

Multi-form Visualisation: An approach to acousmatic composition

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Virginie Cécile Marie Viel

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Abstract

This practice-based doctoral research addresses a critical issue in acousmatic composition: the journey from the immaterial world of sonic imagination to the realisation of musical sound. This was an exploratory journey, where my personal sensibility for visual arts practice met my curiosity and profound interest in acousmatic music. Methodologically, the project approached acousmatic composition as an organic process, intertwining visual sensibilities and musical domains by offering a critical approach to the listening experience and to my compositional practice. A key metaphor used is that of the blank page as a space for multi-form visualisation, where gestures derived from sketching and other visual stimuli are used as guides and catalysts for the realisation of sound. In this approach, a process of deliberately blurring boundaries between real and imaginary realms affords a space to daydream to be moved by sounds, the flow of mental images, virtual sensations, and memory-images that one can associate with traces, dots, shapes or textures. This parallel allows me to find my way within the sonic realm, shaping sound materials and sequences that progressively define a musical structure. This space, which has no proper physical existence, invites sonic and visual perception and imagination to confront, destroy and renew each another, directing the music's emergence through a feedback loop between the visual and the aural. A key conceptual tool in this practice is the notion of sensory qualia and a blend of phenomenological and ecological views of sound and bodily centered, internally registered responses. By focusing on qualitative sensations derived from drawing, painting and sensations of motion in the natural world, parallels with the sonic imagination are stimulated. The graphical expression of gestures deployed in space and time becomes a space of boundless, imaginative reflection of the composer's sonic conceptions and expectations.

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I dedicate this thesis to my grandmothers Isabelle, Yvette
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Introduction

As far back as I can remember I have always been fascinated by the capture of real-life events and the possibility to relive past events as will. It started when I was a child, looking at photographs of family gatherings and landscapes made me want to practise photography to capture and 'orchestrate' traces of my perspective of events and places I visited. In the same period, I also started to record my favourite tracks on the radio and my voice on a cassette player at home. Listening to my recorded tracks felt like looking at pictures, they transported me to an imaginary space between reality, memories of the past and imagination. However, listening to the recording of my own voice was disturbing and relatively unpleasant. Hardly recognisable to me, my own voice sounded disembodied and filtered, without much low frequencies, my chest, my body were not vibrating. Listening to this voice coming from the speaker was like listening to a stranger mimicking me, making me feel rejection and familiarity in the same time. Yet when I recorded and then listened to my sisters' voices, despite the artefacts of the tape, their voices sounded very familiar and were easily recognisable to me. My experiences at that time echo to the study led by Holzman and Rousey in 1966, examining people's reactions to the feeling of negative affective reactions experienced by participants of the experiments who listened to their own recorded voices. To me, the sounding world is like magic and full of mystery. It triggers memories of past experiences, the emotions I attach to them. It also invites me to make up stories, to imagine landscapes or even how people behind voices I listen look like. Today, my relationship with sound and in particular with acousmatic music is coloured by my childhood experiences and my taste for particular sonorities. For me composing is not a demonstration of virtuosity, it consists of building a musical world that leaves doors open for listeners to enter, embrace the sense of familiarity they may feel through the ability of sound to evocate dimensions of their experience of life, objective and subjective.

Overall this research addresses two questions that arise from the

apparently limitless nature of acousmatic music's materials and their abilities to trigger the extra-aural. Firstly, how to conceive a way of creating a coherent and consistent compositional approach with such a rich array of possibilities.

Secondly, and most crucially, to identify methods by which mental images of sound quality, form and texture can be conceived and directed in the compositional process with the assistance of visual representation—such as through concepts of qualitative 'feel' in line, textural quality or gestural evolution. While there is scope for composers to use multiple forms of visual representation to assist them in their creative process, to explain their music (as an analytical or pedagogical tool) the aim of the study is to focus on refining an approach to the practice of acousmatic composition. Similarly, work that seeks to find synergy between electroacoustic music and the moving image, as an integrated audiovisual experience like videomusic, is put aside here.

The first section of this thesis sets the theoretical ground of my approach to sounds and music composition. I question how composers of acousmatic music in regard to ecological perspective on perception and the inheritance of Schaeffer¹ can directly convolve listeners perceptual instincts to lead a musical discourse. The second section intertwines concepts and practice featuring a detailed and analytical study of the compositional process for each of my piece. My portfolio, presented chronologically, reflects the evolution of my thinking during my research period. Its examination allows me to present to the community of electroacoustic composers compositional method that could be used by other composers. It features how one could use visuals, sketch, film, take pictures and elaborate customised sets of key words at different stages of their compositional process in order to trigger aural sensations and compositional ideas.

¹ Pierre Schaeffer (1910-1995) is a French composer, theorist and initiator of music concrete and acousmatic music in the 1950s

1. A perceptual approach on acousmatic music, from phenomenology to ecological psychology

1.1. Phenomenological foundations

1.1.1. Schaeffer's phenomenological view of listening and musical experience

The perceiving body is a point of reference toward which all information from captured stimuli converge. In my practice of electroacoustic composition, I notice that not only the totality of my listening experience, but also perceptual experience generally is strongly intertwined with my aesthetic choices. In order to understand my creative process, I propose to address the examination of the perceptive process from a phenomenological viewpoint and observe its connections to a perspective on electroacoustic music based on Pierre Schaeffer's pioneering research.² Schaeffer was deeply influenced by the work of Husserl, and a brief outline of Husserl's notion of phenomenology is necessary.

Husserl's phenomenology aims to create an epistemological foundation for scientific study that is transcendental and positions consciousness at its centre. Husserl advocated a rigorously objective practice in natural sciences, emphasising perception of the world as the basis for phenomenological investigation with the intention of avoiding the risk that research findings may be coloured by the assumptions of a pre-existing theoretical framework. Adopting this standpoint requires us to radically reorient our view of the world's phenomena. This empirical approach involves questioning pre-existing belief systems that may otherwise be used to explain the way we see the world and ourselves in it—such as biases and conditioning brought about through cultural practices and the affordances of language. To do so, Husserl proposed that we

² SCHAEFFER, P. (1966) *Traité des Objets Musicaux*. Paris: Seuil.

study the perception of phenomena as they appear to our senses as pure sensory stimuli. This requires detachment from the perceiver's intentionality and belief systems, whether cultural or scientific. This approach, called phenomenological reduction, is based on the stoicist notion of *epoché*.³ It seeks transcendental insight through the bracketing of our human immanence.⁴ Husserl's thinking has had major impact on ways musical listening has been re-evaluated over the last century.

1.1.2. The emergence of a new paradigm in music : acousmatics

Husserlian phenomenology encouraged Schaeffer to write the *Traité des objets musicaux*⁵ [TOM] examining musical listening and to question the factors of psychological conditioning that influence it. This was enabled by the technological means in the studios of the national French broadcast, ORTF: namely through sound recording and the capacity to intervene in the structure of sound in ways that transcended the actual physical process of sound production. The sonic realm, traditionally qualified as immaterial and ungraspable, became manipulable and *concrete*. This brought the listening and composing process into a new relationship, which, although historically significant, remains highly relevant to contemporary practices. Firstly, the instinctive and natural tendency to draw connections between sonic and the visual stimuli is challenged when sound is apprehended solely through loudspeakers (that is, when it is impossible for listeners to see the actual physical sound sources). This delivers sound to us in an acousmatic form.⁶ As a result, listening can be intensified, freed from the

³ *εποχή* (*epoché*) is a term created by the Stoics in Ancient Greece

⁴ FINK, Eugen (1995) *Sixth Cartesian Meditation: The Idea of a Transcendental Theory of Method*. Translated by Ronald Bruzina. Bloomington: Indiana University Press.

