July 2004 – revised 2006

in-s-cape II (stereo acousmatic, duration: 11:00) October 2004

in-s-cape III (stereo acousmatic, duration: 16:30) July 2006

in-s-cape I is the first work I composed during the years of my PhD studies. The idea of creating works that could potentially be perceived as environments due to their forming rather than their contents was already there. At that time (2003-2006) I wanted to compose sounding environments which through the emergence of the sense of being in an environment would afford the emergence of a listener-dependant experience of the union of the internal with the external.

Naturally and in parallel with reading and thinking I started composing and experimenting with sounds, recordings, improvisations and studio work in an intuitive way, taking myself the part of the listener who is wandering in the environment and interacting within it. From these wanderings and confusion of ‘roles’ two ideas close to my aim were shaped and developed through the composition of the three *in-s-capes*. Furthermore through this ‘practical’ first approach and encounter with the sounding environment my ideas about it were transformed and developed further.

2.3.1.1 Imaginary sonic journeys

One of the ways to explore the world is to change position within the environment. As the experiences from each different position together with the ways of approaching and leaving these positions are integrated within ourselves our ideas, senses and feelings about the environment are shaped, transformed and we become able to recognize the known and the unexpected.

This continues in most of our life activity, which can result in different experiences for each of us. Changing the position of my body in the environment, might mean that I walk, run, climb, lie on the ground, stay still for a while, I change the posture of my body, etc. Performing all these actions I am hearing, too, although my attention might not be focused on the soundings at all times. It seems that most people on earth have this basic experience of *hearing while moving* in the environment.

As the environment is changing while we are changing it seems that an important factor for our survival is the development of an ability to ‘tune in’ and balance our own movement with the changing whole that is surrounding us. These two very complex activities of *tuning in* and *balancing*, which usually we perform in an automated mode are probably partly responsible for our impression of the degrees of continuity in our own experience.

While working on these compositions and experimenting on how to create with sounds the *sense of being in an environment* I walked into various places having my listening attention focused on the soundings. The more I was focusing on listening the slower my movements in the actual places were becoming. It seems to me that without practice it will not be possible to walk on the mountains or in a big city in this condition, for a long time, safely.

Additionally and intuitively I decided that if the actual environment is so complex, changing continuously and as large as the whole world - at least - then a possible way to understand how I could create the experience *of being in an environment* could be to start exploring my environment and my listening habits and reactions within it, more consciously than before. In a way I was on a journey in my own life. That is how the idea to organise the material in a *journey*-form and consequently the idea of *imaginary journeys* was born. The journey as a metaphor is very common and very often used in most areas of our life.

Furthermore, and considering a possible model of the environment, I felt that an imaginary listener could as well be placed in this ‘model’ in progress. Consequently, as the listener might also act, interact, think, imagine or remember,

an additional condition to this interaction with the environment was considered and was shaped mostly in an intuitively way.

This non-linear general framework could also be considered as a story. That there are two coexisting worlds: the inner world of this imaginary traveler-listener and the environment which he/she encounters. The traveller is wandering between and within these worlds which were named respectively inner soundscape and outer soundscape.

This idea of inner and outer soundscape was used for the three acousmatic compositions, *in-s-capas I-III*, which have been also developed as imaginary journeys. Naturally the actual traveller, listener and performer through the development of these three compositions was myself.

Although it is more than possible that there is no such land as inner soundscape in the real sense, this concept functioned to explore ideas and theories about imagination, reality and abstraction, memory, inner listening, sounds in dreams as they have been approached also by others. Additionally the interaction between these two worlds as a model was used in the compositional process, as well. These ideas and some of their connections with the relevant literature are presented in the next section.

2.3.1.2 About inner soundscape

In our every day life we are exposed more or less continuously to sound. There is no real silence (no-sound) in the external world. We can also hear sounds in our mind, which are not coming from the external world. I will refer to these sounds as inner soundscape.

Where does inner start and outer stop? Is *outer* what we perceive from the outer world and *inner* what we think and imagine? Considering the distinction between inner and outer from the point of view of our physiology, only a small part of the world's complexity (out) is passing through our sensory systems to be filtered further by our perception mechanisms. Our sensory system is *inside* our body, so one may think that what comes from *outside*, the moment that touches the surface

of our body, transforms to *inner*. Although I do listen through my sensory system which is located inside my body, I know that the sounds are coming from outside - I do not imagine them - they exist outside of me.

Outer soundscape is defined by the sounds we listen to coming from the environment, including the sounds we produce, while *inner soundscape* consists of the sounds we imagine but do not listen to through our (physical) sensory system. Inside us we can listen to sounds, voices and we can imagine new sounds. Furthermore inner soundscape emerges during sleep, in our dreams.

Context and the functions of the inner soundscape

Inner soundscape is tied in with an individual person. Although any research on its functions, properties and modes of operation can only be subjective, there might be some applications of its modes of operation in composition. Nevertheless, the function of inner sounding is not only to imagine, it seems that the ways of operation of inner soundscape are similar to the ways creative imagination works.

Functions

1. Interaction with the environment in our everyday living
2. Imagination
3. The soundscape of our dreams.
4. Day dreaming
5. Inner Speech

Context

- A. Memories - Experiences
 - a. Languages
 - b. Sound events

- c. Sonic memories
- d. Other memories
- e. Patterns in nature and culture

B. Imagination

C. Other

Inner soundscape is also the soundscape of our dreams. Time flow of our inner reality is not always continuous or linear. It is possibly a pool of sonic memories and records of reconstructions, abstractions and patterns of behaviour. Inner sounding is in dialogue with our life and the environment. We are not always conscious about what is sounding inside us. Inside us a sound might be different from its original experience. There exist sounds and relations that do not exist in the real world we perceive through our senses. Inner soundscape is boundless while outer soundscape is limited. The whole environment potentially can only be imagined inside us. Although there are cases in which *inner* and *outer* soundscape are inseparable, we are usually in a position to make the distinction. In our every day life inner and outer coexist and interact.

Our inner soundscape is a personal sound scene, consisting of our thoughts, music remembered or improvised, fragments of filtered memories, imagined sounds and scenarios, voices of people we know, dreams we remember. We can live our ordinary life, while 'inside' us we are talking to ourselves, singing, dancing, imagining, or replying in silence to the environment. Sometimes we externalise some parts of our *inner* sound scene spontaneously and sometimes we think before we do this. There is a natural interaction of the inner and outer, where inner often operates as a testing scene, an integrating area of the information coming from outside and thoughts, ideas and memories emerging from within.

In this respect *inner soundscape* has a tendency to follow a time flow, which relates to the present time in the *actual environment*. There is however a certain distinction regarding time. While in the *outer scape* a linearity of time passing is

dominant and it consists of the soundings within a certain place, *inner soundscape* is boundless in regard to its context and time flow. There could co-exist different times and places. It is the place where our imagination can reconstruct, construct, connect, delete, remember and forget.

It seems that there is a reciprocal relation between the loudness of inner and outer-scape, at least in our everyday life. When our external conditions demand our full attention, we live in the present and it seems that the inner world silences. But this is not always, true. Much of the materials of the inner *soundscape* are memory records of our experiences. Both *inner* and *outer* are understood from us through our consciousness which is operating in the *present* time.

Moreover, if the composer serves as a kind of interface between the inner world and the environment then *inner soundscape* is the source and the means of his/her musical expression. *Inner soundings* might not be the primordial source but they form a 'place' where sources are mirrored, unfold and interact. Studying this 'place' could be a process of self-knowledge, of immersion and emergence while using the 'findings' in composition might be of some importance, at least for the present author.

Inner soundscape is related to imagination. Imagination and memory both have similar content to sounds. Don Ihde (1976) discussing auditory imagination states that:

[...] auditory imagination as a whole displays the same generic possibilities as the full imaginative mode of experience. Within the active imaginative mode of experience lies the full range from sedimented memories to wildest fantasy. (Ihde 1976: 61)

This type of imagination and memory record could be considered as the place where compositional possibilities are tested, the pool from which ideas come, and as a particular model of time flow and type of structural complexity in electroacoustic music composition.

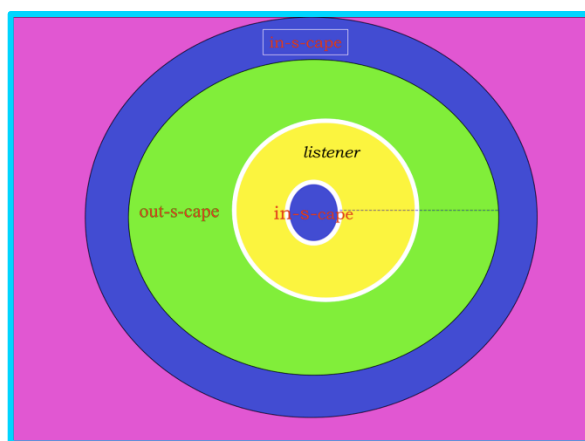


Figure 7 Inner soundscape and the listener

In Figure 7 is a graphical representation of the inner soundscape of a listener in the environment (dated during the composition of *inscapes I-III*). There is a constant interaction of inner and outer-scape thus it is difficult to draw an instant. The listener (yellow) is aware both of the sounds produced in the actual environment (out-s-cape, in green), and of the imaginary sounds (in-s-cape, the small blue circle) within his/her mind. There is a larger blue ring (*inner soundscape: in-s-cape*) surrounding both the listener and the 'out-s-cape', as its contents might be of a larger sounding environment than the actual one (including memory and imagination). Nevertheless it is also true that the environment is surrounding the listener and inner soundscape is somewhere inside the listener. An imaginary soundscape is a type of inner soundscape and may include both real-world sounds and other sounds. It is a place in which 'real' and non-real can co-exist.

