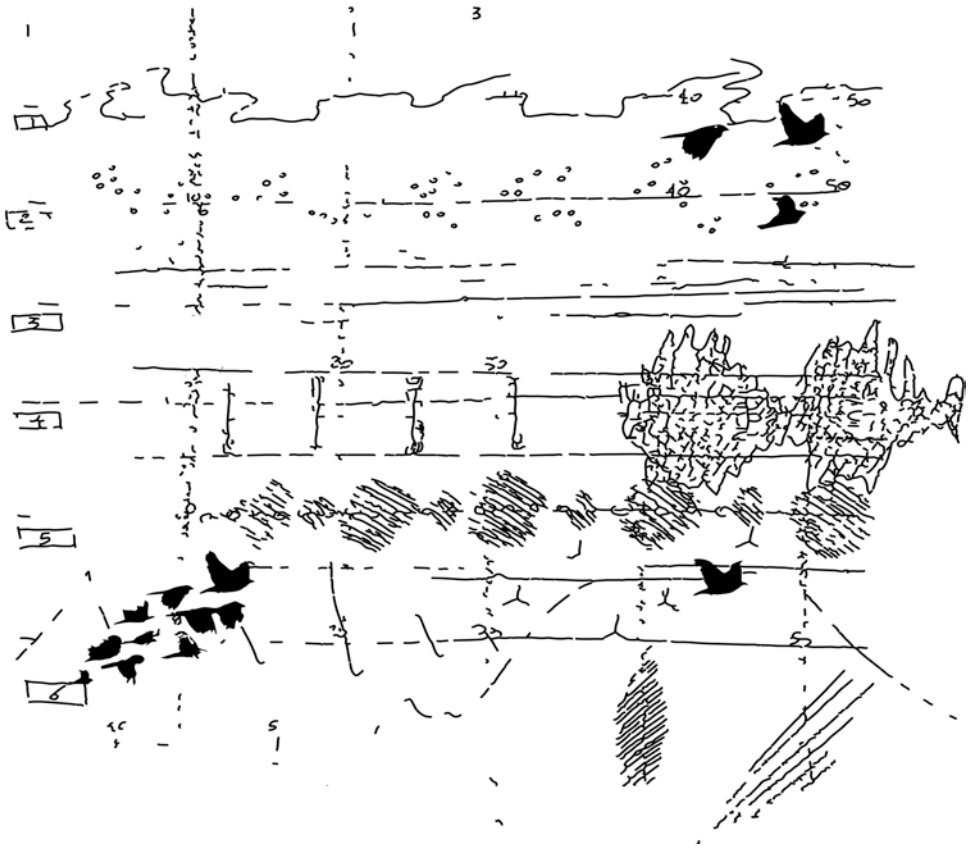
LISTAHÁSKÓLI ÍSLANDS
Iceland Academy of the Arts

Department of Design and Architecture

Master of Design



SOUNDSCAPE
LOOKS LIKE MUSIC

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Design

Anna Giudice

03 | 2015

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ABSTRACT

Analysis and knowledge are required in order to obtain awareness and understanding of sensory data, sound in this case, to process what we perceive and to derive some meaning. It is possible to capture small details in the environment and take them all in to see the whole. The aim of my research is to explore the connections between sound and perception through the decoding of physics rules, cultural aspects, and parameters contained in sound. This research is about looking for something in a focused and systematic way, to create a new knowledge through active experimentation and also interpretation of new sound sensations. This project explores listening to "noise" to develop a new attitude to understanding sounds and music in order to arrive at a new way of thinking that helps the listeners understand the shapes of sound through analytic investigation. This research could be a help for designers, city planners, musicians, artists and those who want to experience new perceptions.
My thesis project will support these goals and my conclusion will discuss the objectives proposed in this paper.

Keywords: Design, Sound, Soundscape, Perception, Acoustic Environment

Cover illustration: *Remix.* Anna Giudice. 2015

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1. INTRODUCTION

The purpose of this study is to introduce some tools for dealing with sound in design research. In this study, I will consider sound as an object in its own right. This is a theoretical analysis which will attempt to change the perception of so-called "noise," which is often considered an annoying part of our soundscape, to a stimulus that creates a positive experience.

The soundscape is the sonic environment of the world; it is any acoustic field of study. A soundscape can be defined as a musical composition, radio programs, a forest or a school or an isolated acoustic environment. The soundscape has changed over time; modern man exists in a sound environment much different than it was in past.

> In discussing the transition from the rural to the urban soundscape, I will be using two terms: hi-fi and lo-fi. They need to be explained. A hi-fi system is one possessing a favorable signal to - noise ratio. The hi-fi soundscape is one in which discrete sounds can be heard clearly because of the low ambient noise level. The country is generally more hi-fi than the city; night more than day; ancient times more than modern. In the hi-fi soundscape, sounds overlap less frequently; there is perspective - foreground and background. [1]

The sense of participation based on balance and consistency between human expression and natural sounds is completely altered by the emergence of a quantitatively immeasurable sound reality. In this situation, the individual becomes a simple passive receptor, a spectator of an uncontrollable reality. The soundscape necessarily implies a reference to a cultural, symbolic and social milieu. Using the study of acoustic phenomena and coding theory, it is possible to reflect on soundscapes in a meaningful way and thereby make it accessible to designers. The questions to be examined are: What is relevant when we hear a sound and how can knowledge affect the environment and human awareness? How should these sounds be conceptualized?

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[1] R. Murray Schafer, *The Soundscape*. (Rochester: Destiny Books, 1977).

Analysis and knowledge are required in order to obtain awareness and understanding of sensory data, sound in this case, to process what we perceive and to derive some meaning. It is possible to capture small details in the environment and take them all in to see the whole. The aim of my research is to explore the connections between sound and perception through the decoding of physics rules, cultural aspects, and parameters contained in sound. This research is about looking for something in a focused and systematic way, to create a new knowledge through active experimentation and also interpretation of new sound sensations. This project explores listening to "noise" to develop a new attitude to understanding sounds and music in order to arrive at a new way of thinking that helps the listeners understand the shapes of sound through analytic investigation. This research could be a help for designers, city planners, musicians, artists and those who want to experience new perceptions. My thesis project will support these goals and my conclusion will discuss the objectives proposed in this paper.

Theoretical research is, indeed, the base of my creative narrative that will bring me to my final project. According to Brandon LaBelle,

> Sound's locational intensity arrives through it in always already being there: before this writing starts, a sound is heard, its presence already passing, altered in the flows of molecules, cut up by mouths inhaling and speaking back into the air's modulations, trapping, letting go, and attenuating the plateau of the aural. Sound butts in, and then falls back, pushing forth its source, whether object, body, music, or movement, into the frame of perception. I stand by sound, and sound invades my space - it disrespects borders, as thereby making explicit the intensity of territory.[2]

This quotation encapsulates the aim of my projct: The object of my study is to analyze the sound that breaks the boundaries LaBelle notes and fills all spaces to an almost overbearing degree, which can then be isolated and understood. The sound that enters the body and makes it alive; it permeates the space, yelling forcefully with its being. In this paper, I will analyze the concept of sound, from music to silence; I will interpret and analyze its perception, and how to catalog these soundscapes and make them understandable according to the theory of musical object by Pierre Schaeffer.

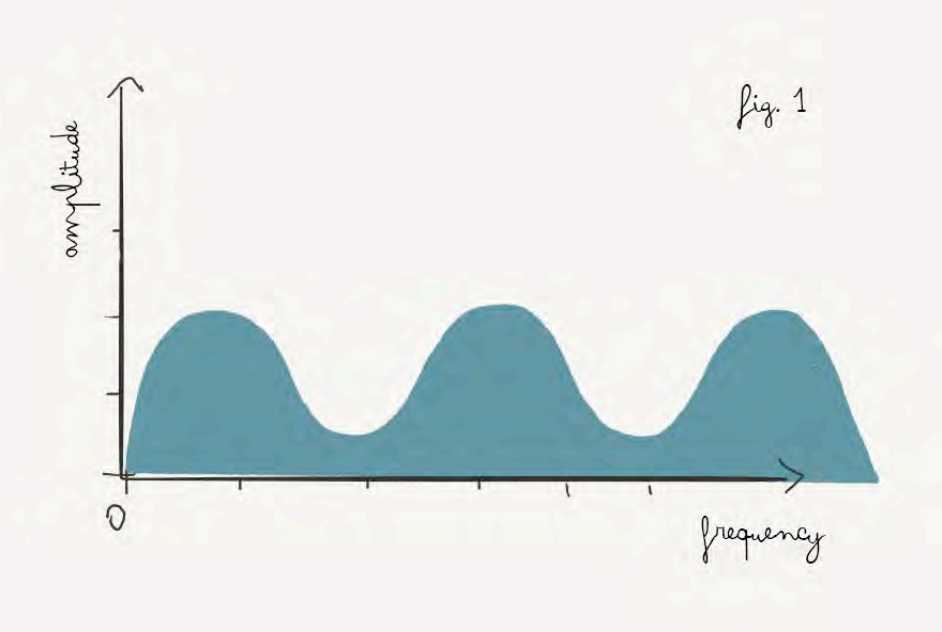
[2] Brandon LaBelle, *Background Noise: Perspectives on Sound Art*. (New York: Bloomsbury, 2012).

1. NOISE AND SILENCE ARE SOUND

There are no differences between music and sound. Music is just a form of noise and people tend to call music the thing that is appealing to them, or what metaphorically represents beauty. The distinction is only a mathematical form not related to perception: music is ordered sound and noise is disordered sound.