Fink describes "human immanence" as all aspects of each one's existence that we take for granted : our bodies, culture, gravity, everyday language, logic... Together these aspects are present and accepted by every individual in every moment of our life. For Fink, this acceptance keeps us in captivity.

⁵ SCHAEFFER, P. (1966) *Traité des Objets Musicaux*. Paris: Seuil.

⁶ The notion of acousmatic qualifies any sound whose source remains invisible to the listener. It is apparently based on Pythagoras's teaching method used to diffuse his knowledge orally while

influence of other senses, and this became a fundamental aspect of Schaeffer's quest for a new music. The 'bracketing' created by acousmatic listening conditions led Schaeffer to equate it with the phenomenological notion of epoché on which he based the practice of *reduced listening*.⁷ Secondly, the storage of sound on a recording medium (in analogue or digital form) changed the way a composer's material was created, captured and stored, by providing direct access to very specific sounds. This marked a change of paradigm from the traditional musical score in which sound is specified or implied on the page and re-realised from a set of performance instructions. With recording, a transient, accidental or ephemeral sound (that may be impossible to describe on a score) can be captured, stored and reproduced as a concrete phenomenon and become integral to a composed structure. Thirdly, the development of an 'instrumentarium' based on recorded and/or electronically generated sounds enables the use of material that is innovative or provocative. Sounds of the natural world, which historically had *influenced* compositional thinking, now became accessible and manipulable.

1.1.3. Toward the sound object

By admitting environmental sound directly into the composer's palette, sound recording posed deep questions about the potential nature of musical material and expression. Similarly electronic synthesis and processing of natural sounds enabled the creation of utterly new abstract sonic structures. These two directions of extreme abstraction and a kind of cinematic realism afford new connections between music as a cultural entity and an audience's physical and sensory experience of the world. It leads to an inherent tension in listening: between the urge to recognise sound sources and the appreciation of sonority on its own terms. In that sense Schaeffer's early research at the Club d'Essai (1946-59) arrived at a distinction between our potential experience of sound as abstract

hidden behind a curtain.

⁷ SCHAEFFER, Op. cit., p. 262

or associated with a recognizable sound source.

1.1.4. Schaeffer's musical research

Schaeffer's essential vision was to see in recorded sounds and electroacoustic means two essential possibilities to define and understand what is music and to establish a new musical genre. The emergence of "Musique concrète" was the first stage of his research. With only a few exceptions Schaeffer focused on using a reduced listening approach to composition with sounds of a wide variety of sources—from his first *Études de bruit* (1948) to his last études, such as *Études aux sons animés* (1958), *Étude aux allures* (1958) or *Étude aux objets* (1959)—with the intention of finding in the structure and qualities of the sounds-in-themselves a means to realise musical discourse. As a genre, Musique concrète challenged the western tradition of score-based music whose aural embodiment emerges from abstract writing—the notational system—questioning the cultural and psychological conditionings of the musical ear. This comes through emphasis on direct sensory contact with sound materials. Even though the operations of recording, transforming and editing contribute to the emergence of a musical discourse, Schaeffer's retreat from composition in the 1960s was indicative of an inability to define the essence of music in a way that suited his researches, as heralded in the *TOM*. Although the *TOM* does not deal with compositional matters *per se*, it gives insight into the process of audition and potential ways to seek and find relationships between sound objects. It is possible to measure parameters, but rarely perceptions. And we can always go and look for the phenomenon in the "external world" without necessarily encountering, in the slightest, the phenomenon of music, which is within human consciousness, even though, paradoxically, it is materialised by the instruments and notations of the past as well as by the tools and calculations of the present.⁸

⁸ SCHAEFFER, P. (2017) *Treatise on Musical Objects: An Essay across Disciplines*. Translated by Christine North and John Dack, Oakland: University of California Press, p. 11. Translated from: *On peut mesurer des paramètres, mais rarement des perceptions. On peut toujours aller chercher le phénomène dans le "monde extérieur", sans devoir pour cela aborder*

In identifying this challenge, Schaeffer undertook a meticulous examination of the listening process with the aim of dissociating the sense of hearing from the other senses. In analysing the process of listening he found in it functional associations with the cycle of verbal communication, starting from the perception of aural stimuli and ending with the reception of the message and potential understanding of its meaning. From this work, four listening modes were defined: *listening (mode 1)*, *perceiving (mode 2)*, *hearing (mode 3)* and *understanding (mode 4)*.⁹ Schaeffer proposed two overarching entry points to understand these modes. The first looks at them through the dialectic of concrete versus abstract. The modes of *listening* and *perceiving* are defined as concrete since they are focused on the perceptual qualities of sounds; whereas the modes *hearing* and *understanding* are regarded as abstract, because they are directed to certain sonic qualities that echo other qualities or impart particular meanings. *Perceiving* concerns the raw perception of sounds and it is an encounter between the listener and the aural stimuli. *Listening* corresponds to the recognition of the agency of sounds, which may refer to the sound-making gesture or its physical sound source. *Hearing* is selective and hones in on particular qualities of sound, while *understanding* takes us toward the recognition of a code or a language in which sound projects a meaning beyond itself (...à des notions extra-sonores)¹⁰. The second entry point to Schaeffer's nomenclature is based on the opposition between objective and subjective. The objective mode corresponds to listening and understanding and describes situations where listeners focus their attention on the object of perception, whereas the subjective ones, like perceiving and hearing, are focused on the listener's experience. This plethoric analysis of the listening process is also complemented by a classification of different listening attitudes such as banal, specialised, natural or cultural.¹¹ Schaeffer, who rarely

si peu que ce soit le phénomène musical, qui est intérieur à la conscience humaine, encore que paradoxalement matérialisé par les instruments ou les notations du passé, aussi bien que par les outils et les calculs du présent. (TOM, p. 27)

⁹ [French originals: écouter (mode 1), ouïr (mode 2), entendre (mode 3) and comprendre (mode 4)]

¹⁰ SCHAEFFER, Op. cit., p. 116

¹¹ Ibid. p. 120ff

missed an opportunity to be prescriptive in his research, positioned banal listening as a trigger that connects instinctively what is heard with a causality and meaning, while practitioners' listening is seen as specialised, and even then potentially divergent—musicians and acousticians may find they have different perspectives on a sound. Schaeffer also polarises the idea of natural and cultural listenings. Natural listening considers sounds as functional, because they provide information about the immediate sound-producing context, whereas cultural listening seeks to catch a meaning, a message particular to the social or ecological situation of the listener.

From the perspective of the acousmatic composer, interested in all sounds as possible musical material, an interesting question here would be to ask how any particular listening mode is enacted and whether or how listeners might switch between them at will or instinctively. It often seems that listeners' experience of life, background, personality or knowledge play an important role in the mechanisms of perception and thus musical understanding. This turns the idea of an impartial and pure form of listening, as derived from Husserl, into a challenge because it requires the perceiver's detachment in order to overcome their own mindset and expectations. Acknowledging this situation, it may be an advantage to find a generalised way to consider sound as aesthetic object: to find a way to bypass the colouring of our perception in order to think about music outside the conditionings of cultural tradition or banale recognition of sound sources. How, then might one propose new ways of listening that would open new sights on electroacoustic practices? The absence of any type of conditioning associated with acousmatic music facilitates a new perspective on the musical experience of composers and listeners. The 'traditional' view of acousmatic music—centred around Schaeffer's emphasis on reduced listening as the way to focus one's musical perceptions—regards sound materials solely as audible forms shaped in time: sonority only 'as itself.' A fundamental view in acousmatic theory is that these sonic forms are understood as *sound objects*. They are identified through a particular kind of listening intentionality regardless of their cause and meaning. Each sound becomes independent from its *audiovisual*

*complex*¹² ; it is perceived for its properties as a sonorous entity. In this context, listeners direct freely their thoughts or behaviours on specific sound phenomena which become intentional objects. Schaeffer's treatise may appear as a gold mine for avant-gardiste composers, music lovers or artists who seek to break away from traditional ways of thinking about and composing music. However, simultaneously, it also seems to be held back by Schaeffer's frequent references to classical music. Even if they are justified, they seem to hold back Schaeffer, making it difficult to radically break and explore the full potential of phenomenology *outside the limits or traditions of instrumental music*.