It seems that there are certain similarities between the inner soundscape and the real soundscape. Soundscape is perceived through our senses, filtered in our perception mechanisms where evaluation, recognition and re-construction form a set of inner soundscapes which can coexist. Sometimes these do not even consist of sound and they seem to be abstracted representations of the perceived reality.

The context and velocity of the outer soundscape is limited always by physical, cultural and technological constraints. On the contrary the inner soundscape

seems to be boundless. Potentially, inner soundscape could include every sound ever heard – the coexistence of soundscapes simultaneously - dislocated in time and space - as well as mostly abstracted or symbolic patterns of energy formations.

The actual sounding environment is always present in various degrees of velocity and complexity ranging from near silence to noise. Inner soundscape is limited by human mind functions and is not always sounding. There could be real silence in the inner soundscape - the silence of the mind.

Katharine Norman, Hildegard Westerkamp, Barry Truax and other composers address the notion of inner and outer also. Hildegard Westerkamp (1999) states that ‘soundscape composition’⁹ exists exclusively in the electroacoustic realm’ (Westerkamp 1999: 2) and addresses a critical point:

By riding the edge” between real and abstract ‘composed soundscapes’ [the composer] can create a ‘place of balance’ between inner and outer worlds. (Westerkamp 1999: 2)

She is locating soundscape ‘listening and composing’ in the same place with creativity itself, a place where:

[...] reality and imagination are in continuous conversation with each other in order to reach beneath the surface of life experience. (Westerkamp 1999: 2)

⁹ *She refers to ‘tape pieces that are created with recorded environmental sounds’ and not ‘installations or electroacoustic instruments that are composed for specific sites and may address soundscape issues.’ (p. 7)*

2.3.1.3 in-s-cape I

This composition takes the form of an imaginary, endless journey of one who is forced to move from one place to another, again and again, sometimes before she/he arrives to the expected somewhere. The time to leave, the choice of the next stop, the duration are unknown and unpredictable from the beginning. An invisible force is driving the vehicle.

The traveller has one option: to move.

The piece is structured on three levels:

1. The inner soundscape (reactions, feelings, etc.) of the one that moves.
2. Soundscapes of the places to go, to be and to leave from.
3. Sonic signs of the route to follow.

Material and Original Recordings:

For the composition of this piece original recordings were used of:

1. Cars moving in the rain on Rhodes island, Greece (April 2004).
2. A waterfall in Kourtalitiko gorge, Crete, (23 November 2003).
3. Road traffic in Rethimno, Crete, summer midday inside the park.
4. Various recordings of improvisations using pd and max/msp.
5. Piano, rainstick and flute improvisations.
6. Recording of the 'Preveli' ferry leaving Rethimno port, Crete, from right to left (South to North in this case).
7. Birds singing early in the morning in Wiesbaden (Germany, April 2004).

Forming

The work was developed as ‘scenes’, sound-bridges, signs and motion streams. Many of these have as their primordial material improvisations with various homemade algorithms, and several improvisations with them in the studio. Further more processed recordings were used both for the scenes and the ‘sound bridges’. All recordings have been processed, mainly with filters, cross-synthesis and imposed space algorithms, with the exception of the recording of the waterfall in Kourtaliotiko gorge in Crete, where all the seeming movement of this full spectrum sound maze is done by the movement of the microphones in relation to the falling waters.

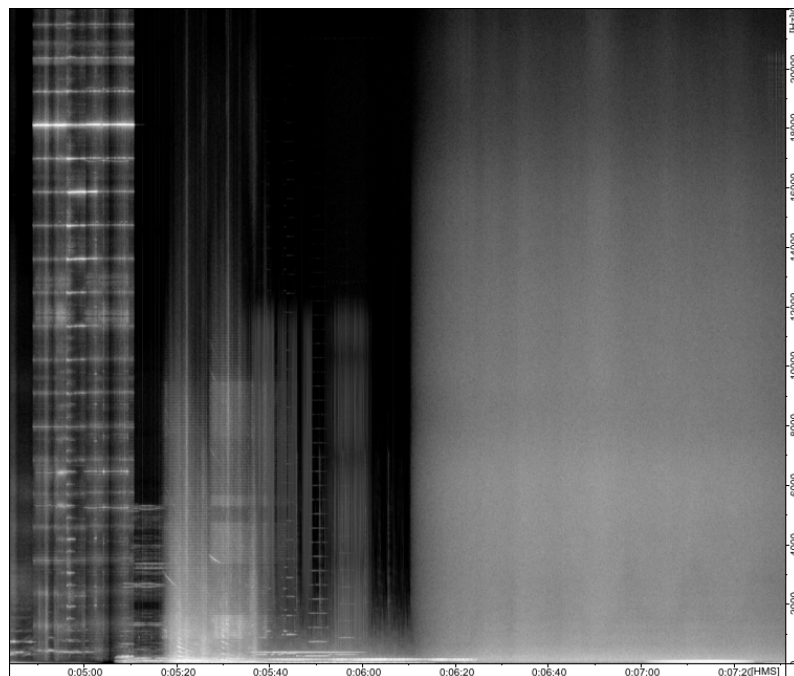


Figure 8 *in-s-cape I* sonogram of waterfall

2.3.1.4 *in-s-cape II*

Date of composition: October 2004

Duration: 11:00

Medium: acousmatic stereo

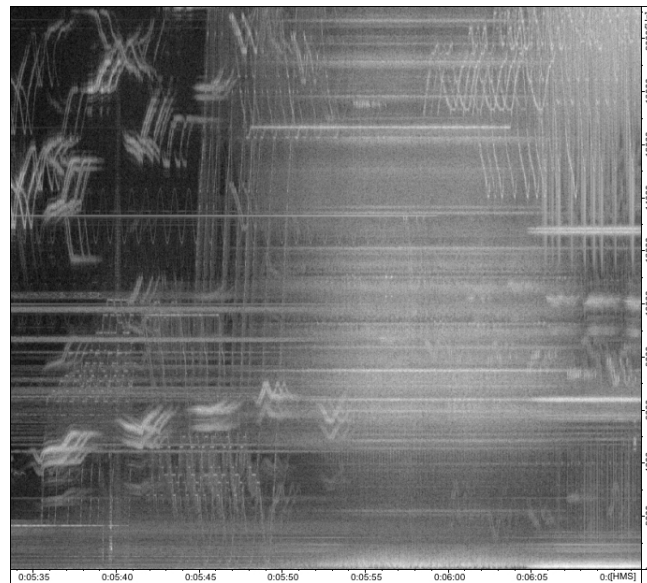


Figure 9 *in-s-cape II* sonogram

Programme Note

in-s-cape II is a composition about *inner* experienced as *outer*. The transitions from one inner soundscape to another have a natural evolution, while sometimes an inner force transforms this ‘naturalistic’ order to an emerging, demanding gesture which stresses the limits of the quasi-outer, to become momentarily ‘*inner*’. The piece is constructed from streams of sonic events, superimposed and flowing at different speeds which at given times slide so as to move for a while as one. These are the times of transition to another level, which may be experienced as a resolution to the previous. The real world is sounding with greater clarity at the end and the recording of an F-16 fighter airplane closes the piece. It is constructed in a near cyclic form. In the beginning there is *inner* that sounds like

outer which is gradually transformed from *sounding outer* to *real outer* which sounds like *inner*.

Material – Processing

Some recordings were used as well as synthesized sounds:

- a) Recordings of crickets, space and dogs at Vederoi village, Crete, a summer night.
- b) Tap-water running into a metal container.
- c) Recordings of *bansuri* unpitched sounds performed by me.
- d) Recording of an F-16 airplane as heard in my house in Rethimno, Crete.

Forming

Cross-synthesis, morphing, convolution and some other idiomatic tools developed in the Max/MSP programming environment by me were used for the generation of the sound material which was later used as source to several generations of superimposed sounds until the final mix.