Music is an infinite and ordinate sum of sines and cosines multiplied by coefficients. Therefore, this is the mathematical representation of music:

$$f(t) = a_0 + \sum a_n \cos\left(\frac{2\pi nt}{T}\right) + \sum b_n \sin\left(\frac{2\pi nt}{T}\right)$$ [3]



[3] Fourier transform function.

$$a_0 = \frac{1}{T}\int_0^T f(t)\,dt$$

$$a_n = \frac{2}{T}\int_0^T f(t)\cos\left(\frac{2\pi nt}{T}\right)dt$$

$$b_n = \frac{2}{T}\int_0^T f(t)\sin\left(\frac{2\pi nt}{T}\right)dt$$

Noise is a random spectral power distribution, much like the statistical distributions of kinetic molecular theory.

$$P = \int_{fmin}^{fmax} p(f)\, df$$

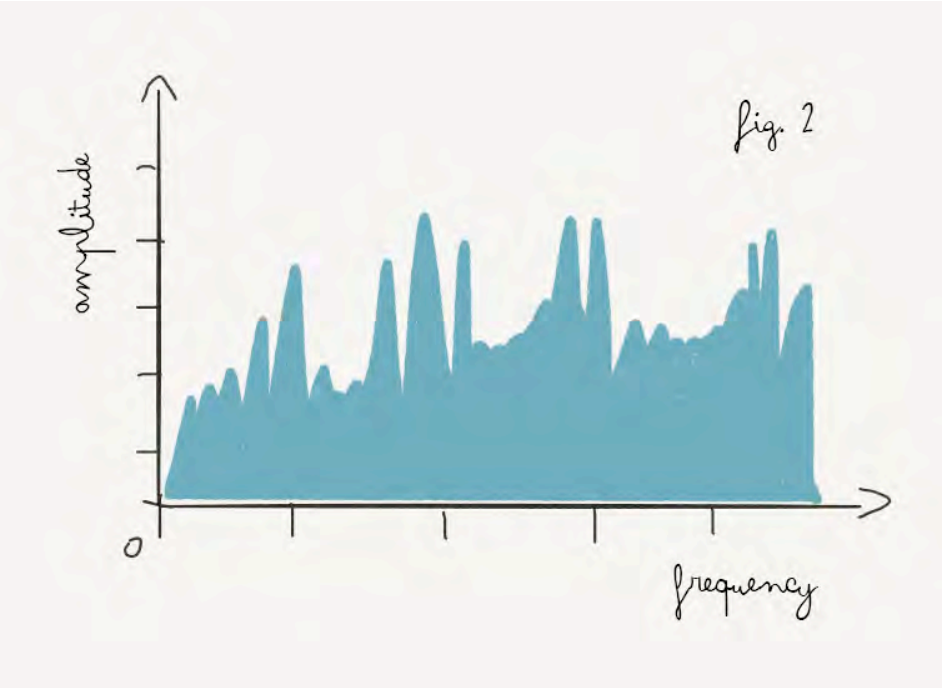
with $p(f) = constant$

where:

$p(f)$ = the value of the power spectral density measured in W/Hz (used for theoretical discussions) or the relative power spectral density in V2/Hz (what normally gets used in practice)

f = any frequency of sound in the range of human hearing

t P = he total power output of the source [4]



However, the only noise that follows this rule is the white noise, a sound with a flat frequency spectrum. White noise doesn't exist in reality, it is only an idealization, since no device is able to generate a spectrum uniform for all frequencies.

[4] *Music and Noise*. http://physics.info/music/ (accessed October 28, 2015).

Sounds are sometimes too strong, sometimes annoying, sometimes simply out of place. How can they be reframed in context as something understandable and therefore acceptable to the human ear? It is not just a matter of positively accepting what is happening and to listening to the sounds with better preparation; I think it's more a matter of how to interpret and decode what we perceive without feeling something that is unpleasant to us, or without feeling something pleasant, which makes the difference between a positive and negative sound experience.

The idea is to learn to isolate the sounds that are considered unsightly and to perceive them as a stimulus that can be part of something not necessarily unpleasant through interpretation and knowledge. From acoustics and psychoacoustics studies, we have learned to interpret sound physically and we have considered how it affects the brain. From arts and music, we know now how to create an ideal sound around us that allows us to reflect both creatively and psychologically. Using the framework put forth by Raymond Murray Schafer, composer, writer, music educator and environmentalist, this work shows that it is possible to perceive the world as a great macrocosmic musical composition.

> When city dwellers remember their environment from a perspective of memory, individual sounds come into focus: dockyard work sirens, the one o'clock gun, the grinding sound of a tram's wheels turning a corner. Some sounds are common to many urban environments, a shared soundscape, while others are particular to certain places. Either way, they enter into the memory of those who grew up in a specific environment, even if they remain unarticulated for long periods. Soundscapes attempt to preserve the sonic 'view' of a place at a particular time, in a similar way to a folklorist capturing stories and thereby an essence of a culture caught in time. The means of such preservation is, of course, a relatively recent phenomenon. The American sound designer David Sonnenschein has written of time's effect on cityscapes, and their change and effect on how we live with sound: In the Paris of the 17th century, reports of noise included shouting, carts, horses, bells, artisans at work, etc. All these sounds came from specific directions and were very impulsive, rather than long constant tones, with few low frequencies.[5]

It is catching these sounds, which are moments and memories, which marks the direction of my study. When the perspective is lost and when the strong symbolic character is no longer identifiable, sound shows its shape and structure. According to

[5] Seán Street, *The Memory of Sound: Preserving the Sonic Past*. (London: Routledge, 2015).

Professor David Novak, writing about the composer and music theorist John Cage, the sound perceived as annoying or inappropriate is, in popular culture, defined as noise:

> Noise is typically separated from music on the ground of aesthetic value. Music is constituted by beautiful, desirable sounds, and noise is composed of sound that are unintentional and unwanted. But if noise is non-musical, music is noisy, and noise sounds have always been part of music.[6]

Noise is a socially considered a component of the industrial and post-industrial city, in contrast to the pleasant sounds of nature. In ecological terms, it is the contrast between the degradation and pollution with the quiet and peace of sounds that evoke desires for peace. The perception of everything that is not generated as music or from intellectual development as opposed to the noise generated by the social and human actions is just considered as something casual and not noteworthy.

The noise, therefore, lives in a context of sensory experience, a combination of elements driven by the process of listening and understanding language that categorizes what is good and what is bad, and it is often contrasted, in Western culture, with silence. Silence does not evoke anything and too often is associated with death. Silence, then, is the symbol of the isolation of man is manifested in the loss of the senses. It is the same silence that can be considered as a break between two sounds or a break between two architectures. But as Dave Novak notes, "where none of these is present, Silence Becomes something else - not silence at all, but sounds, the ambients sounds. [...] These sounds are called silence only Because They do not form part of a musical intention."[7] In John Cage's musical composition "4'33 ", the silent pause of the pianist becomes amplified by the silence of waiting spectators. It is a silence that becomes sound, which is enriched with breaths, with small movements, expectations and pathos.

Silence, concept *Extra Homo,* becomes emotional manipulation. The idea of silence is concentrated on something impossible to hear and is measured by non-human perception. It is less than 20 decibels, which the human ear is not capable of picking up, which precludes all the sounds of life. The human ear, deprived of this

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[6] Dave Novak, *'Noise' in Keywords in Sound*. (London: Duke University Press, 2015).

[7] John Cage, *Silence: Lectures and Writings*. Middletown, Conn.: Wesleyan University Press, 1961.

sense projected outward, amplifies the sound inside the human body. But although it is not audible to the human ear, the "silence" continues to live as a sound and emits vibrations, beats, and sends signals to the surrounding environment.

> It is, in a state of vibration. It is therefore making a sound, but we don't yet know what that sound is. The physicist can prove what we already suspect, but we can't hear those vibrations. When I went into the anechoic chamber, I could hear myself. Well, now, instead of listening to myself, I want to listen to this ashtray. But I won't strike it as I would a percussion instrument. I am going to listen to its inner life thanks to a suitable technology. While in the case of the ashtray, we are indeed dealing with an object. It would be extremely interesting to place it in a little anechoic chamber and to listen to it through a suitable sound system. Object would become a process; we would discover, thanks to a procedure borrowed from science, the meaning of nature through the music of objects. [8]

This is the primordial concept expressed by Pythagoras who reported a celestial music produced by the Universe. The movements of the planets are made up of rhythms, numbers and proportions. Musical intervals are the basis of the Cosmos as a system balanced and the seven known planets, including the sun and the moon, they correspond to the seven natural notes. From here it follows the vision of the planetary spheres that make up the paradise of Dante that produce a celestial music with their perpetual rotate.

Or as Italo Calvino in the short story "Il cielo di pietra" tells of vibrations coming from the atmosphere and unfamiliar voices that capture people from the planet Earth.

And so the rhythms of body fluids are amplified, the hiss of breath through the trachea inflates the lungs, muscles and nerves contract and relax, the skin vibrates. It is introspection in its essence, a silence that becomes deafening noise and that leads to madness. Through the body it is possible to reach the awareness of boundaries. According to Professor Debora Kapchan, "the resonant body, the intramodal body, the sonic affective body, the postphenomenal body, the technobody, the transgendered body. Adjectives proliferate. The body persists."[9]

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[8] John Cage and Daniel Charles, *For the Birds*. (Boston: M. Boyars, 1981).

[9] Debora Kapchan, *'Bodye' in Keywords in Sound*. (London: Duke University Press, 2015).

It is through the body, through the physical shape of the ears, you can feel the vibrations and translating them into the perceived mental image. The human ear can perceive sound in every direction by conveying a sense of that which is introspective, inside, through the body. The body is fully immersed in this experience, soaked in it. Only then will the intellect try to associate the sound with an idea and will tend to sort, within defined borders formed by the individual´s understanding of music, those sounds of music and not music.

Through the projection of the sound it gives a psychological imprinting. As philosopher Alva Noë says,

> Perception is a causal concept, but it is also a concept of a kind of action. Perception depends on how things are, and it depends on what we do. When we perceive, we keep track not only of how things are, but of our changing relation to how things are.
> In the natural world, however, it may be that the only way to preserve the right kinds of dependence relations between experience and the world is by the standard, biologically realized ways with which we are familiar. From a certain standpoint, artificial perceptual systems are very much like biological ones. Importantly, the inadequacy of such systems is in direct proportion to the degree to which they are different from ordinary, biological systems.[10]

[10] Alva Noë, *Causation and Perception: The Puzzle Unravelled*. (Santa Cruz: University of California, 2003).

SEMANTIC OF THE SOUND

The act of listening requires a skill more refined than the one of feeling. The French composer Pierre Schaffer notes that the act of listening is created in four actions for different intensity, interest and knowledge. The four actions are intrinsically related to the semantics of the musical structure and the basic grammar of the concept itself. They are: to listen, to hear, to understand and to comprehend.[11]

Listening is defined as having an interest related to sound and a tender ear to listen to it. For Schaffer, "to listen" is an immediate activation of a familiar figurative landscape. Listening means to return the sound to the mind that immediately activates stereotypes and visions related thereto.[12]

As Douglas Kahn says:

> [It is] introduced on a social scale a newly pervasive, detailed, and atomistic encoding of sound, gathering up all the visual, literary, environmental, gestural, and affective elements they brushed up against. Sound proliferated by incorporating a greater divergence of cultural codes and worldly sources and generated still greater variety through internal means; the sheer number of sounds increased as they became freighted with multiple allusions and meanings. Sound themselves have multiple personalities and the nature of sound became less natural. [13]

According to Algirdas Greimas, "The listening allows immediate reconstruction of the frame figurative. There is, therefore, a cogency of listening that is derived from being willing act."[14] The conceptualization of the vague moment in the complex process that transforms the subject in terms of the narrative dimension, except for those related to the size of the senses. This concept expresses that the semiotics of the image are related to the perception, which follows the phenomenological model of Maurice Merleau-Ponty.