The *TOM* examines the listening experience and the sound object with a certain obsessive comprehensiveness. The absence of previous musical knowledge makes the *TOM* approachable. Schaeffer argued that the sound objects most suited to musical structures were those found at the center of the TARTYP ("Tableau Récapitulatif de la Typologie"). He reasoned that these 'balanced' objects are well formed in facture—displaying an equilibrium of sustainment and shaping of spectral content¹³ which has strong correspondence to traditional normative instrumental note production. Although the TARTYP accounts for objects outside of this balanced state—such as extremes of micro duration, extremes in variation of spectral/pitch content or indefinitely extended duration, all of which can be quite naturally produced by electroacoustic means—as objects these are marginalised for musical purposes. From a practical perspective, listeners who intentionally adopt reduced listening and 'bracket' sound objects may quickly be confronted by the vagaries of their perception. In fact the definition of the typo-morphological identity of a particular sound object and the distribution of its sonic features may be disrupted by a change of context. For example, sonic features formerly integrated as one source-related identity may take on another, as Schaeffer demonstrated in 1948 by assigning an 'oboe' quality to the cut bell resonance. The variable ways in which perception is focused

¹² (Translation of *complexe audiovisuel*) CHION, M. (2009) *Le promeneur écoutant*. essais d'acoulogie. p. 45, http://electro-strasbourg.eu/blog/wp-content/uploads/2016/04/le_promeneur_ecoutant.pdf [accessed 10 March, 2018]

¹³ *Ibid.*, p. 443

correlates with the multiplicity of view points within a group of listeners: each listener may attribute to a same sound object one unique typo-morphological identity which may be different for all listeners. This points to the impossibility of building consensual typo-morphological identities for sound objects. If viewed from this critical perspective, the *TOM* remains an essential tool by which electroacoustic composers and listeners can be introduced to the inner ambiguities of the perceptual process as it applies to sound. Indeed it sheds light on a profound attachment to Husserlian phenomenology while simultaneously constrained by Schaeffer's adherence to the traditional nature of his musical background. The *TOM* does not discuss in depth compositional processes, such as the construction of spatio-temporal relationships between sound objects. The development of poles of post-war musical research using electroacoustic means in emblematic centres such as those in Paris, Cologne and New York encouraged profound reassessment of traditional definitions of music. The input of Schaeffer's research is indisputable but remains incomplete as a musical treatise. My research draws on the fertile ground left by Schaeffer, while claiming independence from it. Indeed, examination of an ecological perspective on listening and the creative process appears to me essential as a way to reflect closely the reality of the bodily experience of aural perception as possible. This is a perspective that has involved refinement of my sensitivity to sound and its possible meanings through the relationship between visual art practice and electroacoustic composition. It has also required reflection on the mechanisms and meanings of sonic perception in a way that embraces sensations beyond those which are purely aural, as a way to better understand the profound consequences of composing and listening in the acousmatic domain.

1.2. Perspectives on perception

1.2.1. Perceptual experience

In this section I will examine a range of approaches to perceptual experience explaining cognitive mechanisms involved in our apprehension of the world. This will articulate a theoretical understanding that has shaped my compositional methods, with the aim of creating music elaborated from my bodily experience of the world and its qualia¹⁴—subjective sensations that accompany sensory experiences. The process of perception is complex and has relevance to philosophy, cognitive sciences, anthropology and geography. It starts with the primary sense of proprioception which, through continuous sensations triggered by the muscular activation of the body, makes us aware of our physical existence as organised entities. Therefore, perception is a first person experience¹⁵ and the perceiving body is the origin of an ego-centred system of coordinates which evolves in an environment¹⁶. Delivery of information from our sensory apparatus, such as kinaesthetic sensations, makes us conscious of our position within the environment such that we can actively explore the world around us. According to Fugali, the sensation of being physically anchored in the world relies essentially on touch,¹⁷ which is exteroceptive and interoceptive¹⁸. That is to say touch is both outwardly and inwardly oriented, providing information about the world's material features and an awareness of our bodily posture, balance and inner condition. The perspectival way we gain access to the world—determined by the dynamic interaction between our sense organs and defined as the *mobile*

¹⁴ qualia, see glossary p.124

¹⁵ LAMEDICA, E. (2014) *The Aesthesiological Paradigm: a resonant cycle between movement and perception*. p.2, <http://www.ed1.ulg.ac.be/sd/textes/20140220-Lamedica.pdf> [accessed 23 May, 2018]

¹⁶ DE MONTICELLI, R. (2013) *Embodied Visual Perception. An Argument from Plessner* (1923) (4), p. 44.

¹⁷ FUGALI, E. (2013) The Role of Tactility in the Constitution of Embodied Experience. *Sense and Sensibility. Empirical and Philosophical Investigations on the Five Senses*, 4 (1), pp. 73-83. p.74.

¹⁸ exteroceptive and interoceptive, see glossary p.124

parts of the sensory system—shapes our perceptual experience.¹⁹

The lived environment provides us with different forms of stimuli that we generally define in regard to the different sensory modalities that characterize our body: visual, aural, tactile, olfactory or gustative. Our sensory modalities represent the different channels through which information emitted from the physical environment is received by the perceiver. Once information has been processed, the perceiver, in turn, sends a bodily response to the environment through one or several sensory modalities. Therefore, the perceptual process can be defined as interactive. Gibson²⁰ considers perception as a direct, mutual and continuous relationship between an organism and its environment. The complexity of our constant interaction with the world around us invites the interweaving of consciously and subconsciously collected and processed information. For Gibson, the mechanisms of perception are innate and shaped by the evolution of our species and our instinct for survival. Any direct and immediate relationship between perceivers and their environment is led by the survival instinct, which requires perceivers to constantly adjust their own set of perceptual skills to the features of their environment.

1.2.2. A Sensorimotor perspective on perception

Cognitive sciences see the nature and functioning of our mind as mainly determined by our bodily constitution and the way we engage our sense organs in an active exploration of our environment. Noë and O'Regan²¹ conceptualise the sensorimotor contingency theory to examine the nature of our sensory engagement. They observe perceptual experience as a mutual co-determining

¹⁹ GIBSON, J.J. (1983) *The Senses Considered as Perceptual Systems*, Greenwood Press, p. 40 ; Cited in ZHOK, A. (2013) On the reality of percepts : Husserl and Gibson. *Sense and Sensibility. Empirical and Philosophical Investigations on the Five Senses*, 4 (1), p. 64.

²⁰ GIBSON J.J. (1986) *The Ecological Approach to Visual Perception*. New Jersey; London: Lawrence Erlbaum Associates.