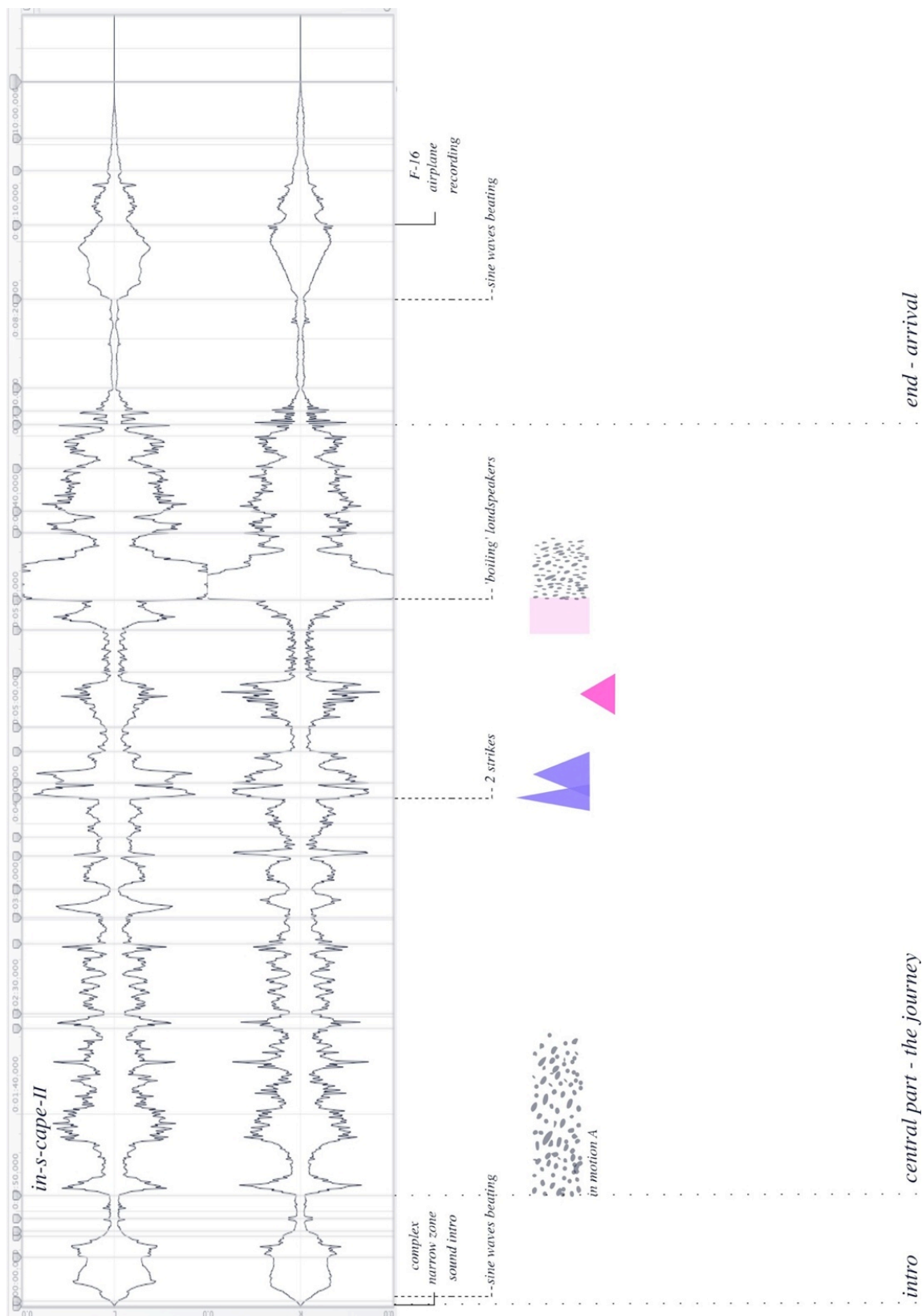


Figure 10 *in-s-cape II* - parts

2.3.1.5 in-s-cape III

Date of composition: July 2006

Duration: 16:30

Medium: stereo acousmatic

Programme Note

The piece is about open spaces on the mountains. In the mountains sound can travel great distances, reflect and come back in very strange ways. Often one might have the illusion that the mountain is ‘singing’, that there are voices coming in an unpredictable way. Similar soundings one might experience in large caves, or gorges and sometimes in big cities, where the tall buildings form valleys, mountain tops, slopes and gorges. These formations of earth and culture amplify specific frequencies of the sound spectrum that give to each place a characteristic ‘voice’. Voices coming from the mountains seem to be projected into inner soundscapes. In these spaces either in the big cities or in the mountains inner soundscape is more present. There are times when the reflections of outer to inner are interrelated with the reflections of inner to outer. One might speak to the place and have a reply. The piece ends with a prayer for ‘mountain’ voices, whisperings and transformed water sounds.

Materials

For the composition of this piece original recordings made by me were used:

1. Country church bell and its iron door inside Rouvas Forest on the southeast part of Psiloretas Mountain (‘High Mountain’) in Crete (July 2005) – early morning.
2. Road traffic and people talking in a bus in New Delhi, India (February 2005).
3. Kirpal Ashram- courtyard with trees - New Delhi, India (February 2005)

4. Clarinet and wooden flutes improvisation in an underground tunnel of the fortress in Rethimno, Crete (May 2003).
5. By a streamlet at Muloi ravine, nearby Rethimno, Crete, morning (Spring 2005)
6. Late night talking near a fireplace, a cricket behind the refrigerator, Marathon, Greece, countryside (January 2005)
7. Nightscape near by an operating swimming pool, countryside, Marathon, Greece (January 2005)
8. Max/msp based improvisations with fft-filters, delay lines and various interfaces under construction.
9. C-sound orchestra for first mixes, amplitude envelope and pitch shifting.
10. Improvisation with the sound of various materials in the studio.
11. Whispering chorus - students of the Department of Music Technology and Acoustics in Rethimno, Crete (Spring 2006).
12. Aluminium foil performed by me between two microphones in the studio.
13. Effervescent tablet in a glass of water, close recording (Spring 2006), in the studio.

Processing

All recordings have been processed, mainly with filters, cross-synthesis, transposition, impulse response algorithms, Doppler effects (GRM-Tools), de-noise algorithms, etc.

2.3.2 About Jyoti

Date of composition: July 2007

Duration: 09:05

Medium: a) eight (8) channel acousmatic, b) stereo acousmatic

Aim and ideas

This composition is about the experience of *light*.

The word *light* in English, $\phi\omega\varsigma$ in Greek, *jyoti* in Hindi is used for the visible light of this world, which is energy. There is also a metaphorical meaning of *light*, common in most spiritual traditions, where the divine Light and Sound are manifestations of the Holy Word of God. Sant Kirpal Singh Ji writes that the divine Light and Sound are connected in such a way that from the Light comes the Sound, and this Light is within us.

We have the divine Light in us and from within It emanates Sound, and the two together have been described as Flaming Sound or Sounding Flame. (Kirpal Singh 1960: 155)

This sounding and image of *Flaming Sound* or *Sounding Flame*, which is not possible in the physical domain was an inspiration for this composition, and my aim was to compose an imaginary journey from the light to the Flaming Sound or Sounding Flame.

Forming

The development of the composition happened in two separate stages:

Stage A: (morphologies and transitions) - thinking about material and form

I started thinking and taking notes of relevant ideas and questions about light and the different aspects of it in order to define some of the morphological

possibilities. Some of these questions were: How is light in this world 'shaped' in the environment? Are there critical changes of light which denote changes in the external world? How and which are the different ways of experiencing the light?

It seemed to me that almost any sound recording of the 'real world', in a way 'gives' light, creates a picture, a scene of a supposed real landscape, which we 'see' in an acousmatic situation with the eyes of our imagination, thus, any real-world soundings in composition is also about light.

Additionally light is also energy and not only a condition due to which we are able to see surfaces, spaces, materials, living organisms. This aspect of light, the energetic one, is apparent when the light is changing within meso and micro time scales. When, for example, the moon or the sun is reflecting in the moving waters of a lake or a running river, or within a forest the rays of light are passing through holes of the tree foliage, or when thunder and lightning during and a rainbow after a storm appear, when a sudden change of weather happens, etc. These conditions when light is perceived more as energy and movement and less as a condition of space, depend both on time and on the degree of concentration of energy. We might speak, more generally about experiences of *concentrated light* and *spherical light* in different scales of time.

Stage B: Working with sound and form

Sonic Morphologies analogous to light were created having as structural models scenes, energetic profiles and textures of light. As models for these *light-like sounds* and *light as energy transformations* were considered:

Lightning, Rays of Light, Beam of Light, Fireworks, Glow, Blaze, Warm, Flame, Light through different materials (water, sand, forest, constructions, rain), types of changes of state - absorption, reflection, scattering, refraction, explosions of light, luminous bodies like sun, moon, sounds surrounded with a type of halo. Moreover the experience of light in the form of the composition, was framed in relation to the sonic environment – the space within which an imaginary listener lives.

The composition has the following parts:

1. The cycle of night and day. (intro)
2. The birth of light from darkness and materiality (first part).
3. The experience of diffused (spherical) light.
4. The internal light of things.
5. Transition from diffused to concentrated light.
6. The experience of inner light (Flaming Sound or Sounding Flame)
7. Into the Light
8. Back to the cycle of night and day.

Materials - Forming

A. Subtractive fft synthesis of sound. I used a Max/MSP patch (further development of the *Forbidden Planet* patch to implement spectral crossfade) to synthesise in running time the moving base soundings of the first part. The results of this were further refined through 8 channel mixing of this material drawing by hand, the amplitude envelopes so that to create the movement of this base mass of sound.

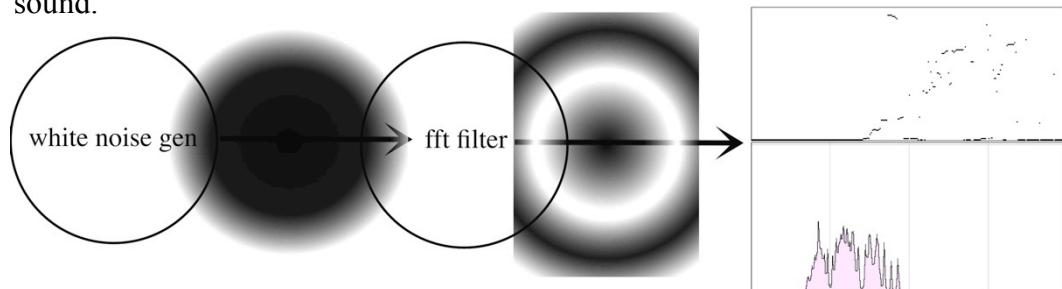


Figure 11 Subtractive synthesis using white noise and fft- filter in Max/Msp

B. Synthetic crickets.

The synthetic *cricket-like* sounds were synthesized using fm synthesis.

C. Recordings of the sea.

D. Cross synthesis between cricket and running water recordings with synthesised sounds as in A.

E. Synthetic cymbal-like sound

F. Recording of crickets

G. Recordings of birds transformed

H. ‘Soundings’ of light (a. Spherical light, b. Rays of light – ‘focused’ light)

Most recorded sound material was further worked so that in most cases it is so abstracted that its source is not recognised anymore.

Example

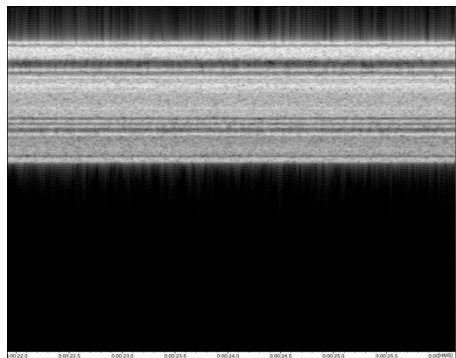


Figure 12 Hb type sound – sonogram

This is an example of sounds produced with the use of the filter mentioned in session [2.2.1]. (sound_example1.aif), of the category Hb.