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[11] Pierre Schaeffer, *Traité Des Objets Musicaux: Essai Interdisciplines*. (Paris: Éditions Du Seuil, 1966).

[12] Ibid.

[13] Douglas Kahn, *John Cage: Silence and Silencing. (*Oxford: Oxford University Press, 1997).

[14] Algirdas Julien Greimas, *Semiotics and Language: An Analytical Dictionary*. (Bloomington: Indiana University Press, 1982).

The most magical moment of the four states is that moment when the individual is in ecstasy and he perceives something unexpected.

This happens not only in the artwork but also in behaviors (actions) and in everyday objects. Perception is, for Merleau-Ponty, openness to the world; it is our introduction into being.[15] This does not mean that perception is immediately transparent to itself; Merleau-Ponty thinks that the perception does not deliver its essence; rather, "it is buried under sediments of knowledge and must be conquered by a work comparable to that of an archaeologist."[16]

And it is this knowledge that I try to bring out to the sound through my work. As Noë notes, "Visual experience does not arise because an internal representation of the world is activated in some brain area. On the contrary, visual experience is a mode of activity involving practical knowledge about currently possible behaviors and associated sensory consequences. Visual experience rests on know-how, the possession of skills."[17] Noë refers to images but the same process of the visual experience is applicable to the sound as it implies, equally, the possession of knowledge.

It is the “Heterodox” view that maintains that an understanding of perception must include facts about the environment in which a perceiver is situated and the extracranial activities. Noë takes into consideration the role of the perceiver, perception involves a great deal of behavior on the part of the perceiver. Perceivers move around things, with different heights, different diopters. All of these behaviors are important for how perception is actually achieved.

On the other hand, hearing is a passive approach to sound. The subject is invested in the sound even if it is not voluntary. The information that comes to the subject is less clear, the sounds are perceived as an indistinguishable background; auditory information is continuous but apparently inaccurate. The brain incorporates sounds but doesn't process them; it doesn't encode this input properly and turns it into the expected images. The composer Michel Chion, paraphrasing Schaeffer, writes: “‘Ouir, is to perceive with the ear, to be struck by sounds, it is the lowest, most

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[15] Maurice Merleau-Ponty and Donald A. Landes. *Phenomenology of Perception. (*London: Routledge*,* 2012).

[16] Colin Smith, *Maurice Merleau-Ponty Phenomenology of Perception.* (Abingdon: Taylor & Francis, 2002).

[17] Daniel Dennett, *Center for Cognitive Studies.* (Medford: Tufts University, 2002).

elementary level of perception; one passively ‘‘hears’’ many things that one neither seeks nor listens to (ecouter) nor understands (comprendre)’. ”[18]

The third of the actions is understanding: The ear not only detects the sound and sends the information to the brain but is driven by the intention to hear it, select it and process it in the consciousness. With this action, the cultural component becomes predominant. The intention of the subject is driven not only from instinctively but also from his background.

Finally, there is the action of understanding. Understanding means "to see under, to see deeply” and to become master of one´s own perception. The understanding requires an analysis of the listening semantic of the listening object. Being "signs to be interpreted" and not dependent only on the level of attention and listen. For the linguist Ferruccio Rossi-Landi, everything is a sign because we transform such input when we create an interaction. A sign that wasn't created specifically as a sign can play an instrumental extra-semiotic role even when working (or not working) as a sign. These signs are both natural, that is, found in nature, and cultural, that is, human artifacts produced to fulfill functions other than that of signs.[19]

[18] Michel Chion, *Guide Des Objets Sonores. Pierre Schaeffer Et La Recherche Musicale*. (Paris: Buchet-Chastel , 1983).

[19] Ferruccio Landi, *Metodica Filosofica E Scienza Dei Segni: Nuovi Saggi Sul Linguaggio E L'ideologia*. (1a ed. Milano: Bompiani, 1985).

THE PERCEIVED SOUND

For the Danish linguist Louis Hjelmslev, signs are inherent in all "being" but their development is only possible in a human context.[20] And even for Schaeffer, "reduced listening" is the attitude of listening to the sound itself, as a sound object, abstracting from its origin, real or supposed.[21] It has carried out a real removal of the sound source from the perception of the listener in order to perceive the sound object in its morphological structure. The act of leaving aside some of our listening habits is a voluntary act that allows us to explain many phenomena implicit in our perception. Since this type of listening is to strip the sound of all that is not really inherent in himself, paying attention only to the latter in its materiality, in its essence, in its size sensitive.

Before you can access the reduced listening mode, through awareness and knowledge, you need to go through some of deconditioning exercises, in order to be aware of the reflections listening "Reference" and to become able to suspend them at the appropriate time. Listening reduction, however, retains a link with the ordinary ratings of sound: it is about changing the direction of our interest, stopping to listen to an event through the sound it produces and therefore cease to hear the sound as an event sound. This direct approach to listening only to the sound itself, is the main focus of my project. According to R.M. Schafer,

> Any sound phenomenon can be taken[…] like the words of a language[,] for its relative meaning or its actual substance.In that its meaning predominates, and this is what we play with, it is literature and not music. But how can we forget its meaning, isolate it from the sound phenomenon? This requires two prior operations: Distinguishing an element(listening to it in itself, for its texture, its material, itscolour). Repeating it. Repeat the same sound fragment twice: the event is replaced by music.[22]

[20] Susan Petrilli, *Lavoro Immateriale*. (Roma: Meltemi, 2004).

[21] Pierre Schaeffer, *Traité Des Objets Musicaux: Essai Interdisciplines*. (Paris: Éditions Du Seuil, 1966).

[22] R. Murray Schafer, *The Tuning of the World*. (New York: A.A. Knopf, 1977).

The idea to extrapolate the sound source from the environment has already been taken into account by the philosopher mathematician Pythagoras. He used to hide behind a curtain while teaching his classes to allow students to concentrate only on the words and concepts and not on the expressions and gestures of the presenter. This concept is expressed by the word "Acusmatic," which derives from the greek ἀκουσματικοί, "listeners," and describes sounds you hear without specifying the cause. This particular practice of listening can decouple view from hearing, which encourages listening to audio sources without interference, allowing repetition. The repeating sound lets you hear in different directions in order to understand the different hues. This is fits well into the methodology of my studies.

Through a sound recording you can create cuts and inversions, rings, transposition, sampling, compression, gels (freezing), reverberation, echoes, delays, filtering, mixing, and accumulation.

> Thus we see that—with or without words—radio is sound. This is why its imaginative power is so great, and why we can summon its prompts from memory when provoked to do so by the right question or an involuntary trigger. Beyond the technical, we might see ourselves as receivers, with the capacity for tuning in to the world around us. The ears of a person with unimpaired hearing are never closed, so imaginative sound will constantly have to compete with the currency of the sound we are absorbing as 'receivers'. The Belgian sound artist Stijn Demeulenaere has written: 'When asked to remember a sound, to recreate it in our heads, we have to rely a lot more on our imagination, our cross-links between feelings, thoughts and memories to attempt to hear it again. And by using that imagination, we explore what it was that made a certain sound special to us, and why it stuck with us.[23]

As I pointed out before, it is important to interpret and decode the sound to be able to understand its internal structure, its morphology, as defined by Shaeffer.

Morphology identifies sounds and characteristic of sounds: pitch, intensity and timbre, and it is therefore the study of the sound object as a structure, or its context: looking inward that aims at a description of its physical properties. The qualification of the object, which is supposed to be described, has seven morphological criteria that are divided according to the axis of form/matter.

Typology identifies sounds by category. The typological criteria are a property of the perceived sound that allows you to identify, categorize, qualify and analyze it of

[23] Seán Street, *The Memory of Sound: Preserving the Sonic Past*. (London: Routledge, 2015).

criteria sound identification of the objects Are taken into consideration pairs, which are then isolated and classified by types.

In the creation of his system of typology of sound, Schaeffer formulated six typological criteria.

Mass/Facture

The mass is a characteristic of the sound object and represents the content of heights. Facture identifies the way that energy is communicated and is manifested in life.

Duration/Variation

The duration is the time of the object as it is experienced psychologically, while the variation, defined as something that changes a function of time, represents something that resembles the speed.

Balance/Originality

To balance means something variable, the facture of the sound object, between the "too structured and too simple." Originality is, however, the ability of the object to be different compared to what was previously predicted…[24]

Schaeffer adds seven criteria when speaking of types of sound: mass, dynamic, harmonic timbre, melodic profile, mass profile, grain and allure. These are defined as follows:

Mass: Sound object analysis

Dynamic: Evolution of the sound field intensity.

Harmonic Timbre: Features related to the mass that allows to qualify the sound.

Melodic Profile: General profile drawn by the sound in its texture.

Mass Profile: General profile of a sound of which the mass is sculpted by internal variations.

[24] Pierre Schaeffer, *Traité Des Objets Musicaux: Essai Interdisciplines*. (Paris: Éditions Du Seuil, 1966).

> *Grain*: Microstructure of the material sound that evokes the texture of a fabric or a mineral.
> *Allure*: Oscillation, vibrato, characteristics of the development of sound[25]

What I find useful to my study is the consideration of sound as if it were a phoneme. The sound is considered as a single unit that stands out from all others even if only as a variant. In order for two different sounds to be perceived differently, one needs only to change one parameter. The sound in question is based on a notion that deviates from the ordinary meaning, which considers it as a random and useless object. It is a concept that includes everything we perceive with hearing, including what is commonly called "noise." It is everything that has the ability to convey a particular aesthetic quality.

The sound that I intend to analyze is a pure sound that tends not to recall images or melodies of cultural notes. It is a sound of context wherein I will endeavor not to put off thousands of years of history of harmony and I will try not to move within the expected conventions and codifications of music. The human mind has a strong ability to empathize with the source generating the sound and even more with the technical capacity or the artistic expression of the performer. According to psychologist Carl Seashore:

> The necessity of living in a world of representation tends to bring out vivid visual imagery as well as imagery in the other senses, because there is a general tendency to reinstate, in the representation of a sensory experience, the whole of the origin setting. Thus a musician not only hears the music but often lives it out so realistically in his imagination and memory that he sees and feels a response to the persons, instruments, or total situation in the rendition presented. Without the warmth of experience, music would lose its essential esthetic nature.[26]

And again, to explain the importance of isolating the sound from its context in order to be able to understand its essence, Wilhelm Meister, Goethe´s character, said:

> They spoil us at the theatre; the music there is, as it were, subservient to the eye; it accompanies movements, not emotions. In oratorios and concerts, the form of the musician constantly disturbs us: true music is intended for the ear alone; a fine voice is the most universal thing that can be figured; and while the narrow individual that uses it presents himself before the eye, he cannot fail to trouble the effect of that pure

[25] Ibid.
[26] Calrl Seashore, *Psychology of Music*. (New York: Dover Publications, 1967).