²¹ O'REGAN, K. J., & NOË, A. (2001). A Sensorimotor account of vision and visual consciousness. *Behavioral and Brain Sciences* (24), pp.939-1031.

relationship between body and environment and explore the idea of *phenomenal feel*²² through two features corporeality and alerting capacity.²³

These two properties help to elaborate sensory consciousness. They are based on the skills involved in perception—namely the articulation of specific patterns of sensorimotor interdependence between perceivers' sensing-moving body and their environment. Noë and O'Regan consider the mastery *a repertoire of exploratory skills*²⁴ essential to live in the world and attune their sensory apparatus to the object of their perception. However, Torrance²⁵ sees this theory as unsuitable to musical listening. Indeed, when I listen to a piece of music, the nature of my bodily engagement towards the music in an acousmatic context is fundamentally different to the perception of my multi-sensory environment. The mono-sensory quality of my acousmatic experience does not require the use of my sensorimotor skills as much as I do when I perceive the environment. Instead, it invites me to engage in a mental process and to adapt the focus of my attention through my cognitive skills. In these terms, a helpful way to widen the perspective offered by Noë and O'Regan is to examine the sensory dimension of the perceptual experience and to look at the concept of embodiment to articulate the impact of bodily experience in musical perception. In the context of an acousmatic concert, the corporality and alerting capacities are not literally applicable to bodily engagement, yet they may be useful when transferred into the cerebral domain, using mental projection.

²² TORRANCE, S. (2005) In Search of the Enactive: Introduction to special issue of Enactive Experience. *Phenomenology and the Cognitive Sciences*, 4 (5), pp. 357-368. p 361.

²³ Corporeality and alerting capacity: see glossary p. 123

²⁴ LAMEDICA, E. (2014) *The Aesthesiological Paradigm: A resonant cycle between movement and perception*. p.3, <http://www.ed1.ulg.ac.be/sd/textes/20140220-Lamedica.pdf> [accessed 23 May, 2018]

²⁵ TORRANCE, S. (2005) In Search of the Enactive: Introduction to special issue of Enactive Experience. *Phenomenology and the Cognitive Sciences*, 4 (5), pp. 357-368. p. 362

1.2.3. A Multi-sensory perspective on perception

Sensory experience is unstable, and alien to natural perception, which we achieve with our whole body all at once, and which opens on a world of inter-acting senses.²⁶

In phenomenological terms, embodied experience is achievable in a unique and structured moment of presence. It connects intrinsically the perceived object to the perceiver in an interactive and constructive mediation. I am bodily aware of the multi-sensory structure of my living environment thanks to the inextricable intertwining of my senses rather than by the independent action of each sense organ. The combination of stimuli, either modal (visual, tactile, smell, aural, olfactory) or supra-modal (proprioceptive, kinesthetic, vestibular) captured during my sensorimotor exploration and then processed, provides essential information to phenomenally ground my body in a transmodal experience and understand the world in which I live. For example, when I observe a flying bird, an active sensorimotor cooperation between sense organs occurs. The capture of supra-modal information (such as proprioceptive, kinaesthetic, exteroceptive ones) and visual information positions my body as a stationary and grounded self while I perceive the bird as a no-self body, moving in the air. Each modality explores the environment in its own style, picking up and pairing multi-modal information. Reflection on how this multi-modal information can be held together in the image of a world apparently coherent, solid and meaningful like our living environment becomes an important way in which we explore the nature of our senses themselves and the way they contribute to our understanding of the world and our place in it.

²⁶ MERLEAU-PONTY, M. (1962) *Phenomenology of Perception*. Translated by Colin Smith, London/New York: Routledge & Kegan Paul, p. 262.

1.2.4. Approaches to perceptual modalities

A sensory perspective on perceptual experience shows a clear distinction between Merleau-Ponty's phenomenological view of perception and that of modern psychology. The latter considers the unity of a perceived object as embodied thanks to the perceiver's mental synthesis of all information captured by his/ her sense organs. Merleau-Ponty's approach sees any perceived object as being a significant and meaningful structure that has a *living significance of its own*²⁷ which is revealed due to the close interplay of the perceiver's sensory modalities during the embodied exploration of the environment. The adoption of an open account on what a sense can apprehend allows perceivers to observe, for instance, the textural quality of a coloured surface or to hear the physical quality of an object.

One sees the hardness and brittleness of glass, and when, with a tinkling sound, it breaks, this sound is conveyed by the visible glass. One sees the springiness of steel, the ductility of red-hot steel, the hardness of a plane blade, the softness of shavings.²⁸

The observation of these qualities shows that, in an apparently restricted sensory engagement with the world, the perceiver processes the captured information through the filter of her practical experience of it and deduces a meaning out of her bodily engagement with the world. Thus, certain sensory qualities appear transmodal. It indicates how our sensory modalities co-operate with one another to communicate particular information.

²⁷ MORAN, D. (2010) Husserl and Merleau-Ponty on Embodied Experience. *Advancing Phenomenology*, 62, pp. 175-195 (p. 183).

²⁸ MERLEAU-PONTY, M. (1962) *Phenomenology of Perception*. Translated by Colin Smith, London/New York: Routledge & Kegan Paul, pp. 266-7.

Going a step further, Varela, in the 1980s in cognitive sciences, sees perception as enactive, meaning world and subject are co-determined by one another. Essentially dynamic, the joint emergence of a world and a mind start from the set of action accomplished by one in the world. The experience is a dynamic structure, where any act of communication is no more a one-way transfer of information from a to b, but is shaped by how one acts, thinks, perceives oneself, conceives the environment.

Enactivism²⁹ blends phenomenology and cognitive science to analyse how perceivers can relate to the world as unified body-mind entities, in opposition to the Cartesian body and mind distinction.

Starting with the observation that body and brain are physically bound to each other, in many views within cognitive sciences the body is described as a system of *suitable structures to produce the conscious manifestation of life*³⁰ and is the repository of a lived experience: biological, phenomenological and psychological. The notion of embodied mind is conceived as *relational, distributed over body, brain and environment*³¹, without being attached to any physical structure. From this perspective, the sensorimotor contingency theory seems to apprehend only partially the whole experience of life because it focuses just on *objective instrumental actions* without accounting for the non-physical and not measurable aspect of life experience, which is the organism's subjectivity. Our subjectivity that gives to each of our experiences its unique colour is, for Fuchs, *necessarily embodied*.³² That is to say conditioned by how our body is shaped and how connections between senses are physiologically constructed. So in relation to the idea that our perceptual experience relies on inner representations of the external world, enactivism positions our body as determinant to shaping our subjectivity—the way we singularly interact with the world around us through perception, thought, feelings, desires and imagination.

²⁹ enactivism: see glossary p. 123

³⁰ Ibid., p. 74

³¹ Ibid., p. 74

³² Ibid., p. 74. Scarinzi quotes Fuchs : FUCHS, T.: The Feeling of Being Alive. Organic Foundations of Self-Awareness. In FINGERHUT, J., MARIENBERG, S. (eds.), *Feelings of Being Alive*, pp. 151-165. Berlin, de Gruyter Verlag (2012)

This defines us as autonomous and self-determined selves capable of generating meaning out of our experiential interactions with the world, which reveal themselves as an entanglement of objective and subjective experiences.

1.2.5. Important aspects of my compositional method

My music aims to call upon the similar experiential knowledge of the sounding world that listeners and I may share. Indeed, I argue that using bodily sensations of proprioception, motion and touch that can be communicated through sounds may shape how listeners could engage objectively and subjectively with a piece. Thus when I start a project, I imagine my future piece as a series of evolving sensations of texture, motion, space, density and even weight over time. Then according to what I have in mind, I search in my sound library for sequences that could suit my project. I also look for physical objects I could to manipulate to find interesting sounds that I could record.