Jyoti was composed originally for 8 channels.

2.3.3 About Rustlings

Rustlings - Θροΐσματα – (Throismata)

Date of composition: November 2009

Duration: 12:52

Medium: eight channel acousmatic, stereo acousmatic

Programme Note

Trees by themselves, as elements of the soundscape are usually considered 'silent'. They contribute though to the creation of the soundscape in various ways. First, as home for various soundmaking creatures like birds, insects, small animals. Second, when their branches and leaves during windy conditions move and 'touch' each other, various sound morphologies are produced, as a response to the force, velocity and direction of the wind. The soundscape from the listening perspective of the tree position might be constructed from all these sounds, as well as the sounds of the environment in which the tree is present.

In this piece recordings mostly taken with the microphone placed inside the tree foliage have been used and transformed. These trees are oak trees, which inhabit the village of Gallou in Rethymno, Crete and they are the remains of an old wild oak tree forest. Both the imaginary ancient forest and the real contemporary woods of the area are somehow present in the sonic world of the composition.

Aim and Ideas

The piece started as an attempt to diffuse live in a concert space different soundscapes, transmitted through the Internet simultaneously from different geographical locations, creating a type of 'sonic map' of a larger area than the one defined by the acoustic horizon of one listener in a place. Naturally one of the first questions was if it would be perceptible as different spaces coexisting in one space, or like a 'blurred' un-real space.

Later, in the fixed 8 channel version, the idea of past and present time coexistence extended the original idea of spaces within space which both express the concepts of real–imaginary coexistence and extended-soundscapes.

While experimenting on the actual sounding of the environment and the types of changes, textures and sounding patterns, it became unavoidable to make a more in-depth, focused, detailed study of adequate duration of a specific soundscape, so that one might discover some of these that cannot be easily noticed through every day listening. This systematic approach to a specific smaller part of the sonic environment could be considered as a case study. That is the case of *Rustlings*.

Rustlings is a composition about a specific place and its inhabitants. The composition has the form of an imaginary sound walk inside the area through time.

About the area

The area was chosen so that I could have the chance to listen to it, everyday and night for as long as possible, while the time span of the study should be at least one year.¹⁰



Figure 13 *Rustlings* area in Crete

¹⁰ *We might not experience simultaneously all the sounds of a specific area. We have to move around. So perspective is somehow different from the visual domain. On the other hand I might hear a sound of which I cannot see its source.*



Figure 14 *Rustlings* older oak trees woods

The area is a small wood of oak trees on a hill facing the Aegean Pelagos and Rethymno city. At present most of the area belongs to the University of Crete, while a smaller part to the people of the nearby village (Gallos village).

Its natural frontiers are 2 small gorges, while it is crossed by one main road and ends partly by the main 'high-way' of North Crete. There are some more rural roads inside this area that are used till today. I did several recordings in different days, times and weather conditions trying to cover the whole area. Most of the recordings were done with the microphone inside the tree foliage.

These woods, although they cover a small area, have become forest in specific places, and a refuge for the birds and wild animals of the wider area. Especially the part that is inside the university area is somehow a forgotten place. You can still find the old stonewalls defining the properties of the previous owners, hidden in the rank vegetation, but it is very difficult to cross and to walk in some parts. The oak trees are regenerating and one can meet all sizes of oaks. From 10 cm high to 10 meters high. In some crags near the west gorge one can find trees that are even older and higher.

Outside the village area, one meets with the noises of the roads and the sounds of rural life, many sheep and goats with their characteristic bells. In this part the vegetation consists mostly of oak trees and olive trees mixed with carob trees. The sounds of the highway break into the woods as well as many of the sounds of the village and of the other village to the west side of the gorge. In the night one can listen to many sounds from the other side of the gorge, which are magnified by the resonant space of the gorge and projected into the area of recording. In the day the soundings from the road are louder (North, East, South) and there are also many mechanical sounds due to the construction of new buildings around (south and west).

It is very easy to have a wrong estimation of the distance and direction of sound sources in the parts of the wood which are nearer to the west gorge. There is a common belief of the older people of Crete that oak trees are of the most silent. I suspect that it is due to the shaping of the branches and leaves which are not so easily movable by air as in other trees like eucalyptus or aspen. When I started the recordings (September 2007) it was not windy at all, so I had the chance to record this 'silence'. In mid October 2007, very strong north winds came, and together with them I went, to the woods. It seems it was almost impossible, in such strong winds (which can change direction momentarily), to avoid the characteristic sound of the wind on the microphones, even with a very good windshield. From these recordings I have many but no longer than one minute continuous recordings without problems. This of course means that I have not full wind complex sound gestures. I just recorded some meso-time level gestures.

This sound of the whole forest sounding and 'dancing' due to many different streams of wind changing directions simultaneously in a large area is very similar to the sound of the sea waves, but it has a unique spectrum and micro-gestural quality that separates these sounds from the sea waves although they might share similar meso- and macro-gesture patterns.

I tried very carefully to filter some of the microphone 'air booms', but even the slightest filtering changes this unique quality of the wind. Some of these changes

are acceptable though, if the intention is to stay close to the original spectromorphological ‘stamp’ of this sound.

I used the recordings of the first three months for the composition of a live piece, called *Rustlings*. The title might be misleading, as the first part is not rustlings at all. It is an imaginary representation of the sound I was hearing during the strong winds of October 2007.

A short analysis of the soundscape of the woods of Gallou area:

Invariants

Landscape formations and fewer buildings acting as sounding boards, reflectors and absorbers.

Types of sound sources

Geophony – Rain, wind, storms (thunder etc.), rustlings and more sounds produced by the trees’ leaves forced by the wind to contact.

Biophony - sheep, goats, birds, dogs, insects

Human Presence – village people, University activities, amplified sounds (Divine Service, music from the nearby residences, performances and concerts in the university area), walking in the forest, crackling of small pieces of wood.

Mechanical Sounds: electricity wires, cars, motorbikes, mechanical wood cutters, cushion blasts, airplanes.

Materials

Several recordings were used:

1. Recording while listening through headphones and walking slowly between the trees with the microphones focusing either on the whole scene, or on details –

2. Binaural recordings without simultaneously listening through headphones, either moving or standing in the area and trying to imagine how it will sound afterwards in the studio.
3. Fixed point recordings without moving at all and with the microphone in the tree foliage.
4. Recordings through windy conditions.
5. Thunder and rain falling in the area - the recording system outside of my house, more or less protected under the roof of the veranda.

All these recordings were done during a period of one year, under different weather conditions, and in several different points of the greater area.

Forming and Ideas

The work has been developed as *scenes* and *transitions*, although it is not always clear when one scene stops and the other begins, as I have used the same materials both to create the sense of an environment and the transitions from one 'part' to the other.

1. Wind

I composed wind gestures of various lengths using as first material the actual recordings of the area during heavy wind conditions. No further processing other than choosing the right fragments from the original recording and minor rebalancing of the dynamic profile of the composed gestures. The aim was to create a 'realistic' soundscape of wind blowing through the trees while someone is walking or moving between the oak trees. Using these new wind gestures as sound files and a simple Max/Msp patch to control the positioning of the sounds in 8 channels I performed and recorded the longer gestures, which in the final mixes of the work I refined further.

2. Water flowing on the forest floor.

3. Storm and Rain - Many recordings of storms and rains in this area, and some of them close to the sound source (water) were used for this part, as well as synthesised imaginary *rain-like* sounds.
4. Sounds of birds have been used both as they were recorded and transformed. I used them in the transitions from one 'soundings scene' to another.
5. Bells – Sunday Morning - sheep voices
6. The other forest
7. Dense choruses of birds
8. A motor bike passing along the road – in its 'tail' the water begins to flow.
9. The 'songs' of the imaginary birds in the ancient forest.
10. 'Solo' of a male blackbird.