> universality. The person whom I am to speak with, I must see, because it is a solitary man, whose form and character gives worth or worthlessness to what he says: but, on the other hand, whoever sings to me must be invisible; his form must not confuse me, or corrupt my judgment. Here, it is but one human organ speaking to another; it is not spirit speaking to spirit, not a thousandfold world to the eye, not a heaven to the man.' On the same principles, in respect of instrumental music, he required that the orchestra should as much as possible be hid; because by the mechanical exertions, by the mean and awkward gestures of the performers, our feelings are so much dispersed and perplexed. Accordingly he always used to shut his eyes while hearing music; thereby to concentrate his whole being on the single pure enjoyment of the ear.[27]

We face the ἐποχή practice, or the suspension of judgment that the philosopher Edmund Husserl sees in his theory. Husserl calls "intentional correlation" between data and the way of givenness, the inseparable link between what is objectively given and the subjective experience by which the objective fact is manifested.[28]

Expectation induces the perceiver to focus his attention on particular aspects of the sensory stimulation. This can help to understand or it can distort perceptions, too. What you have to put in brackets in the case of music are all the prejudices that have always affected the history of music and/or the sound object, until finally reaching a pure perception, which does not exist outside of an individual´s perception. It is precisely this notion of sound objects that lends itself well to act as a witness to the ideal of an aesthetic theory that focuses on perceptual peculiarities of attention during an artistic enjoyment. It is precisely in this that the creak of a door opening in my listening room is different from the creak of the door opening that can be heard in the "Variations on a Door and a Sigh" by Pierre Henry.

For the squeaking we hear in our room, we know the cause. While it is "pure" in the sense just specified, the importance is what we hear repeatedly in the variations.

The creaking in the work by Henry is recorded on tape and repeated several times, manipulated through a sampler and, by this process, is materialized. It is for this reason that it conveys an aesthetic attention, which however, distinguishes it from creak we hear every day in our room. Not only that, the squeak which is heard in my

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[27] Johann Wolfgang Von Goethe and Thomas Carlyle. *Wilhelm Meister's Apprenticeship and Travels*. (London: Chapman and Hall, 1874).

[28] Hubert Dreyfus, *Husserl, Intentionality, and Cognitive Science*. (Cambridge, Mass.: MIT Press, 1982).

room is "functional," meaning a response to the stimuli of the environment, when it is assumed that a work of art is never functional. [29]

No one would dream of using the urinal of Marcel Duchamp in the museum where it is displayed, even in the case of incontinence! Similarly, no one listening to the variations of Henry would turn to see who is entering his room at the moment that he perceived the squeak. The sound here is considered for what it is, only for its purity and its part within the physical composition. The only difference between a musical note and a sound is that the first is determined while the second is indeterminate. This is similar to the way we speak of regular polygons and irregular polygons. Both are part of the set of polygons and regular polygons are a subset. For regular polygons, there is a relationship between the side of the polygon and the apothem and then the formula to calculate area and perimeter never changes.

Like the readymades of Duchamp, therefore, the sounds of concrete music are an important example of how attention-perceptual changes depend on the context in which we find ourselves. According to the theory on attention aesthetic espoused by the philosopher Nicolas J. Bullot, "certain artistic devices are based on inhibition processes of subsets of routines that typically monitor the attention object-based space-time."[30] We can consider the sound, or rather the sound object, as theorized by Schaeffer, like objects of space and time which are usually anchored in our daily attention. This is the point of my research. Evaluating objects in the space-time theory of Bullot's object-based sound and Schaeffer's "musique concrete" could prove a valuable addition to current aesthetic theories on attention. The objects of space and time are anchored in perceptual processes that Bullot calls routine, e.g. those perceptual processes "developed through the learning performance of recurrent acts."[31]

[29] Stefano Bianchi, *La musica futurista. Ricerche e documenti*. (Arsina, Libreria Musicale Italiana Editrice, 1995).

[30] Nicolas J. Bullot. *Objects and aesthetic attention*. (Interdisciplines, Interdisciplines, 2003).

[31] Ibid.

CONCLUSION

At this moment, I do not know yet what will be my final project. My intention is to work on soundscape, to isolate its sounds, whether natural or artificially produced, and return pure. The final result could be a collective machine that stimulates ownership of the environment, bringing together people of all ages and backgrounds, to feel sound in different way, to appreciate each sound for its own value.

This big device can teach to people about how sounds are created, inviting them to play together, create their own "city landscape" in a big musical ensemble. When people play all together, it possible to compose a sound piece in cooperation, to connect to one another and to have a sense of ownership of space due to the sound they create. The sound composition is a great way to understand how the single unit can be part of a larger composition. I can define my research as research through design, of which the aim is communicate new knowledge through a methodological process.

The breakdown of barriers between ordinary attention to sounds and the aesthetic perception of same forms the basis of my research. Everything is a sound object, according to Schaeffer and his school, and all that is the sound object itself has the same right to be considered art, because in certain contexts all sounds, from noise to note, from the noise of the city to the squeak of a door, are able to convey attention aesthetics. In this way, they inhibit the normal processes of routines to which typically turn. After making a pure sound-object, it has become a potential art object.

The interpretation of the environment is determined by the interaction of the biological structure of brain and by the cerebral synthesis. The knowledge adds elements that the body cannot perceive, changing the way to understand. Emotions routinely affect how and what we perceive.

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Master of Design

REYKJAVIK SOUND SCAPE

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Design

Anna Giudice

2016

REYKJAVIK SOUND SCAPE

A Document Submitted to:
The Department of Design and Architecture, Iceland Academy of the Arts,
in partial fulfillment of the requirements for the degree of Master of Design, 2016

Mentor MA project | Thesis: Guðbjörg Rannveig Jóhannesdóttir
MA project | Design work: Guðmundur Oddur Magnússon

This thesis is 4 ECTS credit hours of a total of 30 credit hours final project towards the degree of Master of Design. The written content of this publication as well as the images are the responsibility of the author.

Goddur, my mentor.

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ABSTRACT

The aim of my project is to explore the connections between sound and perception through the decoding of physics rules, cultural aspects, and parameters contained within sound.

This research is about looking for something in a focused and systematic way, to create new knowledge through active social experimentation and also interpretation of new sound sensations.

The Reykjavik Soundscape is a board game created in order to help designers to come up with ideas. It is a tool designed to understand and transform the city soundscape. This project explores listening to "noise" to develop a new attitude to understanding sounds and music in order to arrive at a new way of thinking that helps the listeners understand the shapes of sound through analytic investigation.

This approach can help designers, city planners, architects, understand how sounds are created, inviting them to play together, to create their own "city landscape" in a big musical ensemble. When people play all together, it is possible to compose a story using sound and memory in cooperation, to connect to one another and to have a sense of ownership of space due to the sound they create. The storytelling is a great way to understand how the single unit can be part of a larger composition.

ACKNOWLEDGEMENTS

I would like to sincerely thank my supervisor Guðbjörg Rannveig Jóhannesdóttir (Gugga) and my mentor Guðmundur Oddur Magnússon (Goddur), for their guidance, support and for their friendship, which gave me the possibility to learn and grow personally and professionally during my Master studies.

I would like to thanks my colleages and friends Shuyi, Eusun, Sinead, Ma and Maria and teachers Johannes, Dora, Halldor, Thomas, Massimo, Hlin at LHI, for their friendship and support in the academic world and every-day life.

A big thanks goes to Fabio, Valeria, Nicola and Kyriaki.

Sound experiment.

INTRODUCTION

The Reykjavik Soundscape is a board game created in order to help designers to come up with ideas. It is a journey throughout the city and its sound. The aim of this project is to explore the connections between sound and perception through the decoding of physics rules, cultural aspects, and parameters contained within sound.

This game was inspired by The Game of the Goose, a race game of unknown origins in Europe in the 16th century. Like The Game of the Goose , players will move their tokens on a virtual walk through the board, which is printed with a cityscape. The tokens will be shaped like cats!

The Reykjavik Soundscape is a tool designed to understand and transform the city soundscape. It is about looking specifically at sound to create an experience, examining one´s reactions and perceptions. It enhances creativity, and also promotes idea generation and design thinking, while raising awareness about environmental and social issues.

Begin by choosing a particular group issue that you are currently dealing with, one that you would like to resolve by playing at The Reykjavik Soundscape. Using the 120 cards, representing sounds and actions, walking throughout the city, players have to tell a story.

The city of Reykjavik provides an excellent study typology because the entire city environment is condensed into a small, densely populated space.

This approach can help designers, city planners, architects, understand how sounds are created, inviting them to play together, to create their own “city landscape” in a big musical ensemble. When people play all together, it is possible to compose a story using sound and memory in cooperation, to connect to one another and to have a sense of ownership of space due to the sound they create. Storytelling is a great way to understand how the single unit can be part of a larger composition.

Put into practice, the theory of the soundscape as I describe here represented as an experience journey can inspire a new approach to the creation of city guides, urban solutions, installations and new creative solutions to define a standard of quality of the life of citizens. The journey proposes a new approach for understanding city development projects, through an investigation into the relationships between soundscape and city. I define my research as research through design, of which the aim is to communicate new knowledge through a methodological process.

My objective is to change the perception of sound as an element of a given environ-

ment to those who imagine sound as being invisible and intangible (Figure 1); because of this, it is often overlooked and people are seldom aware of the soundscape surrounding them. Our sense of vision often seems more dominant than our sense of hearing, yet sound plays a fundamental role in our everyday lives, especially in detecting danger, making communication and providing orientation in a physical space.

Each individual organizes sound in their own way (Figure 2); the thing that most fascinates me is the perception of sound in the brain. At the beginning, the sound of environment around me is like a background buzz, but slowly becomes something that can be reimagined as an orchestra playing a symphony. It is a sound that I cannot control, but I can perceive in a different way: in the active voice and the passive voice. In its passive form, it is possible to be lulled by the sound or it is possible to become really annoyed; in the active form, it is possible to isolate individual sounds without identifying the source; in effect, letting the melody make up its own mind.

New tools are necessary to further explore the complexities of perception of sound.

In the first part of this analysis, I will introduce the research field. In the second part, I will analyze my design approach from the methodological point of view; finally, I will describe the parameters and rules that led to the final result.