When I found an object, I manipulate it under the mic, performing exaggerated gestures. I emphasise the spatial amplitude, the speed, the weight I apply on the object. Then when all sound materials I want are collected, I listen and select bits of each sequences that I like. I often choose them according to the degree expressivity of bodily sensations. I then let my subjective preferences for particular sonic features leading me to process sounds and compose sequences. As I describe, my compositional process results basically of an interaction between the objective features of sounds and the subjectivity of the choices I do. Despite the listener's perspective displays an interaction between the objectivity of the sound stimuli with the subjectivity of the perceiver, both objective and subjective aspects of the listening experience cannot be tackled equally. The subjective dimension of listening is more complex: it is intimate, unique to each individual. It corresponds to the colouring of the sensory features of sound by the subjectivity³³ of the listener and is escorted by various types mental images, such

³³ Also called subject-position. See CLARKE, E. (2005) *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*, Oxford: Oxford University Press, for a wider discussion of subject-position in relation to music.

as memories of past bodily experiences, personal feelings and imagination. Therefore, as a composer, my impact on how the audience engages subjectively with a piece is limited. To guide listeners is the perception of my intentions, I adopt a strategy that consists in structuring and punctuating pieces with sequences that are evocative of particular bodily sensations. These sequences that I see as 'objective' signposts can be compared to the concept of "Something to Hold on to factor" (SHF) developed by Landy and Weale.³⁴ My method is thus close to the SHF. The objective signposts are indeed series of factors that help listeners to interpret and give a particular meaning to a work through the building of a subjective and individual sound image of the piece which is coloured by memories, imagination and personal feelings of each listener.

For example, when I composed *I belong to the sea*, I was very much inspired by my memory of a seascape. So when I shaped a couple of wide spinning gestures, *extract_01_chapter_2* (from 9'00), my aim was double. Subjectively, I was driven by my wish to imaginatively represent the violent and wide gusts of wind that I remember feeling on that beach. Practically I was searching to embody this idea musically. To do so, I recorded two-minutes sequences of me performing the same rubbing gestures with different objects on various surfaces. The idea was to index variations of the same gestures, circular rubbing an object on a surface, perceived through different textures, different pitches. So when I had all sounds I wanted, I listened and selected bits of these sequences and processed them using various effects such as Filter, Shuffle, Pitch variation, Pitch shift, Delay. At this stage, I use sound processing as a way to distance my sounds from the real world they come from. While I ensure neither object nor surface are not directly recognizable, I use the inherent motion sensation of the sequence or punctual rubbing gestures as a trigger to call listener's bodily experience of motion and evoke abstractly the objectness³⁵ of the wind movements, a natural element that most of us have experience in the

³⁴ WEALE, R. (2006). Discovering how accessible electroacoustic music can be: The Intention/Reception project. *Organised Sound*, 11(2), 189-200.

³⁵ SMALLEY, D. (1996) The Listening Imagination: Listening in the electroacoustic era. *Contemporary Music Review*, 13 (2), pp. 77-107 (p. 89).

environment. The next step consists in editing, composing sequences of different durations that I would spatialize, using Zirkonium with Reaper, on an eight channels speaker setup to give the sensation of being surrounded by vivid gestural sounds spreading over space.

By putting the listener within an artificial environment, i.e. a ring of eight speakers, in a studio or a concert hall, where the sound spatialisation of some elements of the piece evokes wind movements, I aim to call the inner world of the listener made of memories or imaginary images. In this way, I invite them to colour the piece, wandering in their imaginary world, in the realm of their past experiences, showing that objective and subjective features of the piece are intrinsically connected.

As another example, I propose to look at a sequence extracted from *Univers(e)*, *extract_02_chapter_2* (from 7'38), which features spinning movements of pitched sounds which go up or down at various speeds. I started to work on this section aiming to compose a sequence made of superimposition of spinning, swirling sounds of different pitches, amplitude and speeds. To imaginatively call the listener's sensorimotor skills through sounds and find how I could communicate proprioceptive sensations of spinning gestures, I felt the necessity to draw. In fact, tracing wide curved lines and abstract shapes on a large surface on the wall helped me to approach the sonic domain. The movement of my arm and hand led me to implement the mental image of drawing a curved line in the frequency domain to process series of abstract sounds in Reaper and Audiosculpt. I used automation curves in Audiosculpt with *Pitch and Spectral Enveloppe Transposition*, *Frequency Shift* and also in Reaper with *GRM Shuffle* and *Transposition* and *Pitch shifting*.³⁶ The resulting sequence, a succession of crossing and overlapping lines, aims to create proprioceptive sensations of uphill, and downhill, acceleration and slowing down, representing imaginatively the gestural experience of drawing sonic curved lines in the air. The objective features of music produce a realm of bodily sensations that listeners connect to their imaginary or mnemonic realm of mental images as the piece goes on and

³⁶ The original version of this sound appears previously in the piece around 5'44.

make the composer powerless on how such connections occur in listeners mind. In reverse, the subjective connection between the imaginary and mnemonic realm of the composer that inspire the piece and the wish to evoke particular bodily sensations through the objective shaping of sound materials and composition of the piece remains covert from a listener's perspective. On both sides, composer and listener must remain aware of the subtle equilibrium of objective and subjective features and how their intermeshing builds the sound image of a work. Composing and listening is accepting that the subjective features of a piece remain unique to each individual.

1.2.6. The Entanglement of objectivity and subjectivity leads to the notion of qualia

What we take to be objective is what can be turned from individual accounts to a body of regulated knowledge. This body of knowledge is inescapably in part subjective since it depends on individual observation and experience and partly objective since it is constrained and regulated by the empirical natural phenomena.³⁷

For example, I am aware that a quick weather change occurs objectively thanks to my bodily contact with my surrounding. I experience it visually by observing the clouds starting to hide sporadically the sun and tactilely by feeling the temperature drop through the cold wind skims on my skin. My sensory experience within the environment is interactive and provides an array of information that defines my field of action, enabled by the relevant affordances.³⁸ Essentially relational, an affordance does not rely on the perceiver's needs or expectations. In this example, the temperature drop can be seen as an affordance of the sudden weather change which, in relation to my bodily position,

³⁷ VARELA, F. and SHEAR, J. (1999) First-person Methodologies : What, Why, How ? . *Journal of Consciousness Studies*, 6 (2-3), pp. 1-14 (p.1).

³⁸ GIBSON, J.J. (1986) *The Ecological Approach to Visual Perception*. New Jersey; London: Lawrence Erlbaum Associates (chapter 8). See glossary p. 125

the way I am dressed, my fatigue and my state of mind, invites me to walk faster, to come back inside my house or to wear a jacket. Moreover, if we further analyse this particular example from the perceiver's perspective, we may observe that my bodily experience may be accompanied by a feeling of annoyance, discomfort or resilience, showing that actual perceptual experiences can be coupled with personal feelings, named *qualia*³⁹. When we listen to acousmatic music we may perceive different qualia as functions of what our sensory and cognitive skills enable us to discern.

A musical illustration is in my experience listening to the first 1'55 of the acousmatic work *Futaie*⁴⁰ by Régis Renouard-Larivière. The section features sharp and short percussive sound objects located in the lower area of the audio spectrum and a discrete background of tonic and slightly noisy sounds positioned in the higher part of the spectrum. I notice that the percussive sounds form a foreground, punctuating with variable regularity the stream of the background. On repeated listening various *qualia* emerge. Firstly, the perception of a tense, mysterious and slightly burdensome atmosphere. These personal feelings are most probably triggered by the strong spectral contrast that lies between the high-pitched discontinuous stream and the low percussive sounds that I associate with a ticking clock. Secondly, a feeling of stagnation that I associate with the low pitch of percussive sounds, which appear to me as heavy in weight. Finally, when I observe carefully the structure of this sequence, a visual analogy comes to mind: a vision of an irregular horizontal line punctuated by plain black dots. These sensations or qualia emerge from the performative interaction between my subjectivity as listener and the piece's objective features. As Lamedica proposes, this kind of interpretation corresponds to the most basic and immediate sensation "in the performative content of the accomplished exercising of the senses. This kind of content is intrinsically qualitative because it represents a peculiar mode of

³⁹ HURON, D. (2006) Are scale degree qualia a consequence of statistical learning?. In: University of Bologna (ed.) *ICMPC 9, Bologna, August 22-26 2006*, pp. 1675-1680 (p. 1676).