The main parts and soundings of the work are presented in Figure 15

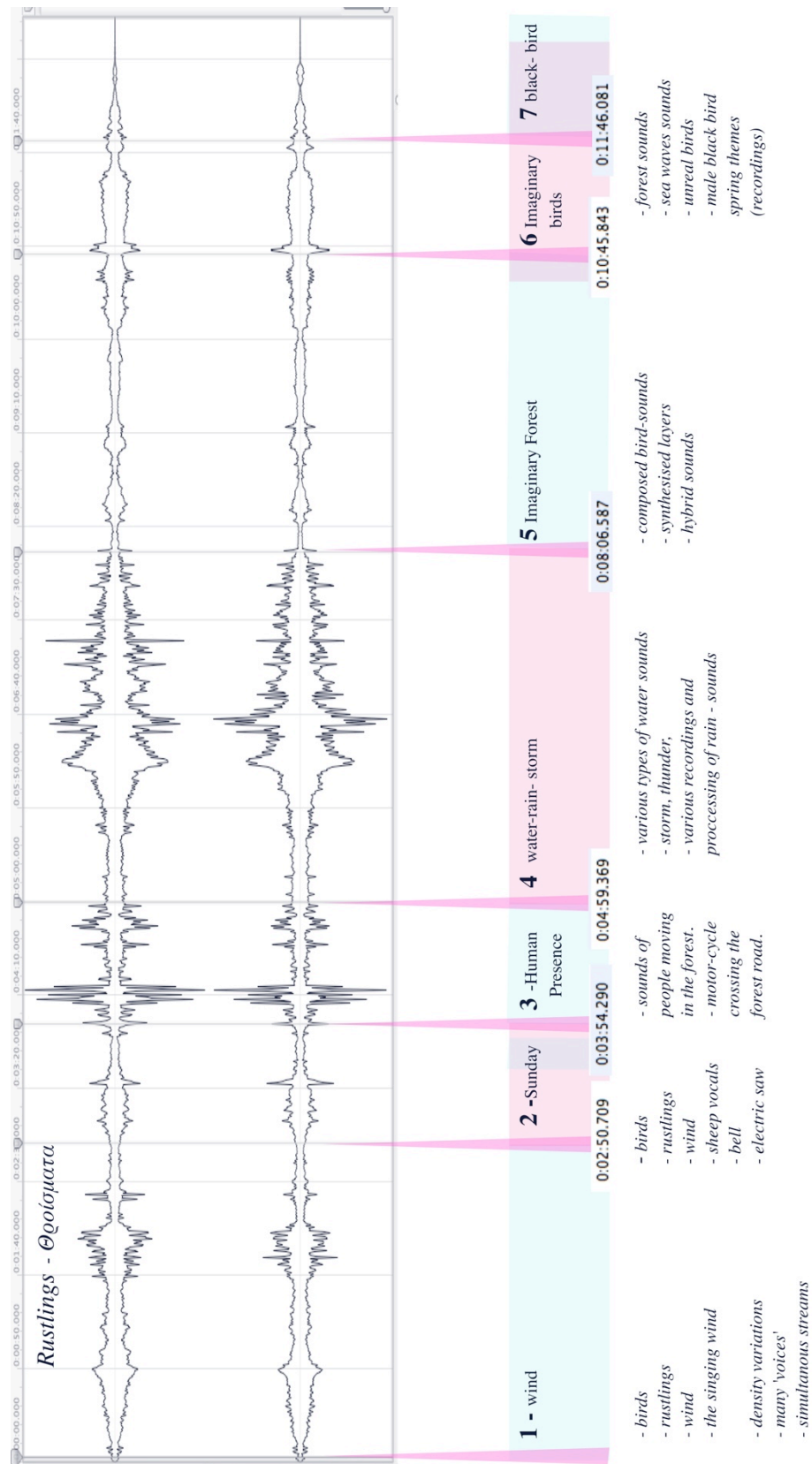


Figure 15 *Rustlings* parts and soundings ‘scenes’.

2.3.4 Αντηχήσεις – Reverberations

[v 1.1a] sound installation (July 2008)

[v 1.1b] Max/Msp based application (stereo) (May 2009)

Duration: ~ ∞

[v 1.2] live performance 8 channels (February 2010)

[v 1.3] stereo fixed version (October 2010)

Duration: 11:55

Αντηχήσεις (Anteheses) – Reverberations

The world *αντηχήσεις* is a compound of *αντί* (anti- opposite) and *ήχος* (echosound) --> *ηχήσεις* (eheses) -plural of *ήχος*.

Aim and ideas

In the physical domain, the actual sounding of a sound source situated in a particular place can be transformed as the spherical direct sound waves radiating from the source are subject to reflection, diffraction, scattering, absorption through different materials constituting the place we listen within. The interference of direct and reflected sound waves composes the final sound we listen to. There is naturally a time difference between the arrival of the direct waves and the arrival of each of the reflected ones and if this difference is greater than about 50 msec our perception differentiates them, if less we perceive the resultant sounding as a unity. In this case we do not hear the reflected waves as separate sounds but as a prolongation and transformation of the initial sounding action. This phenomenon is conditioned from the dimensions of the space, the position of the sound source and the position of the listener within it. Reverberant spaces might give us the impression of a sound transforming device *found* in the

case of natural spaces like caves and *engineered* as in the case of man-made constructions like buildings.

We also speak of reverberation in a metaphorical way. As the sound resulting from an action depends both on the geometry of the particular place and on the frequency content of the sound source, similarly any object or action might have a type of reverberation inside us. For example, I see a glass of water reflecting the light in a particular way and this sensation might evoke a type of “resonant” reaction inside me. A chain reaction of associations might start and if one can keep the flowing and control the speed of the unfolding associations, one might discover ideas and sounds associated with the impacting sensation. In other words one might arrive to a sound world from anything.

This simplified model of reverberation was used both as a metaphor and as a compositional tool to associate components of the environment with soundings in the first version of *Αντηχήσεις (Anteheses)*.

Anteheses v.1 is a sound installation piece, which was presented in parallel with an art exhibition in July and August 2008 in Rethymnon, Crete. The pictures of an art exhibition were connected using this metaphor with a sound world. All pictures although silent in nature - at least for human ears - might evoke imaginary soundings – listener dependant.

I see an object of the external world and I seek for its sounding. It might be a chair, a sunset, a flying bird, a landscape, a person, a movement, an image, an imaginary object, anything. There might be an analogy or a similarity of the chosen object, person or part of the environment, of which I choose to transfer something of its essence in sound with the sounding I imagine. It is a type of ‘sonification’ not based on any proven rules of relation between the object and the imagined sounding, or to a general defined methodology, other than a technique of discovering - thus the result is totally subjective.

As sounds in a real space have in most cases a type of ‘tail’, a ‘shadow’ caused by the reflected copies of itself into space, in the same way a non-sounding

component of the environment might have a type of reflection into the 'space' of our memory and imagination, which reflection or reverberations, translated into soundings result in this association. A non-sounding entity of the environment, has an imaginary sounding, which is not a direct sound. Hence it will always be one of the reflected and transformed copies.

During my first visit to the exhibition space I realised that it was sufficiently reverberant to be noticed (as most empty closed spaces), and it was to remain so, as the visitors of this type of exhibitions were going to pass through the space, look at the paintings, may be think a bit, but not many people were going to stay simultaneously in the space, so the change to the reverberation would be almost unnoticed.

Sounds can be like thoughts. Both can coexist in the same space real or imaginary, interfering, masking, resonating and perpetually changing. In this space I wanted to project through the (wireless touch of sound) memories of its history. Feelings, thoughts, sounds, actions which happened once in these four rooms as time was unfolding through its history.

The third idea used in this piece was that the soundings I was going to compose for this exhibition in this space under these conditions of listening, were going to transform the very same space, in an indirect way, so that I had to consider this aspect too in the composition. So the space is evoking somehow the soundings and the sounding into the space is changing the ways we sense and perceive the space.

If the first main idea for the composition was based on a type of indirect causality the result was going to have a kind of feedback. The place 'proposes' the soundings then the soundings in turn 'change' the place. Thus the framework in which I was going to compose was both for the 'reverberation' and the reverberation of the 'reverberation' in a slightly transformed place.

Materials and set up of the installation version

The conditions under which I had to realise this installation were such that I could not use sensors and computer on site, thus any idea of including interactive elements was abandoned. I used fixed composed sound files which were played from three mp3 players (six channels) and diffused through ten single loudspeakers and two subwoofers into four interconnected rooms, using two 5.1 sound systems (of good sound quality). All the hardware installation was done by me personally in two full days; checking the sound so as to be the closest possible to the original idea and also composing additional sound material which could function better in the given circumstances.



Figure 16 *Αντηχήσεις v1.1* east ground floor



Figure 17 *Αντηχήσεις v1.1* detail

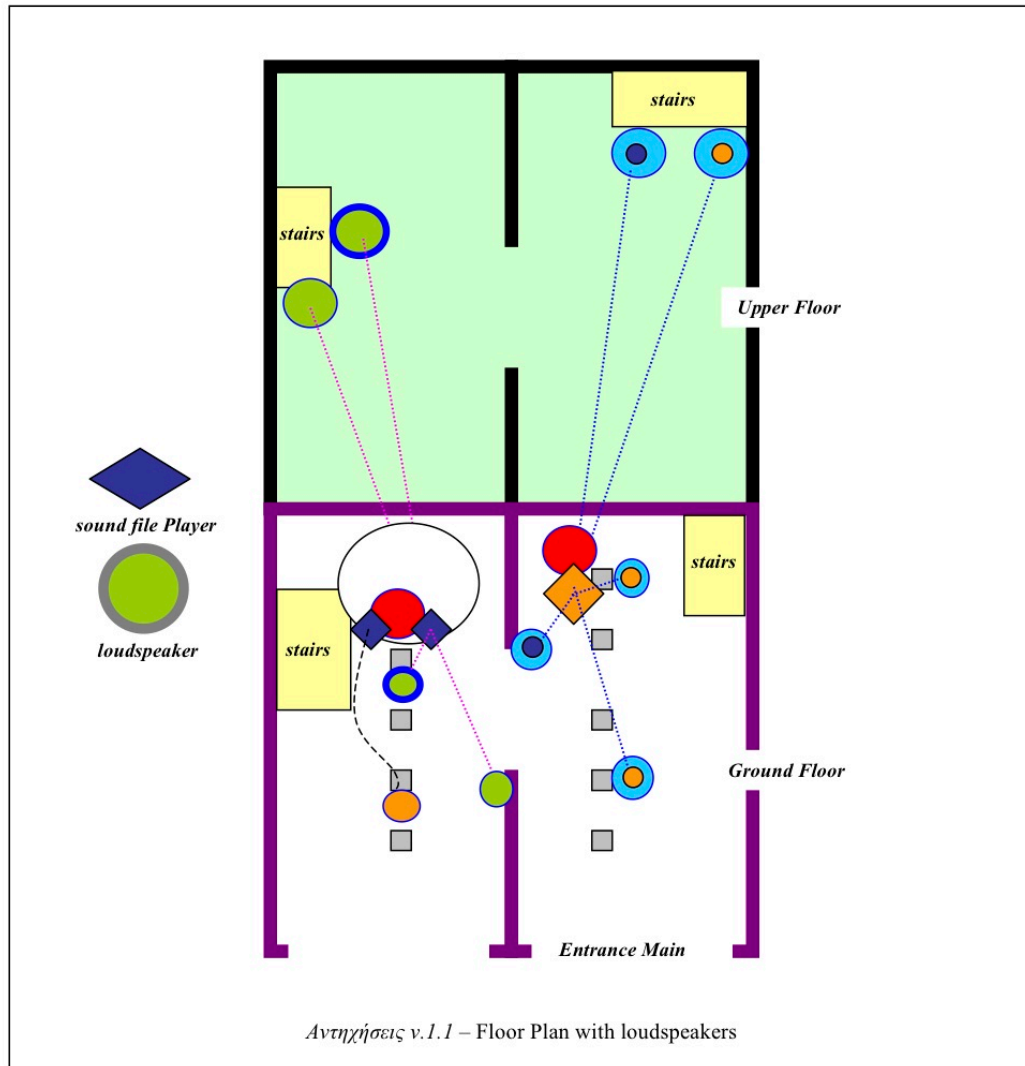


Figure 18 *Avτηχήσεις v.1.1* loudspeaker positions and connections

I arranged the 47 different sound files in the three players so that they were not in the same order and that some were in more than one. Each separate sequence was played in loop, so I had three parallel loops each having different starting times and durations. Theoretically (I did the calculation afterwards) in order to have exactly the same repetition thousands of years would pass. In practice and by design there were similar soundings but not the same exactly.