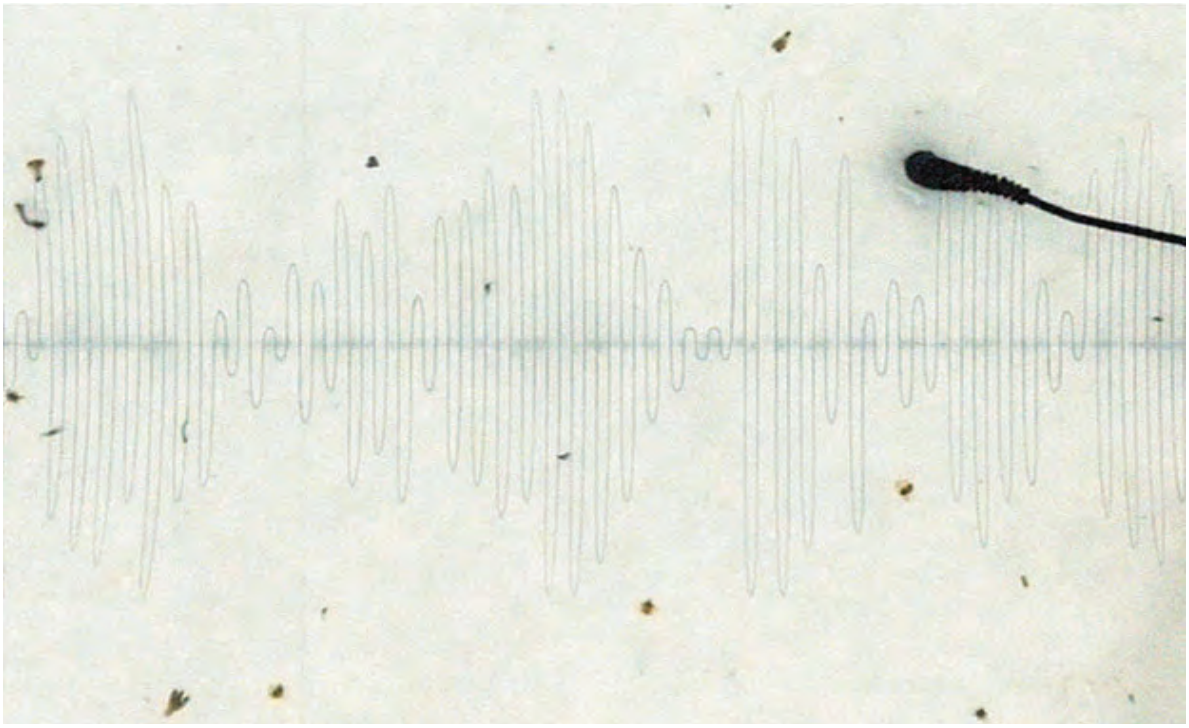


Figure 1. Sound is invisible and intangible.

Figure 2. Individual organizes sound in their own way.

FIELD OF STUDY

Our daily experience is produced by perception. In architecture and design context, sight has been historically privileged over the other senses. In the early sixties, Jane Jacobs stressed the importance of visual order in the city[1], and Kevin Lynch focused on the visual dimensions of urban design.[2] The senses of hearing and smell, for instance, are regarded negatively in contemporary urban research, as something that disturbs our lives: a pungent odor, a deafening noise. A first positive reference is found in studies by Juhani Pallasmaa, wherein he notes:

> Sight isolates, whereas sound incorporates; vision is directional, whereas sound is omni-directional. The sense of sight implies exteriority, but sound creates an experience of interiority. I regard an object, but sound approaches me; the eye reaches, but the ear receives. Buildings do not react to our gaze, but they do return our sounds back to our ears. (…) Hearing structures and articulates the experience and understanding of space. We are not normally aware of the significance of hearing in spatial experience, although sound often provides the temporal continuum in which visual impressions are embedded. When the soundtrack is removed from a film, for instance, the scene loses its plasticity and sense of continuity and life. [3]

According to Pallasmaa, sound is, therefore, essential in human sensory awareness. Urban Studies reveal how the exploration of the city is affected by our ability to store images. Kevin Lynch observes,

> Environmental images are the result of a two-way process between the observer and his environment. The environment suggests distinctions and relations, and the observer – with great adaptability and in the light of his own purposes – selects, organizes, and endows with meaning what he sees. The image so developed now limits and emphasizes what is seen, while the image itself is being tested against the filtered perceptual input in a constant interacting process, thus the image of a given reality may vary significantly between different observers.[4]

1 Jane Jacobs, *The Death and Life of Great American Cities*. (Harmondsworth, Middx., Engl: Penguin Books, 1972).
2 Kevin Lynch, *Good City Form.* (Cambridge, MA: MIT Press, 1984).
3 Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses*. (Chichester: Wiley-Academy, 2005). 49 - 50.
4 Kevin Lynch, *The image of the city.* (Cambridge, MA: MIT Press, 1960). 6.

However, our memory is not only influenced by our visual memory but also by others senses. Sound and memory are closely linked, as well as smell or taste. Research on the perception of urban spaces has neglected for years the significant role that sound plays, for better or for worse, in the urban context, as Emily Brady wrote in "Sniffing and Savouring: The Aesthetics of Smells and Tastes". She notes that *"*one general reason why smells and tastes have been neglected in philosophical aesthetics stems from their association with that which is base. They are associated with the body and with non human animals and relegated to the realm of the crude, so called lower pleasure". [5]

Sounds contribute, along with images and smells, to the recognition of an identity of a place. Sounds and smells are often ignored by city planners, or even treated as something to be resisted and annihilated. Sounds contribute to the construction of a place. The combination of natural sounds to those induced by human activities, create a unique synergy.

The goal of this project is, as I have already described, to encourage people to listen and become aware of their surrounding soundscape. This project began by asking: In what ways can sound be used to perceive the city (Figure 3)? Research *en plein air* and development of a prototyping process was key to exploring these questions (Figure 4). Sounds can be perceived in different ways, sometimes too strong, sometimes annoying, sometimes simply "out of place." How can sound be reframed in contexts which are pleasant and acceptable to the human ear? It is not just a matter of positively accepting what is happening and listening to the sounds with better preparation; I think it's more a matter of how to interpret what we feel.

The idea is to learn how to isolate sounds that are considered unpleasant and to perceive them as a stimulus that can be part of something not necessarily unpleasant through interpretation and knowledge. From psychiatrist Hans Berger, the inventor of electroencephalography, I have learned to interpret sound physically and we have considered how it affects the brain. From arts and music, I know now how to create an ideal sound around us that allows us to reflect both creatively and psychologically.

5 Andrew Light and Jonathan M. Smith, *The Aesthetics of Everyday Life*. (New York: Columbia University Press, 2005). 179.

Using the framework put forth by Raymond Murray Schafer, a composer, writer, music educator and environmentalist, this work will show that it is possible to perceive the world as a great macrocosmic musical composition.[6]

Besides the sensory data, there is the work of recognition and classification of sounds, which occurs according to predetermined categories, suggested by Schafer: continuous sounds, repetitive sounds, those which appear only once; natural sounds, human, or technological; loud sounds or weak; pleasant or unpleasant; internal or external; sounds that are still, in motion, or moving with us. The attention given to the sounds and their perception is the basis of my research.

The way to interpret the environment is determined by the interaction of the biological structure of the brain and its ability to develop. Knowledge of the physical structure of the sound adds information that the body can not perceive. In the book *Art of Noises* in 1916, the futurist Luigi Russolo turned sound into an extraordinary musical experience. In his compositions all sounds have the same aesthetic dignity:

> Let us cross a great modern capital with our ears more alert than our eyes, and we will get enjoyment from distinguishing the eddying of water, air and gas in metal pipes, the grumbling of noises that breathe and pulse with indisputable animality, the palpitation of valves, the coming and going of pistons, the howl of mechanical saws, the jolting of a tram on its rails, the cracking of whips, the flapping of curtains and flags. We enjoy creating mental orchestrations of the crashing down of metal shop blinds, slamming doors, the hubbub and shuffling of crowds, the variety of din, from stations, railways, iron foundries, spinning wheels, printing works, electric power stations and underground railways. We want to attune and regulate this tremendous variety of noises harmonically and rhythmically. To attune noises does not mean to detract from all their irregular movements and vibrations in time and intensity, but rather to give gradation and tone to the most strongly predominant of these vibrations. Noise in fact can be differentiated from sound only in so far as the vibrations which produce it are confused and irregular, both in time and intensity. Every noise has a tone, and sometimes also a harmony that predominates over the body of its irregular vibrations. [7]

The sounds that surround us, following the teachings of Luigi Russolo, are to be considered an asset to our knowledge. The environment around us is a great symphony that becomes an important part of our being.

6 Murray Schafer. *The Soundscape.* (Rochester: Destiny Books, 1977).
7 Luigi Russolo. *The Art of Noises.* (New York: Pendragon Press, 1986.) 5.

Figure 3. Perception of the city.

Figure 4. Research *en plein air*.

METHODOLOGY

I started my research reading about sound and perception doing soundwalks around the 101 district of Reykjavik, bringing with me a sound recorder and a camera. I recorded 237 different sounds, following my sound walk in the Reykjavik city map. I recorded a variety of typical soundmarks in the Reykjavik soundscape, focusing my research on 12 different typological areas: Airport, Bus Station, Harbor, National Hospital, Concert Hall, Park, the Pond, Residential District, Shopping District, Stadium, Swimming Pool and University (Figure 5). While walking, I recorded sounds and took notes and pictures of the areas explored. I identified my path using open source software OpenStreetMap3. This process helped me to classify the sounds I collected at each location. In my soundwalk, I detected that some pleasant sounds are produced by sources which are visually unpleasant, as well as the fact that unpleasant sounds can be produced from visually pleasant sources. Visual and mental perception can affect data generated by the brain positively or negatively, thus distorting the aesthetic perception of reality.

During the soundwalk, I increasingly focused upon tasks of attentive listening. Urban soundscapes are similarly designed. These twelve Reykjavik environments are a mix of overlapping natural and human sounds.

I followed Schafer's sound classification: nature, music, indoor, transport, mechanical and society. [8] (Figure 6).

When I analyzed the sounds collected, and I tried to find an analogy between the sounds of the city and music sound of nature or musical instruments.

I used Praat software to compare the sound spectrogram and to find strong analogies between sounds in order to classify and compare music spectograms and soundwaves to the sounds of the city. This was done in order to discover the essence of the sound, indentifying similarities and differences, and analyzing shapes, data and patterns.

I classified sounds according to physical characteristics (figure 7). The first parameter I examined is that of pitch. According to the physics work of Campbell and Greated, pitch is used to define the quality of a sound that to understand if the sound is "high" or "low." Sound, in acoustics field, is a property of the vibration of particles in a medium.