⁴⁰ RENOARD-LARIVIERE, R. (1996) *Futaie*. On *Futaie, Tchernozaim* (2000), compact disc, [Paris]: Ina-GRM.

appearing of a world..."⁴¹

While the notion of qualia covers the wide spectrum of sensations, both subjective and objective, the concept of *raw feel*⁴² developed by O'Regan runs counter to the notion of embodied mind and bypasses what qualia emphasise which is our active and experiential subjectivity. *Raw feel* is an interesting tool for phenomenological description of the perceptual 'presence' of what we experience, according to our sensorimotor engagement towards it.

Yet, unlike O'Regan's perspective, the notion of qualia endorses the sentient quality of perception that is shaped by the entanglement of the objective and subjective aspects of our living experience. Indeed our perceptual activity, thoughts and feelings are ensured by the constant dialogue between sensory information, practical knowledge and our subjectivity—all contributory to the emergence of meaningful experience. In my opinion, the notions of *raw feel* and qualia are complementary. The notion of *raw feel* fits particularly the description of sensations that are fundamentally linked to the anchoring of my body of the physical world, while the notion of qualia relates essentially to my personal interpretation of them. When I listen to or compose music, I generally describe my experience or my compositional aims in terms of qualia related to motion, texture, space and pace, gesture. Indeed my understanding of an acousmatic piece as a listener and the way I compose music are significantly coloured by the flood of subjective sensations I immediately experience.

⁴¹ LAMEDICA, E. (2014) *The aesthesiological paradigm: a resonant cycle between movement and perception*. p.7, <http://www.ed1.ulg.ac.be/sd/textes/20140220-Lamedica.pdf> [accessed 23 May, 2018]

⁴² Raw feel, see glossary p. 124

1.3. In the context of acousmatic music

1.3.1. The Listening process in acousmatic music

As outlined above, the mechanisms of perception are complex and based on a dynamic relationship between our senses and our surroundings. They provide us with a sense of self, giving us the awareness of our bodily and mindful presence attuned to our changing spatio-temporal environment. However since the essence of acousmatic music—which is purely aural— seems to run counter the multi-sensory nature of our environment, it is therefore legitimate to question how the above examination of the sensory perception of our living environment can fit in the listening context of acousmatic music.

First of all, the notion of acousmatic qualifies any perceptual situation where sounds are the only source of information delivered to perceivers, regardless the nature of sounds, the type of music and the place where it is diffused (for example: in concert hall, at home, or electroacoustic studio). The acousmatic listening context is recognised by the systematic use of loudspeakers and/or the hiding of performers and sound sources in play. This total absence of extra-aural information, from the early stages of composition in the studio until the diffusion of the piece in concert, confronts listeners with an artificial sensory situation. I see the listening experience as pulling listeners' body into a space (concert hall or studio). In acousmatic music, it is normatively set up to limit potential cross-sensory disturbance, internal or external to the concert hall, that may deflect attention from the piece (viz. low lighting to immerse the public in the dark and soundproofing to exclude external noise). When the music starts and the lights go down, the diffusion space becomes a channel for the projected music, which unlike our living environment, leaves little or no room for sensory interaction with other listeners. In fact, these conditions implicitly invite listeners to adopt a sort of reverential attitude toward the music. Their apparent bodily stillness facilitates adjustment of their sensory equilibrium to their new mono-sensory environment, which consequently tends to over-solicit the aural sense and but also has the

Commented [VV1]:

capacity to vicariously stimulate modal and supra-modal senses. Like potential living experiences in the environment, listening to acousmatic music is bodily-centered, using the perceiving body as a referential point that processes all collected aural stimuli into sonic, spatial and temporal information.

1.3.2. Connections between acousmatic music and the lived environment

This section explores how I see the listening experience of acousmatic music as a composer. My understanding of a piece results from the entanglement of what I sensory perceive of its objective features and my subjective vantage point. In fact, knowing the title of the piece, reading its programme notes, recognising what technics, sound processing effects, sound sources or gestural energies within a piece makes me anticipate, expect what is going to happen and how the listener's personal sound image⁴³ of a piece will emerge through time.

When I listen to a piece of acousmatic music I did not compose, in a way similar to the exploration of an unknown environment immersed in the dark, I am driven by the desire to understand its structure and its message and the following hypothetical situation illustrates my engagement in an acousmatic concert. Before the piece starts, I attune my body by adopting a particular position that will enhance my attention towards sounds, generally sitting with eyes closed, acknowledging that a still bodily position is ideal. I also fully focus my aural attention to catch as many details as possible—this entails a situation where I feel that my ears become my skin, the tip of my fingers and my eyes. Aware that the environment in which I am physically located has no causal relationship with the piece, when the music starts I dive into a sound world as if I open the door of my bathroom in the middle of the night and discover it leads to a bright and colourful garden full of blooming trees. Taken by surprise, my sight adjusts to this new luminosity as my attention reaches its peak. One after the other, I place my

⁴³ YOUNG, J. (2007) Reflections on sound image design in electroacoustic music. *Organised Sound*, 12 (1), pp. 25-33 (p.1).

feet on the ground feeling the freshness of the grass as I start wandering barefoot in the garden. While I recognise a couple of familiar features that make me feel comfortable, like the colour of grass, the pink flowers of the cherry trees and the birds singing, I am also disturbed by some elements that do not appear real to me, like the presence of two suns and three moons in the sky, or the porcelain-like texture I feel when I touch the trunk of a tree. As I explore this garden, I progressively connect together all features I notice and start drawing a picture of the place, which I interpret as a dreamlike vision of a Japanese garden full of cherry trees. This kind of fictional wayfaring epitomises my experience a piece of acousmatic music. For me, the music-listener relationship is strongly bonded to the ecological model of environment-perceiver. I consider the listening experience in acousmatic music, regardless of the work's aesthetic, as based first of all on an interactive relationship between the objective, phenomenological qualities of sounds and the subject-position of the listener.⁴⁴ Secondly, listening to a piece of music consists also of leaving an environment and entering into a new one. A process which therefore leads listeners to attune their mindset accordingly to the sensory changes they experience.

1.3.3. Attuning to different aspects of ecological listening

The experience of listening to acousmatic music is contextual and temporally defined by a beginning and ending. This has some correspondence to an event that punctuates our experience in the living environment, but is also more structured, imposed and artificial. Our understanding of the sound forms we hear in the present moment, whether they evoke imagery or a physical presence of some kind, and whether we infer from it stasis, rupture or transition, depends on what happened before in the wide frame of the piece and helps us to anticipate what will come next. The idea of attunement⁴⁵ is central, like many other listeners,

⁴⁴ See CLARKE, E. (2005) *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*, Oxford: Oxford University Press for a wider discussion of subject-position in relation to music.

⁴⁵ attunement: see glossary p. 123

when listening to an acousmatic piece that I did not compose, I need a little time to enter into the aesthetic universe that is displayed to me—as in the discovery of an unknown universe into which I am propelled. My subjective engagement toward music is fundamentally ecologically driven, with the desire to understand the structure and the message of the piece. So from the start of any work, I instinctively begin to hunt for features that, through the filter of my subject-position, seem familiar to me: that is to say ones I could relate to my experience of the world. As the music goes on, my listening switches intuitively between the different Schaefferian modes of listening, in order to face the challenges met in different situations.