Later, I developed a Max/ Msp application which uses the same looping algorithm and materials. This is included in the DVD submission of this work.

The sound materials were organised in the following categories:

According to context and morphology

[S1] 'Natural' like scenes (sea, birds, crickets, water)

[S2] Sudden sound events

[S3] Abstract soundings

[S4] Pitch-focused soundings

[S5] Hybrid complexes

According to duration :

D1. Short (5 – 15 seconds)

D2. Medium (1.5 minute to 3 minutes)

D3. Longer (up to 20 minutes)

Examples of the above categories are indexed in the DVD - of the submission folio, together with more documentary material of the installation (see appendix IV).

Antecheses – Reverberations v1.2 – v1.3

Later this association model was applied to sonic memories. An action in the present environment might evoke a memory and this record another one, and so on. The pathways created by this type of procedure can coexist simultaneously while the forming might have an analogy to an imaginary journey. This form results in a guided sonic experience which is organised using this model of indirect-direct causality in parallel with evocative association both at the level of meanings evoked from the soundings and of the sounds themselves.

I used for these versions of the composition the sonic material created for the installation piece, as well as some selected recordings of past years.

Αντηχήσεις v. 1.3 – (Reverberations v 1.3)

Materials

A. Sound materials from *Reverberations v 1.1* (installation)

B. Recordings:

1. A storm in Rethymnon, Crete October 2009 near by a church, Sunday morning.
2. Goat bells as the goats climb the hills near by my house in Crete.
3. Wet soil in the wheels of a moving car while going down the road from the Refuge in Psylorites Mountain to the village of Couroutes – under heavy rain. The microphones outside the car near the wheels (see photo).
4. Good Friday of 2009, in the Orthodox Church in Rethymnon, Crete after the ceremony of Epitaphy outside the church of Megale Panagia (Santa Maria).
5. Crackling fire in a friend's house in Corfu, Greece (May 2009)
6. Many recordings of rain
7. Recordings of running water (streams and sea side)
8. Recordings of nightscape in Corfu.
9. Wind blowing in Crete.

Processing:

I used convolution, filtering, spectral shaping, synthesis/resynthesis of sound, editing, and of course mixing.

In the stereo fixed version of the composition there are some fragments which I included from the recording of my performance-improvisation of *Reverberations v.1.2*, which was presented in February 2011, in the second Hellenic Symposium of Acoustic Ecology. A graphical score of the stereo composition with the parts and the basic elements of the composition are presented in Figure 19.

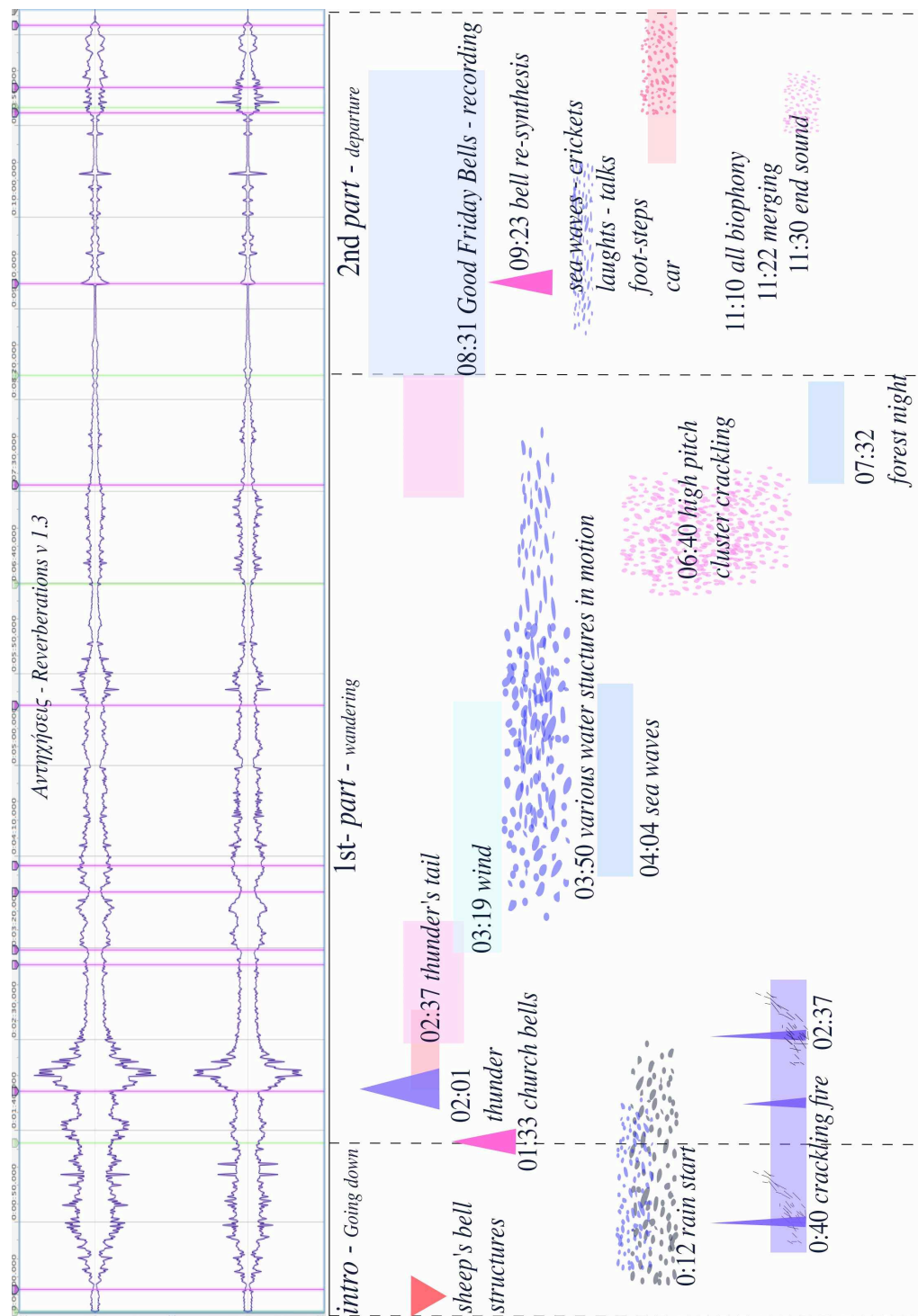


Figure 19 Reverberations v1.3 parts

2.3.5 About Prayer

Prayer is a composition which has taken the forms of an installation with live improvisation and of a stereo documentary, and is about a *specific place*.



Figure 20 The Mosque Sultan Ibrahim Han in Rethymno

This specific place is an old mosque on a hill inside the fortress of the city of Rethimno, Crete. It was built in 1667 on the exact position of an older Church of Saint Nicolas and was dedicated to the Sultan Ibrahim Han. It is visible almost from any part of the city as it is built on the top of the highest hill, facing the Cretan Sea.

For many years this mosque was deserted, the doors were wide open and anyone visiting the castle could enter, look around and listen to its amazing acoustical properties. Built from stone it is basically a square supporting a dome of 14.5 meters diameter. The dome is constructed from smaller rectangular stones, which form a mosaic of great simplicity and is almost 6.5 meters high while the highest point (from the ground) is 18.5 meters.

In the perimeter of the dome there are two lines of ceramic resonators embedded in the dome structure, with only the round openings facing into the space.



Figure 21 Photo of the clay embedded resonators

There are 22 in the lowest line and 23 in the upper line. It is a typical architectural acoustic device used also in many Christian churches. They used to insert smaller or larger clay jars in order to control the reverberation characteristics of the space and to amplify human produced sounds (speech, songs).

It is not only the architecture of the building, the play of light inside it and its history that is interesting. It is also its acoustics that change any sound produced or heard within. The impression that you ‘hear’ the silence clearly is very strong, as well as that the walls, the dome and the whole of the enclosed air are speaking with a unified ‘voice’. The reverberation time is measured at about 5 seconds – and although it appears to be constant it is not.

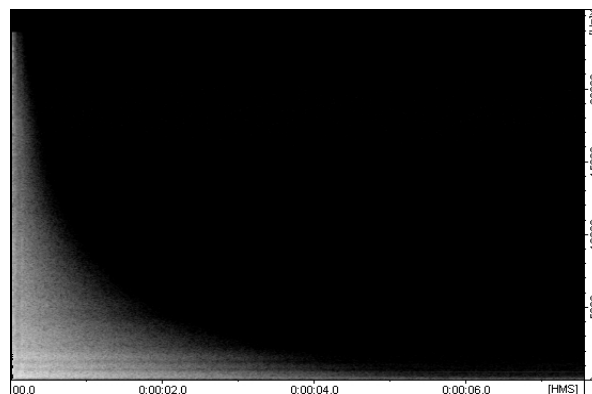


Figure 22 Impulse Response Sonogram

It is difficult to figure out the meaning of speech if someone is talking inside and not very near to your ears. The place was probably built also to amplify the holy words and possibly to create the sense of an unearthly quality to any sound source. Nonverbal sounds are greatly enhanced by the existence of the space alone. Even breathing is different inside the dome.