8 Schafer, R. Murray. *The Soundscape.* Rochester: Destiny Books, 1977.

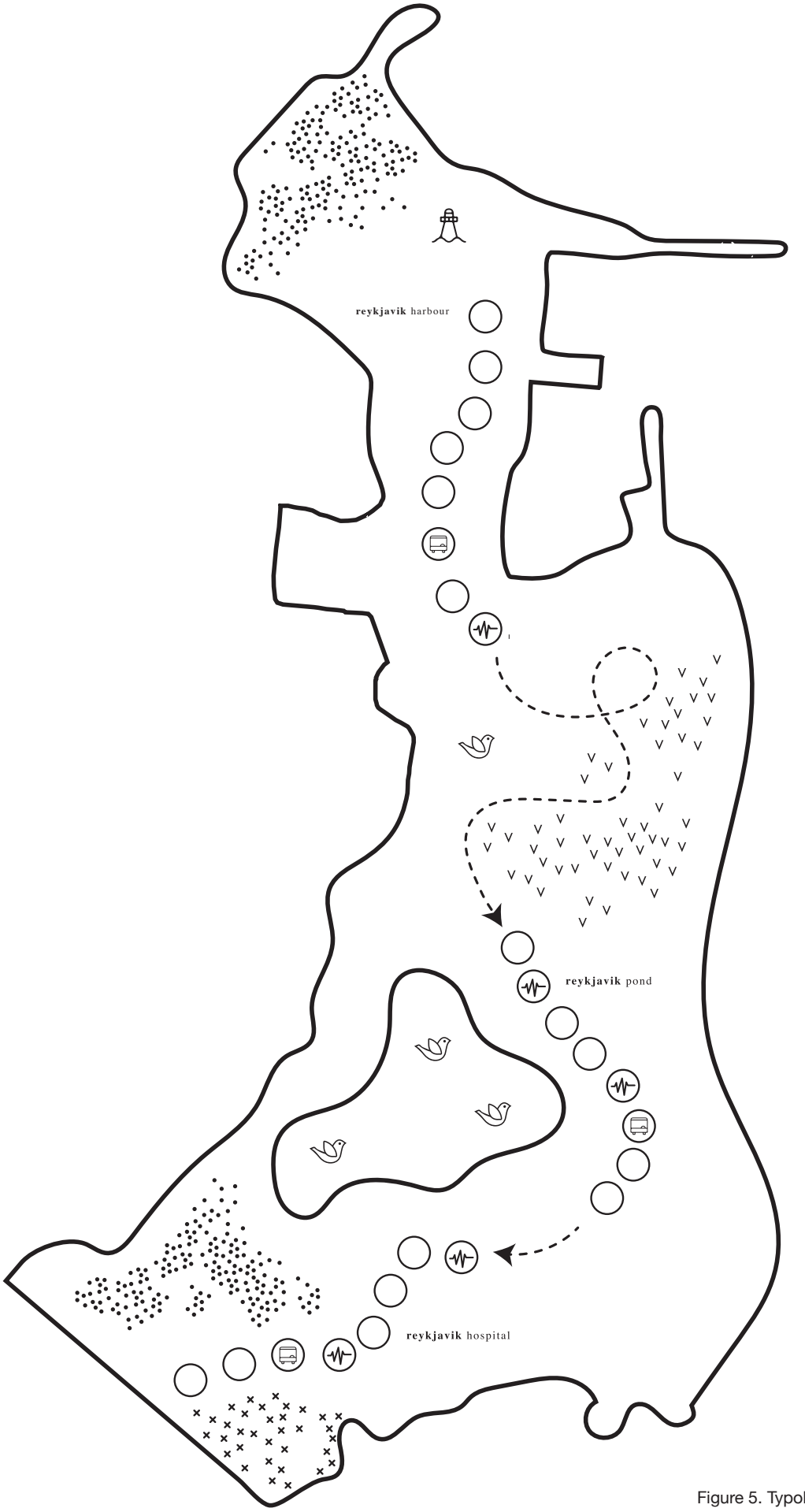


Figure 5. Typological areas.

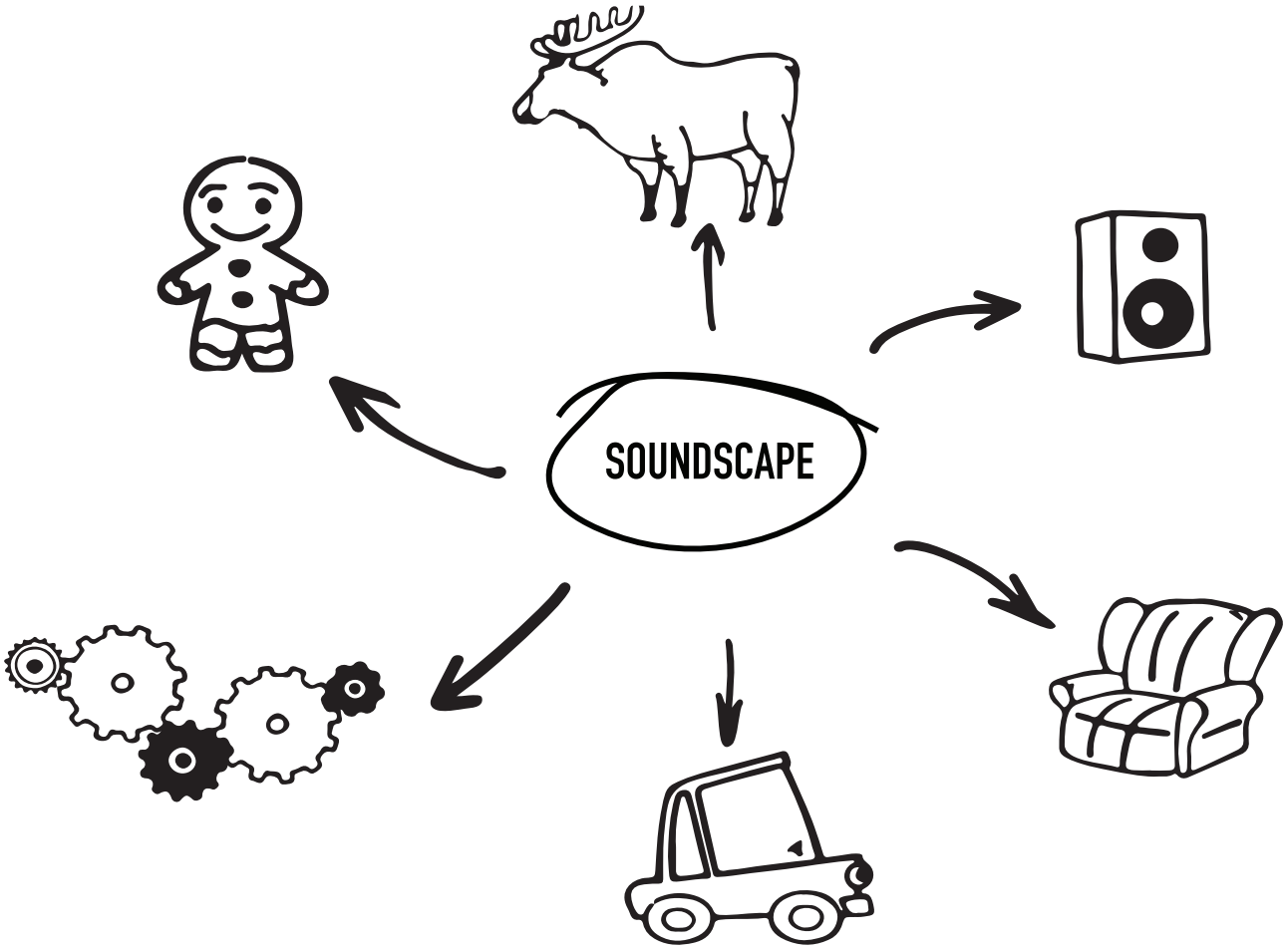


Figure 6. Schafer's sound classification: nature, music, indoor, transport, mechanical and society.

Jeremy Starpoli observes,

> A sound created in air is a vibration of the air particles themselves, acted on by the expenditure of energy. This energy displaces the air particles immediately around it, causing them to crowd the adjacent particles, thereby increasing the pressure. When the original particles return to their position, this causes the second set of particles to follow, which decreases the pressure in that area. This alternation of compression and rarefaction causes a wave, much like the ripples of a stone thrown into a pond. The sound wave expands out into air in all directions, and loses energy by being absorbed by surfaces, eventually dying out unless more energy is expended at the source. If we graph the displacement of energy over time, we can view the waveform of a sound, which is one of many useful visual representations in sound analysis. For a sound to be heard as a pitch, it must consist of many cycles of a sound wave, and one cycle of the wave is the return of a particle to its origin after being displaced in both positive and negative directions. The number of these cycles per second determines the frequency of the wave. The standard unit of measurement of frequency is the Hertz (Hz), a term synonymous with cycles per second. If a cycle repeats itself exactly over a specific time interval, known as the period, then the resulting wave is called a periodic wave. Mathematically, the simplest

> example of a periodic wave is a sine wave, which theoretically repeats indefinitely over time, therefore having a constant frequency. A sine wave that has a frequency of 440 Hz, for example, causes the air particles around it to be displaced from their original positions (in both directions) 440 times in one second.[9]

The intensity of a sound is represented visually on the spectogramme. The horizontal axis (x) represent the time (t), the ordinate axis (y) represent the frequency (Hz). The intensity of the sound, in my anlysis, is represented in gray scale. Higher intensities of color correspond to a higher intensity of sound. Using soundwaves and spectrograms, it is possible to find similarities and differences between two sounds. I used this analytical method to find similarities between sounds that may appear very different on a superficial level.

In my research I was looking for something related to the brain activities. I would like to understand if the brain reacts to sound in different way when we know what sound is and if we are prepared to receive knowledge from that.

Engineer and researcher Kyriaki Kalimeri is studying how brain waves change for the blind during a walk through the city of Reykjavik.

I analyzed her research to understand the user experience of the virtually impaired when navigating in unfamiliar outdoor environments assisted by mobility technologies. She proposed a framework for assessing their cognitive-emotional experience based on ambulatory monitoring and multimodal fusion of electroencephalography, electrodermal activity, and blood volume pulse signals. [10]

I decided to use the same instrument (a Scientific Contestual EEG) to detect how the brain works in the presence of city sound.

To understand the reactions of sensors to sounds, I traced the path I soundwalked with a Brain Computer Interface and Scientific Contextual EEG to map my brain activity and its changes to the onset of a noise. Given the practical constraints involved in an outdoor mobility study, EPOC+ was chosen because it provides a good compromise between performance (i.e. number of channels and scientific validity of the acquired EEG signals) and usability (i.e. outdoor portability, preparation time and user comfort) with respect to other commercial wireless EEG systems (Figure 8).