A sensitivity to distinguishing between what I figure to be anecdotal or abstract sound materials is a determining factor in the way I orientate my listening and seek to connect it with my experiential knowledge of the world. However, sometimes sound materials or a sound sequence can be ambiguous and can compromise the clear distinction between concrete and abstract listening. The case of ambiguous sounds is problematic, because their features are not abstract enough to instinctively adopt a concrete listening and their apparent connection with a physical source or a bodily sensation of gesture, space or texture is so unclear that it is difficult to associate them to a proper aspect of my experiential knowledge of the living environment. So when a piece features such sounds, my listening is not either abstract or concrete, but it merges both, leading me to draw a subjective and imaginary picture of what I perceived. This form of listening—which I called imaginative—has foundations in my knowledge of the world and its physical laws, but may be free to obey or subvert them through the scope of my subjectivity. Bayle associates it with a symbolic function, permitting the emergence of metaphors as a way of engaging in a meaningful relationship with sound. Bayle proposes:

The symbolic function exercises remote control from above, rearranging the real according to a 'projected'

world.⁴⁶

The sensation of ambiguity can also lead us to listen to a piece as if we were experiencing a conscious dream, (une *rêverie* consciente⁴⁷) where sounds lead us to progressively embrace the flow of thoughts, mnemonic or imaginary bodily sensations, qualia (visual, tactile, spatial) that they may trigger in our mind, revealing also the transmodal capacity of sounds. In moments where we face such ambiguities in listening to music we feel unsure about what we perceive and how we should approach sounds' positions between daydream, as an internal construct in response to music, and the sensory reality of the piece. Clarke, in addressing subjective engagement with music, points the particular capacity of electroacoustic music to 'provide the listener with experiences of "impossible worlds" that have some of the same attraction as do other forms of virtual reality.'⁴⁸

For example, when I listen to the beginning sequence of *Entre sueños*, by Raúl Minsburg,⁴⁹ surprised by the abrupt start of the piece, my listening is first focused on the aural features of what I perceive⁵⁰, I do not try to deliberately associate what I listen to anything I could recognize. I am fully attentive to the variety of texture, motion, spectral range and morphology of the sound world that is displayed to me, like when I adjust my sight to the surrounding darkness in order to know what is happening around me. As the work continues, I progressively mix a type of listening oriented around the phenomenological features of sounds with a listening focused on anecdotal attributes of sound, led by my instinctive tendency to draw connections with my living experience of the environment. This allows me to form the sense of a large and distant, empty

⁴⁶ BAYLE, F. (1989) Image-of-sound, or i-son: Metaphor/ metaform. In: MCADAMS, S. and DELIEGE, I. (eds.) *Symposium on Music and the Cognitive Sciences, Paris, 14-18 March 1989*. London: Harwood Academic, pp. 165-170 (p.167).

⁴⁷ BACHELARD, G. (ed.) (1971) *The Poetics of Reverie*. Boston: Beacon Press.

⁴⁸ CLARKE, E. (2005) *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*. Oxford: Oxford University Press. p.90.

⁴⁹ MINSBURG, R. *Entre sueños* (2001). On *RedASLA*, volume 1 (2006), compact disc, [Buenos Aires]: Red de Arte Sonoro Latinoamericano.

⁵⁰ This can be also be named as phenomenological features.

space (A). The low frequency range and the perception (from 0'14) of an oscillating movement (B), slightly higher in frequency that slowly emerges from the background makes me think of the interior acoustic of big underground tunnels. Based on my memories of listening to ventilating tubes and urban undergrounds, I start imagining a large industrial space, dark and dusty. From 0'28, this sonic space is accompanied by another oscillating sound that is spectrally lower and more dense. As it grows fast in amplitude and tends to merge with the oscillating movement (B), especially from 0'43 with an enlargement of its frequency range, I observe that my listening is not completely abstract or completely concrete, I modulate my listening and connect fleeting states of attunement to understand what I perceive. Around 0'51, my focus on the phenomenological features of this growing oscillating stream and the emergence of a new sound pushes me to instinctively switch perspective, becoming attentive to the anecdotal quality of the sounds I hear. This makes me immediately connect what I hear to my experiential knowledge of the sounding world and draw the sound image of an engine like a train or a metro that I imagine approaching very fast towards me. As the sequence goes on, I progressively build a sort of virtual reality or imaginary realm as a result of my objective and subjective engagement with the piece. As the sequence climaxes, and my listening is clearly focused on the anecdotal quality of sounds, a sudden impact (1'17) surprises me and throws off the accumulated energy, which fades away. I associate this event to the sound of a wooden stick mixed with a water splash.

The existential conditions of an acousmatic piece asks listeners to extract themselves from the tangible reality of their proximate physical environment to be embraced by the musical world projected by speakers. The lack of visual cues, on which one tends to rely heavily for apprehending daily life or in engagement with instrumental pieces⁵¹ is a strength of acousmatic music rather than a weakness. Sounds are perceived as aural cues that help the listener to recognise an aural image and contextualise the interpretation sonic events in relation to the listener's imaginary world and experiential knowledge. Indeed, when we start

⁵¹ WISHART, T. (1996) *On Sonic Art*. Amsterdam: Harwood Academic Publishers. pp. 149-150.

listening to a piece, we frequently tend to seek any recognisable sounds that refer clearly to a physical sound source. This involves spotting sounds of obvious traces of human presence (voices or footsteps for example), or sounds that seem humanly generated (like a gesture on a particular surface, the turn of a door handle, the shacking of keys) or other sounds that they can relate to their experiential knowledge of the living environment (such as environmental sounds, sounds of physical objects or mechanical processes). This instinct for recognition of sound sources (source-recognisable sounds are also referred to as anecdotal', typically in the French literature) may well have its roots in ecological strategies for survival (as referred to in the work of Gibson, above) and it remains strong in human audition⁵².

In Minsburg's *Entre sueños*, a new setting is revealed through the perception of a progressive pitch shifting toward a higher frequency range of the low-pitched stream combined with the water splash (1'17) that trigger new sounds of aquatic lapping (1'22). Moreover, from 1'22 the slow movement of this stream from foreground to background—slightly reverberated the presence of twittering reverberated sounds that I associate to the sound of birds (1'23)—offers me the qualia of a large open space. The sound of what I imagine to be a frog or another kind of bird (1'25) the twittering of other birds that follow (from 1'26) and the delicate trickling of water imbued with a crackling quality (from 1'35) make me imagine an acoustically dry exotic and humid landscape. Thanks to sounds I mentioned above, this extract appears to me as a soundscape that I connect to a virtual multi-sensory environment.

⁵² See WISHART, T. (1996) ed. Simon Emmerson, *On Sonic Art*, Amsterdam: Harwood for a full discussion of the processes and potentials of sound source recognition.

1.3.4. Transmodality and the experience of listening

1.3.4.1. A parallel with Kandinsky

When listeners are new to the acousmatic genre or when sound materials appear too causally ambiguous to be related to their experiential knowledge, they may have to adjust their way of listening by releasing themselves from a search for recognisable sounds. This corresponds to viewers who, facing a painting of Wassily Kandinsky, have to leave their expectations for the representational or visually figurative and adjust their mindset to the piece made only of simple geometrical shapes (point, line, circle, rectangle, square) and primary colours (blue, red, yellow). Kandinsky negates viewers' capacity to find any mimetic connection with their living world. As applications of his theories of colours and forms, Kandinsky's paintings aim to transcend materiality and the nominal representative function of painting by building analogies between the spatial organisation of graphical features (points, lines, planes) and the suggestion of proprioceptive sensations (motion, directionality, balance, strength, or temperature). This results in a use of colour as a way to get in touch with the sensibility of the viewer in terms of emotion, transmodal and spatio-temporal experience. Similar to the perception of abstract painting that triggers extra-visual sensations in the viewer's mind, acousmatic music may also bring extra-aural sensations in the listener's mind thanks to its spectromorphological, typomorphological features and their temporal evolution.