From a technical point of view it operates like a *short time memory mirroring machine* in which small changes in the duration of the sound events, pitch, frequency spectrum and dynamics can give different sounding results every time. One could use the place as a prolongation mechanism, to hold a sounding continuity without the need of electronic devices; creating drone sounds (ισοκράτης, *ison* in Byzantine music). In some cases the space reacts also like a tool to magnify explosive sounding events. The louder the sound the more modulated the reply of the place.

My first impression within the mosque was that any sound I might produce is important and every sound making action has not so easily predictable consequences. Nevertheless it was not only the place itself that was important for the compositional decisions, but also the conditions around it, its past, the different paths to enter and leave. I use the term 'path' here both for time-paths and for actual paths in the environment. The place in this case acts like a pole and a magnet having a horizon both in space and in timeline.

The initial idea of this composition was to experiment with sounds and ways of performing to enhance more the 'natural' acoustical properties of the space in order to create conditions under which one might appreciate 'silence' and turn ones attention naturally inwards, like in a prayer or in meditation. My aim was to create a sound environment in a historically religious place that will permit the voluntary immersion, prayer and meditation or that will encourage this possibility.

The first version of *Prayer* was composed for an 8 channel diffusion system with live improvisation and was performed in the Mosque of Sultan Ibrahim Han during the Electroacoustic Music Days 2008, in Rethymno, Greece, which was organized by the Department of Music Technology and Acoustics of the

Technological Institute of Crete and the Hellenic Association of Electroacoustic Music Composers.

We installed an eight channel loudspeaker system, each speaker facing to the central point of the Mosque from the almost exact directions of North, South, East, West and the middle points between, and we positioned the loudspeakers under the perimeter of the dome where possible.

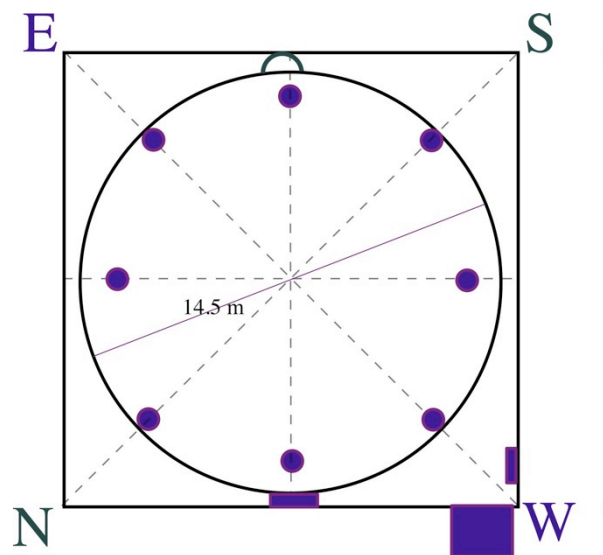


Figure 23 The positioning of the 8 loudspeakers



Figure 24 Photo from the installation

Sound materials:

1. A recording heard as running water continuously in slightly changing repetition. A hydrophone recording of a streamlet in Galliano Gorge (Crete) was used as the basic material for the synthesis of this layer. I used a hydrophone in order (successfully) to filter out the sounds of the many birds around and also to amplify the sounds of the water falling on the several stones inside the streamlet bank, which were creating interesting patterns. In the background of the original recording a female voice (probably mine) is speaking. Indeed while experimenting with hydrophone recordings I discovered that if the water is about 20 cm - 3 meters deep, acoustic waves produced by human voices penetrate the surface of the water and are captured in the recordings. (Sound example: move_waters.wav)
2. A drone synthesised as a hybrid of voices, bowed string with water-like small internal gestures. (sound example: drone_A.wav)

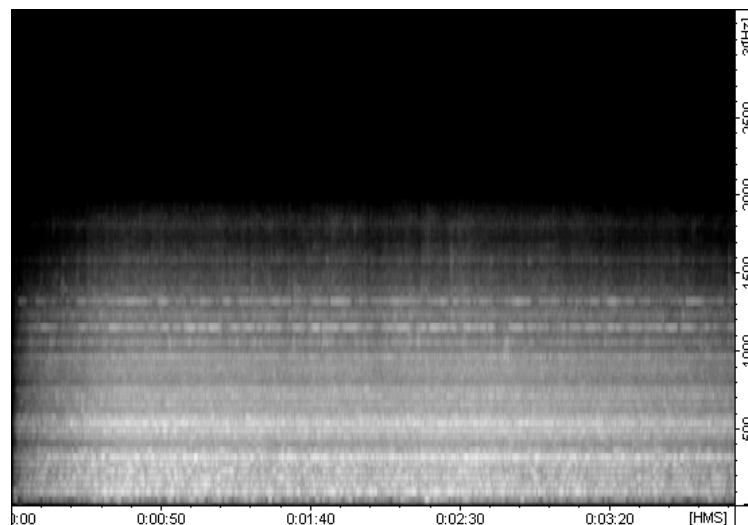


Figure 25 Sonogram of drone_A

3. The same drone an ‘octave’ higher (sound example: drone_B.wav)

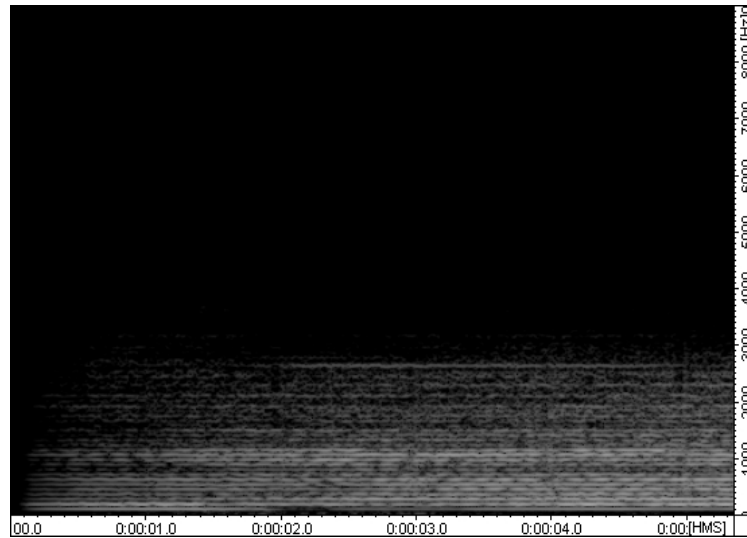


Figure 26 Sonogram of drone_B

4. Various high pitched and dense zoned ‘clusters’ of irregular (in their starting times) and short duration sounds – reminding me of the movements and soundings of various insects like a dense and rich imaginary biophony. (sound example: high_prayer.wav)

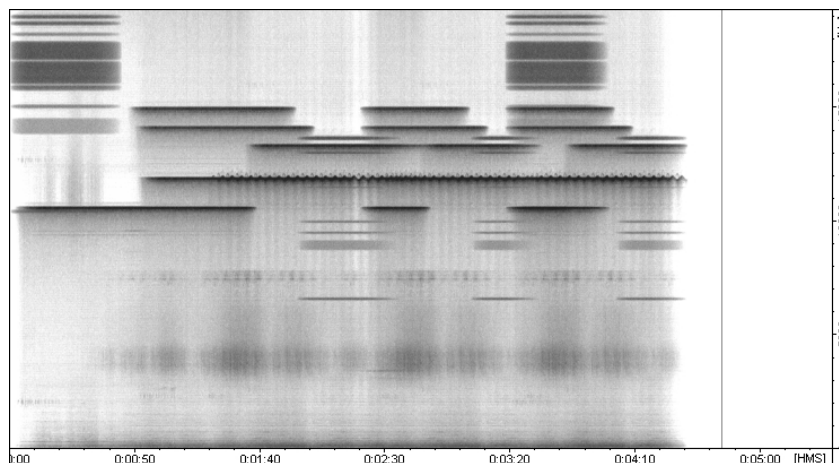


Figure 27 Sonogram of high_prayer

Installation and performance

These 3 different sound layers were diffused live on the eight channel system experimenting and reconfiguring the possible positioning of the sound sources

with the intention to establish smaller spaces within the space, and giving the impression of moving the listener around the space.

Performance pattern I.

1. Establishment of a position in the performance space of a sound source.
2. Very slowly move this sound into the space - so slow as to be almost unperceivable.
3. If the movement stops then it is possible that the listener will recognise the displacement and will question his/her previous impression of the placement of the source.

The listener may experience the momentary illusion that s/he is not in the same position in the space anymore or that all the space is moving, through the extremely slow movement of the sound sources, in different orbits and speeds.

Performance pattern II –mixed with other sound producing mechanisms

In this case I was preparing a positioning of the materials to sound from the loudspeakers and using various wind instruments and/or the two sound producing sculptures (Figure 10) we had installed in the space with a group of my students, to improvise with the acoustics of the space. As I was performing-improvising for eight days in the mornings in this space, from 8:30 to 11:00, which was open to everyone to come in, I had the chance to experience quite different situations. Although this second approach started more as a way to familiarise myself with the space and to experiment - and less part of the central idea of the composition - it functioned later as a way to compare my initial idea with this and also gave me the chance to change my listening position in the space.