9 Jeremy Starpoli. *A method of musical composition based on sound analysis.* (Amherst: Hampshire College, 2002). 12-13.
10 Saitis Charalampos and Kyriaki Kalimeri. *Identifying Urban Mobility Challenges for the Visually Impaired with Mobile Monitoring of Multimodal Biosignals.* (Turin: ISI Foundation, 2016.)

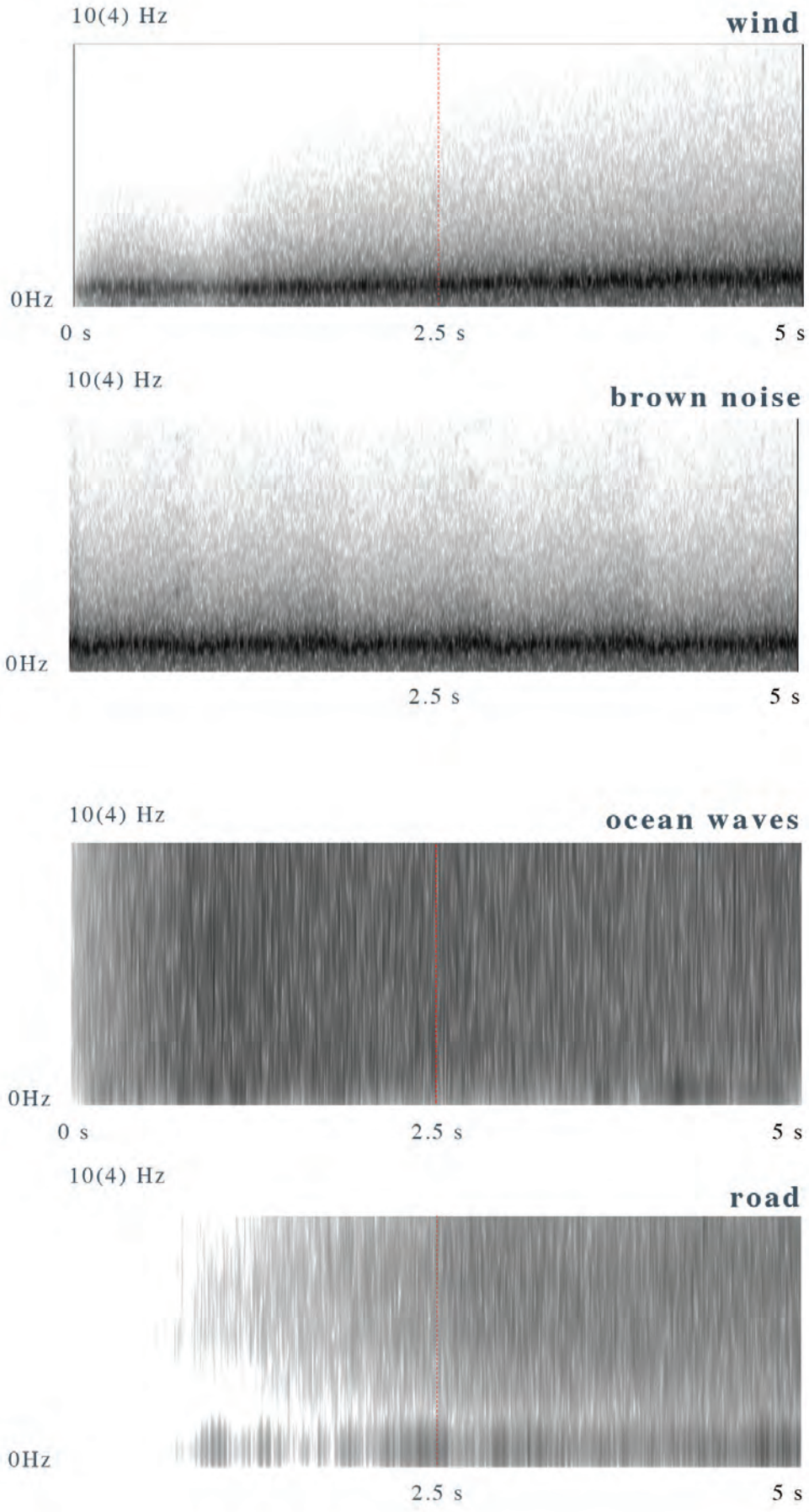


Figure 7. Sound analysis.

The results have been amazing for me. A known sound, although strong or sudden, creates a minor reaction, and therefore less stress, compared to an unknown sound.

At this point, I began to translate the data at my disposal into the journey rules.

As explained by Darren Copeland and Nadene Thériault-Copeland,

People can shape ideas about the world and themselves just by listening to the associations triggered by sounds. Here is one example:Is it true that the blind live in their bodies rather than in the world? I am aware of my body just as I am aware of the rain. My body is similarly made up of many patterns, many different regularities and irregularities, extended in space from down there to up here. These dimensions and details reveal them- selves more and more as I concentrate my attention upon them. Nothing corresponds visually to this realization. Instead of having an image of my body, as being in what we call the "human form," I apprehend it now as these arrangements of sensitivities, a conscious space comparable to the patterns of falling rain.(…) On the basis of such listening, can one ever approach the enormous task of reading the acoustic environment as a record of social experience? [11]

Following Copeland´s work, and by analyzing the data I collected, I understood how the perception of sounds is strictly linked with knowledge: two sounds can be regarded as similar in their structure and, heard in a neutral environment, they can be considered very closely. Yet the same ear may perceive sounds as good or bad depending on their context. Once you understand the sounds and recontextualise them

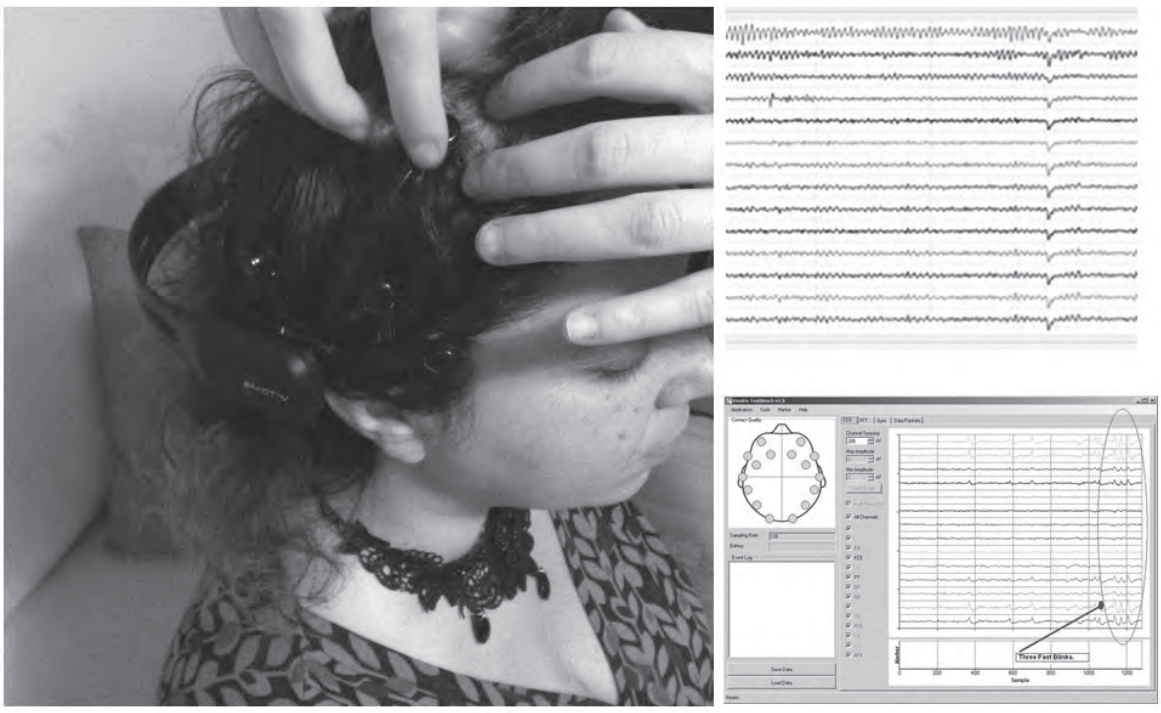


Figure 8. EPOC+. *(Ph. Fabio Del Percio)*

11 Darren Copeland, *http://www.darrencopeland.net*. (retrieved 2/03/2016).

in a new environment, their perception will be different again.

I began to understand how to tell a story using sounds as protagonists, placing them in different contexts and comparing them to each other, which can be a valid exercise of understanding and reworking the soundscape. Players of the Journey I have designed will be able to understand the problems of the city and find solutions through the similarities between sounds, using their comprehension of sound.

Originating as an investigation into the soundscape, this Journey, called Reykjavik

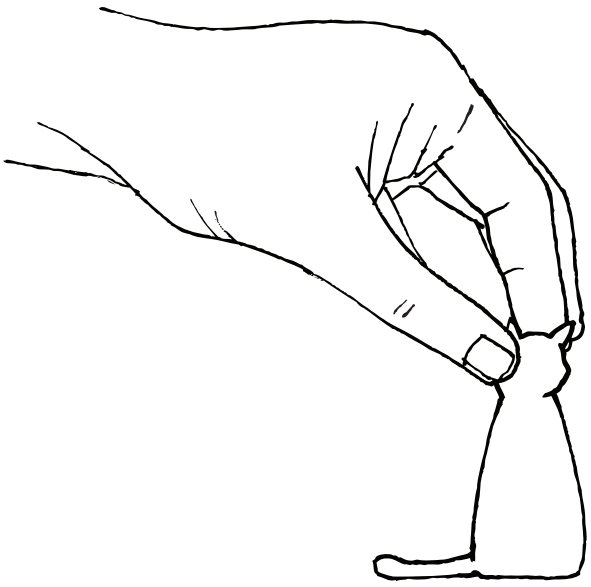
Soundscape, is a joyful way to understand and transform the soundscape of the city. It is a vehicle for creative expression.

The Journey through sound offers a stimulating context which encourages open-mindedness, cooperation and creativity. It is a fun educational tool for creative people. It enhances creativity, and also promotes idea generation and design thinking, while raising awareness of environmental and social issues.

The experience is developed through the use of storytelling. The storytelling methodology is the use of narrative procedures in order to better promote human values and ideas, and focuses on influencing social dynamics. Through the narration, it is possible to create a reflective tool for interpreting reality.

Storytelling is a tool used to penetrate deep into the causes and reasons of events, details of which are recounted build a story, become real and determine the story itself. Sound can be used to perceive the world, the city and the environment. It can be used for design, using improvised mental association and ideas. This project illustrates that sound is a good way to provide users tools for making decisions, judgments and interventions. Many tests were done for the first prototypes. I played with some designers and some sensory and visual data engineers. The designers helped me to improve the rules of storytelling. The engineers helped me to compare in better way the sound and data to arrive at the final result.