Prayer v. 2

Date of composition: March - May 2011

Duration: 12:27

Medium: acousmatic stereo

The stereo acousmatic work with the same title (*Prayer v.2*) uses the same sounding materials and ideas as in the installation work. For this new work, in addition to the sound materials previously mentioned, further recordings were made in March 2011 in the mosque, without audience, of improvisations on various wind instruments, voices and environmental sounds which were added by the weather conditions. The aim of this new piece is to re-experience and further explore both the site and my previous experience within it. It is formed as co-existing listening paths towards and within the site, its past, my past and present experience within it. It is a new work, which although based on the installation work, is a different compositional approach.

Programme Note*Prayer v. 2*

This acousmatic composition is about this state of mind and soul awareness which we often call prayer. Human voices, clarinet, θαμπιόλι (thambioli)¹¹ and electroacoustic sound diffused through 8 loudspeaker system have been performed and recorded within the Mosque Ibrahim Han, in Rethimno, Crete (Greece) in October 2008 and March 2011. These recordings have been further processed and altered. Vocals are performed by Georgios Sklavos, Christos Konstantopoulos, Dimitris Ntzimanis and Stella Paschalidou; clarinet, thambioli and live diffusion by Katerina Tzedaki. The work is based on a previous sound installation piece: *Prayer v. 1* which was presented in the same place during *Electroacoustic Music Days 2008* organised by the Hellenic Association of

¹¹ *Cretan traditional wind instrument - single reed cylindrical*

Electroacoustic Music Composers and the Department of Music Technology & Acoustics of the Technological Educational Institute of Crete. Both recordings and performances in the Mosque Sultan Ibrahim Han were done with permission by the 28th Ephorate of Byzantine Antiquities division of Rethimno and with the support of Municipality of Rethimno – Crete.

Conclusion

This dissertation has addressed some issues concerning the *sounding environment* as approached in the compositions of the folio.

The term has been used in the preceding chapters to refer to the *whole of our living experience* in the world which we might register as relating to sound. The sounding environment includes everything that is sounding, seemingly sounding, imagined sounding, remembered sounding, sensed as sounding, composed to sound. It includes thus the actual sound environment, all that is sensed or interpreted as similar to sound and imaginary sounds. *Environment* has been considered as the ‘organism plus environment’ as described by Tim Ingold (2000), meaning that it is relative to a being and that it is not a static entity but an ever changing whole.

In the first chapter relevant terms, ideas and theories both from the literature of electroacoustic music composition and soundscape composition were introduced, as well as some ways of *listening* as considered by various authors and composers. In the second chapter the compositional approach both to ideas and methodologies as applied in the seven submitted works of this folio was described and documented.

The medium of electroacoustic music allows the creation of works that encourage the emergence of a listener dependant *impression* of ‘being in an environment’. While living our everyday lives we do not often have the chance to immerse and *tune in* to the fragile dynamic balance of the flowing universe.

In these compositions I have made an attempt to transfer the sense that suddenly the world *is tuned*, and that we are a part of the world, by means of sound – composing a reduced version of a ‘harmony’, in order to pose a question and a hope, that there might be the possibility of a thread hidden to our perception, of a higher order and not just an arbitrary sequence of events and actions.

These works are not attempts to imitate the environment, but essentially conscious re-approaches to it through the ‘re-ordering’ of my listening and sound-making experimentation within it. Furthermore, other listeners while experiencing the actual sounding of these works, due to certain possible similarities with their own experience within the environment and through the emergence of empathy and immersion, might discover hidden connecting threads applied to their own living experience.

This compositional approach was implemented mostly through the conscious forming of *listening paths* of an imaginary listener within various sound environments. This was done by creating and choosing the sound materials as:

1. Indications of the presence of a ‘listener’
2. Transitions from one environment to another
3. Transitions from an outer to an inner reality and vice versa
4. Superimposition of ‘inner’ and ‘outer’ soundings

The macro-structure of the works presented could also be considered as variations of a *journey-like form*.

The two installation works were indented as ways to experiment with a performance condition other than the acousmatic, with an actual environment in which the actual listener is free to come and go anytime - an environment possibly closer to everyday life experience. The compositional approach in these two works was two-fold: (a) to change the impression of the actual space through imposed soundings, (b) to experiment with the *echo-poetics* of the non actually heard environment – to *interpret* it in sound.

Considering the potential contents and functions of the sounding environment, this vast complexity, its ever-changing nature and the subjectivity of our experience there could exist innumerable approaches to it. Therefore it is a ‘space’ to be further explored, particularly by the sound-based arts.

Appendices

Appendix I. *List of Compositions*

TITLE	YEAR	DURATION	MEDIUM
<i>in-s-cape I</i>	July 2004	14:30	<i>Stereo acousmatic</i>
<i>in-s-cape II</i>	October 2004	11:00	<i>Stereo acousmatic</i>
<i>in-s-cape III</i>	July 2006	16:30	<i>Stereo acousmatic</i>
<i>Jyoti</i>	July 2007	09:05	<i>8 channels acousmatic</i>
	July 2007	09:05	<i>Stereo version</i>
<i>Rustlings</i>	November 2009	12:52	<i>8 channels acousmatic</i>
	April 2011	12:52	<i>Stereo version</i>
<i>Reverberations -</i>	<i>Αντηχήσεις -</i>	<i>(Anteheses)</i>	
<i>v. 1.1</i>	July 2008	a day --> ∞	<i>Sound installation</i>
<i>v. 1.2</i>	February 2010	12:00 – 18:00	<i>Live electroacoustic</i>
<i>Anteheses v. 1.3</i>	November 2010	11:55	<i>Stereo</i>
<i>Prayer</i>	October 2008	~ 1 hour	<i>Installation + live</i>
<i>Prayer v. 2</i>	March-May 2011	12:27	<i>Stereo acousmatic</i>

Appendix II. *List of sound examples*

Name	Work	Reference	Duration
1. sound_example1.aif	<i>Jyoti</i>	Figure 12	01:32
2. move_waters.wav	<i>Prayer</i>	-	03:00
3. IR_Ibrahim.aif	<i>Prayer</i>	Figure 22	00:11
4. drone_A.wav	<i>Prayer</i>	Figure 25	04:33
5. drone_B.wav	<i>Prayer</i>	Figure 26	04:33
6. high_prayer.wav	<i>Prayer</i>	Figure 27	04:32

Appendix III. *Software and Equipment used*

COMPOSITION	TYPE	NAME
<i>in-s-cape I</i> <i>in-s-cape II</i> <i>in-s-cape III</i>	<i>Operating Systems</i>	Windows XP, Mac OS X 10.3
	<i>Software</i>	Synthesis and mixing environments: <i>csound, Nuendo 2.0, pure data (pd), Max/MSP 4.5</i> Editing, Processing of sounds: <i>Sound Forge 6.0, csound, cmix, Audiosculpt, Soundhack</i> Pluggins: <i>Sonic Foundry (Noise Reduction, Acoustic Mirror), Waves (Doppler, Enigma, Shuffler, TrueVerb, X-Noise)</i>
	<i>Recording equipment</i>	<i>Sony mini disk MD, Sony stereo mic Tascam DA-P1 portable DAT recorder, AKG- C-1000S microphones</i>
<i>Jyoti</i>	<i>Operating Systems</i>	Windows XP, Mac OS X 10.4
	<i>Software</i>	Synthesis and mixing environments: <i>ProTools M-powered, Max/MSP 4.6, Wave Editor</i> Editing, Processing of sounds: <i>Wave Editor, Sound Forge 9.0, Soundhack, Fscape, mammut(notam), Cecilia</i> Pluggins: <i>Sonic Foundry (Noise Reduction, Acoustic Mirror), Waves (TrueVerb, X-Noise), Spectral Shapers (Tom Erbe)</i>
	<i>Hardware, equipment</i>	<i>Sony mini disk MD, Sony stereo mic Tascam DA-P1 portable DAT recorder, AKG- C-1000S microphones</i>
<i>Rustlings</i> <i>Reverberations</i> <i>Prayer</i>	<i>Operating Systems</i>	Windows XP, Mac OS X 10.4 -10.6
	<i>Software</i>	Synthesis and mixing environments: <i>ProTools M-powered, Max/ MSP 4.6 – Max/ MSP 5, Wave Editor, Reaper</i> Editing, Processing of sounds: <i>Wave Editor, Sound Forge 9.0, Soundhack, Fscape, mammut (notam), SPEAR</i> Pluggins: <i>Sonic Foundry (Noise Reduction, Acoustic Mirror), Waves (TrueVerb, X-Noise), GRM Tools, Spectral Shapers (Tom Erbe), Pluggo (Tconvoluion)</i>
	<i>Recordings Equipment</i>	<i>zoom H2 portable recorder, soundman OKM II-classic -binaural microphones, Sound Devices 722 digital audio recorder, Sennheiser MKH 30 and MKH40 microphones, Aquarian Audio Products H2a-XLR Hydrophone</i>

Appendix IV. Contents of CD - DVD submission

CD 1 – audio

Track ID	Title	Duration
1	<i>in-s-cape I</i>	14: 30
2	<i>in-s-cape II</i>	11: 00
3	<i>in-s-cape III</i>	16: 30

CD 2 – audio

Track ID	Title	Duration
1	<i>Jyoti</i>	09: 00
2	<i>Rustlings</i>	12: 52
3	<i>Anteheses v 1.3</i>	11: 55
4	<i>Prayer v. 2</i>	12: 27

DVD – 1

1_compositions

acousmatic

8CH (*Jyoti* and *Rustlings* eight channels + loudspeakers set up)

stereo (the 7 acousmatic works)

DVD – 2

1_compositions

installations

Reverberations

Max_MSP_version (instructions inside this folder)

Photos_v1.1

2_sound_examples (as in Appendix II)

3_Thesis (Dissertation in pdf format)

4_Other_Material

cross_colls_multi_tzed (The filter of pages 46 – 47 of the Thesis)

Rustlings_photos (Photos from the area of *Rustlings*)

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