RULES



THE JOURNEY INCLUDES:

1 playing board
6 markers
60 SOUND cards
60 SITUATION cards
1 hourglass
1 die
1 guidebook

INTRODUCTION:

The *Reykjavik Soundscape* is a joyful way to understand and transform the Soundscape of the city. It is about looking at the sound and create experience, seeing reaction and perception. The *Reykjavik Soundscape* is appropriate for players age 14 and older. It can be played by two to six players. The *Reykjavik Soundscape* encourages openness, cooperation and sharing. It is a fun educational tool for creative people. It enhances creativity, and also promotes idea generation and design thinking, while raising awareness of environmental and social issues.

PREPARATION:

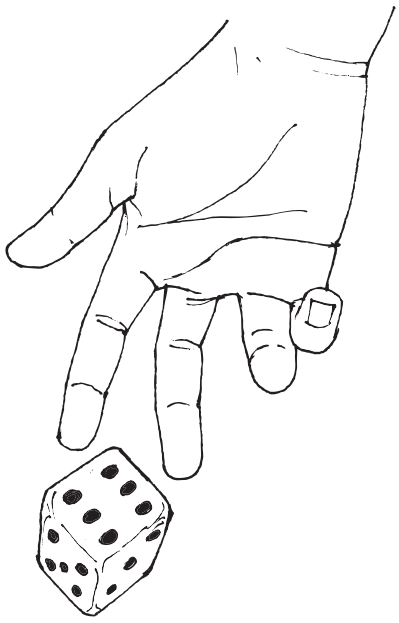
Players each need a pen and paper.

- Set the board so that each player is seated in front of one city walking path.
- Shuffle each cards deck: Sound cards and Situation cards, face down, on the appropriate location on the Journey Board.

GROUP PLAYING FOCUS:

Begin by choosing a particular group issue that you are currently dealing with, one that you would like to resolve by playing the *Reykjavik Soundscape*.

Your experience in the *Reykjavik Soundscape* will provide clarity, understanding, feedback and new direction on your specific issue. The *Reykjavik Soundscape* will reach to the heart of your issue and move you as deeply as you are willing to experience.

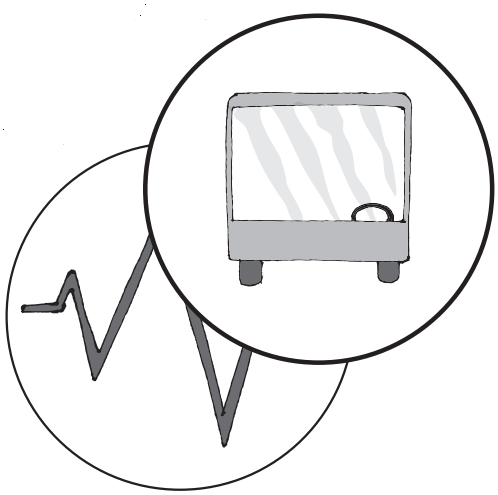


START

Players roll the die to see who gets the highest number. Whoever rolls the highest number will take the first turn. Roll the die and move forward that number of spaces with your marker. Example: If you roll a four, move your piece forward four squares. Read the symbol on the square you land on and follow the instructions for that symbol.

- NORMAL SQUARE: take one SOUND card and one SITUATION card. The player has one minute to tell a story set in the city situation where the marker on the board is located, using the reality described by the SITUATION card. The player must tell a story using the word and and a sound he considers synonymous to the one found on the SOUND card. That means sounds the player thinks are similar.
  Example: Thunder = Car Engine
  Navy sirens = Trumpet
  Ship ropes = Potato Chips Pack

At the end of the minute, all opponents must take note of the word associations made by the storytelling player. In turn, the opponents name the two words that seemed to them most suspect in the history. Then, the storytelling player reveals the words she put into the story. If no one has discovered the words, the player can immediately replay. If not, the next player will roll the die and move.



- WAVES SQUARE: Team meeting. It is time to rethink the group issue for 3 minutes.
- BUS SQUARE: The player will take a bus to go to the area indicated on the playing board.

Note: Every story has to be related in some way to the group focus.

PURPOSE OF THE Journey:

The aim of the Journey is to get to the end of the path.

CONCLUSION

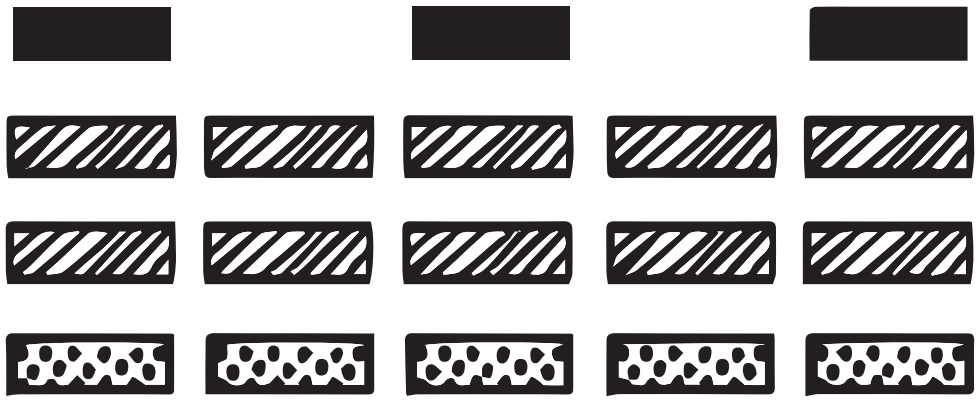
My research contributes to the growing body of literature on how people can experience the environment and, in this particular case, the city. I have researched how we can perceive sound and how we can hear the soundscape. I have tested the relationship between sound and visual representation, sound and the brain, sound and intuitive mental association and finally, I designed a tool to experience sound using intuition, design method and team work. This work examines the themes of the urban soundscape through a journey to allow others to experience it, using the design process.

A narrative journey, as I have already mentioned, that through the sound offers a stimulating context which encourages openmindedness, cooperation and creativity. A narration can create a reflective tool for interpreting reality, to penetrate deep into the causes and reasons of events.

I hope this work can empower designers, researchers, urban planners or just anyone who wants to become more aware of their experience of sound, by offering them methodological tools to rethink the role of sound. Different urban scenarios were compared, aiming to understand the soundscape, exploring the connections between sounds and perception through the cultural aspects and the rules of physics contained within sound.

APPENDIX

In the exhibition room, it is possible to hear a looped musical composition created using all the sounds that I recorded in the city and, at the same time, the bodily impulses that were recorded through the analysis of brain waves. The aim of this symphony is to represent the data I collected in the city soundscape and the human perception data and turn them into a "sound language."



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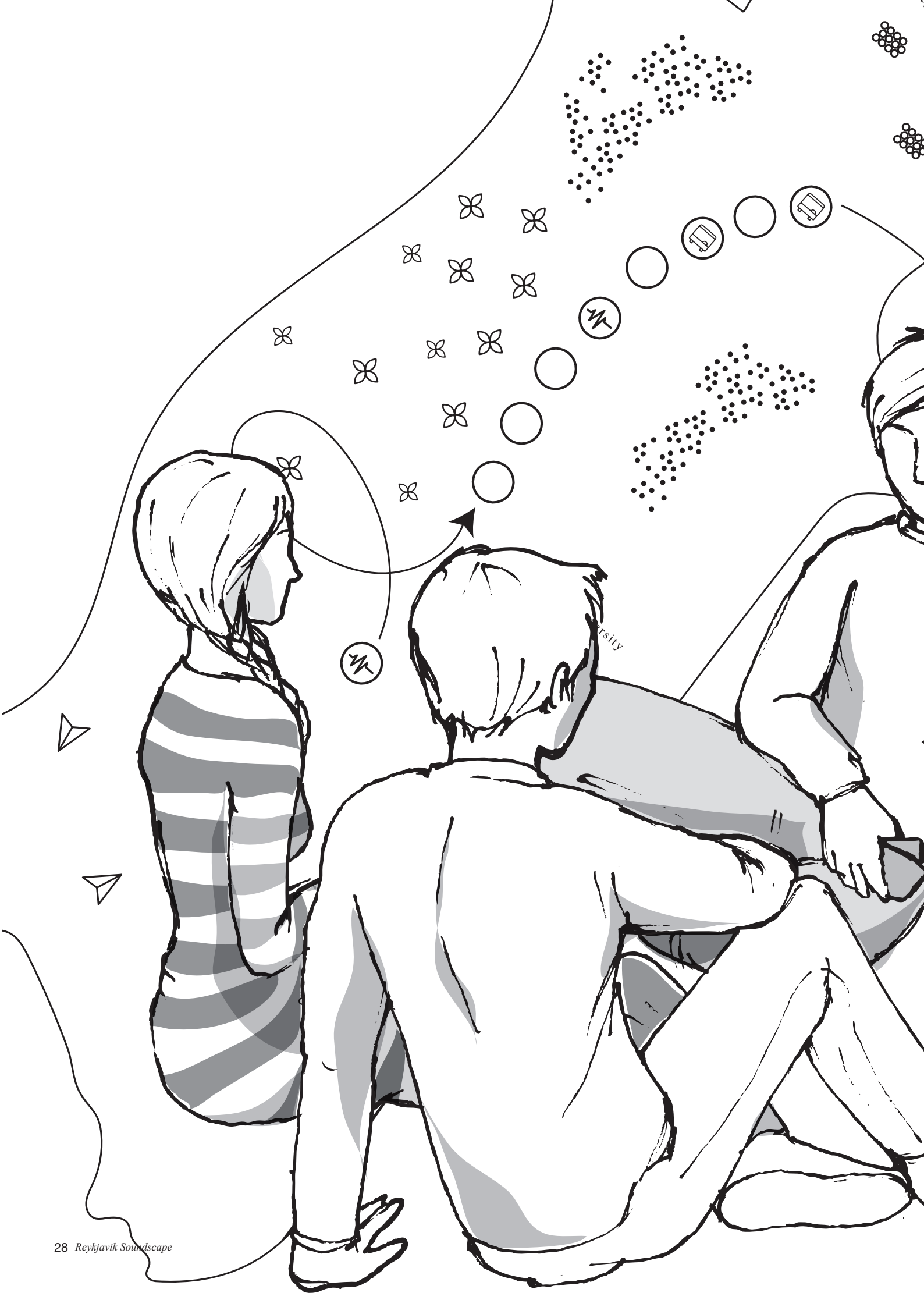


ykjavik residential district

Reykjavik Soundscape.