For example I strongly associate the temporal structure of *Futaie* with an abstract visual design, that is a horizontal line quite regularly punctuated by dots of different sizes and shapes. To me, the short percussive sounds of similar amplitude and pitch are like big dots of similar size and colour. As time goes by, the percussive sounds feature spectromorphological changes that impact the way I visualised the dots. Irregular, fuzzy, more or less dense, longer or shorter—as we progressively move to the right the dots are evocative of motion that is increasingly more complex, as the following illustration displays.

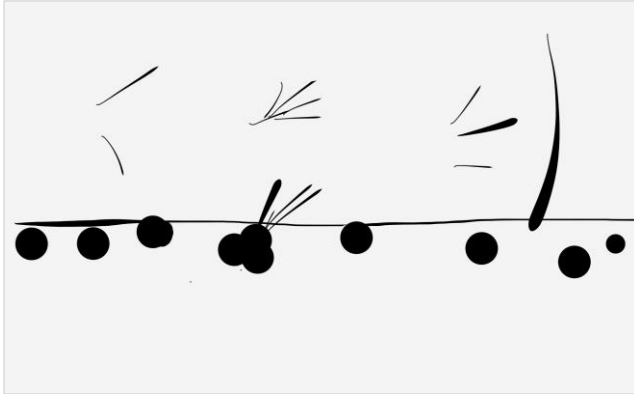


Figure 1. This image illustrates how I visualise the beginning of *Futaie*.

The x axis corresponds to the time and the y axis to frequency.

This perspective highlights the fact that, despite the effort of acousmatic music to conceal visuals and the clear absence of obviously anecdotal material in a piece like *Futaie*, the listening experience can be associated to particular visual representation thanks the transmodal quality of our perception. Moreover, I acknowledge that the visuals I present here are fundamentally subjective and result from my experiential knowledge and my familiarity with visual arts.

1.3.4.2. Musical perception: vectors of qualia

Like the world around us, a piece of music is essentially an object in constant motion, composed of intermeshed, sequential, overlapped gestural formations. Our cultural and practical knowledge of the sounding world is rooted in motion, fundamentally based on our sensorimotor skills and bodily experience, which can be interpreted as gesture. In listening to acousmatic music devoid of anecdotal content we can still experience a certain degree of connection to and familiarity with the shaping influences and structures of the environment.

According to Smalley⁵³ this can be due to the ability of sounds to communicate proprioceptive and motivating sensations that refer to our personal experience of sounding gestures⁵⁴ through the perception of their spectromorphology.⁵⁵

While Kandinsky emphasises the ability of visual features to communicate proprioceptive sensations, spectromorphology appears to be an essential vector to experience various types of qualia (gesture, distance, texture and motion, that includes trajectory and pace) coloured by our subject-position.

Perceiving any qualia in music relies fundamentally on our body-centered and ecological perceptual behaviour, led by our instinctive tendency to seek for coherence and meaning out of connection between the unknown and our experiential knowledge of the world. Thanks to the electroacoustic tools available to composers to record, create and alter sounds, pieces of electroacoustic music give to listeners the possibility to phenomenologically perceive infinite numbers of typo-morphologies and spectromorphologies. Their relationship between bodily experience in the living environment, and music perception colour inherently the way listeners may experience various qualia in musical listening. Independently of each other Smalley and the researchers of the Laboratoire Musique et Informatique de Marseille [MIM]⁵⁶ proposed approaches to the analysis musical perception through a *wider frame of reference outside and beyond music*⁵⁷ looking at proprioceptive, tactile, morphological, motional sensations or semantic properties to particular qualities of our living experience. Both have proposed listening tools based on a close observation of the phenomenological features of sounds. While Smalley's research is based on

⁵³ SMALLEY, D. (1997) Spectromorphology: Explaining sound-shapes. *Organised Sound*, 2 (2), pp. 107-126.

⁵⁴ Smalley defines gesture as an *energy-motion trajectory which excites the sounding body, creating spectromorphological life* in SMALLEY, D. (1997) Spectromorphology: explaining sound-shapes. *Organised Sound*, 2 (2), pp. 107-126 (p.107).

⁵⁵ Smalley defines spectromorphology as *the interactive relationships between sound spectra (-spectro) and the way they change and are shaped through time (-morphology)* in SMALLEY, D. (1997) Spectromorphology: explaining sound-shapes. *Organised Sound*, 2 (2), pp. 107-126 (p.111).

⁵⁶ See: <http://www.labo-mim.org/site/index.php> [accessed 2 February, 2017]

⁵⁷ SMALLEY, D. (1996) The Listening Imagination: Listening in the electroacoustic era. *Contemporary Music Review*, 13 (2), pp. 77-107 (p. 83).

spectromorphology, the MIM's is conceived as a set of Temporal Semiotic Units⁵⁸ (TSU) based on typo-morphological behaviours of sounds.

1.3.4.2.1. Spectromorphology transmits qualia of physical presence

Communicating qualia of physical presence to listeners when they perceive my music is very important for me. This leads how I choose and process my sound materials and also how I compose bits of sequences and construct the final piece. This process is a back and forth relationship between listening and composing. When I compose I use my body as a tool, an interface to test and verify whether the bodily sensations I feel while listening to what I recorded, processed or composed, match with what I intend to communicate. While I am fully aware that what listeners perceive may not mirror precisely my sensations, the cognitive mechanisms involved in perception as described in the previous chapters leads me to investigate further how the quale of motion, distance and substance could be communicate musically to ultimately refine my compositional method.

The qualia of motion are multidimensional, calling instinctively on our ego-centred system of coordinates that enables us to live in our environment, through the perception of proprioceptive sensations. In acousmatic music, these sensations can be virtually triggered, offering to listeners through bodily empathy to feel a large array of bodily gestures. Indeed listeners can perceive qualia of motion as if their body were moving in space, like when one witnesses the making of a bodily gesture of a cellist to create a sound or when one observes a dancer moving in space. In both situations, one's sensorimotor apparatus is remotely called through vision that triggers virtual proprioceptive sensations that one would probably feel if they were performing these bodily actions. Following Smalley's thinking the proprioceptive sensation of gesture aurally perceived refers

⁵⁸ The 19 TSUs are: Braking, Chaotic, Compressing-stretching-out, Divergent, Endless trajectory, Fading away, Falling, Floating, In suspension, Moving forward, Obsessive, Propulsion, Spinning, Stationary, Stretching, Suspending-questioning, Wanting to start, Waves.

specifically to a sonic gesture related to physical sound sources like for example, the opening of a door or footsteps. Sometimes, the motion perceived is not explicitly familiar and may mislead the listener's understanding of the composer's intentions and also lead her to forge imaginative connections.⁵⁹ This is particularly the case when sound materials are abstract and their spectromorphology not "firmly rooted in known sounding gesture."⁶⁰

Physical presence can also be communicated through qualia of distance that can be associated with visual perception of the depth of field—both phenomenologically. In fact, thanks to the physiology of our hearing abilities, we are likely to imaginatively associate low frequency sounds to a distant location and high frequency ones to a proximate space, similarly to the way we relate dark colours, fuzzy forms to the background and the brightest colours and detailed shapes to the foreground of a painting. This echoes fundamentally to our bodily experience in the living environment. For example, when I am at the entrance of a forest and observe the trees and the ground in front of me, I can observe a large array of colours, dark and light green, brown, orange, yellow and white, while when I orientate my sight to the inside of the forest and see the distant trunks, the brightest and hottest shades disappear, I can only observe shades of green and brown. From a musical perspective, in the short sequence of *Futaie* from 1'38 to 1'44, I clearly perceive different qualia of distance which are linked to the spectromorphological features of sounds. I tend to locate the low percussive sounds in the background while the high-pitched impulses in the foreground. As we will see in the chapter 3, I explore very much this projection of perspective in the composition of *I belong to the sea* and *Uni-vers(e)*.

Another important type of qualia is the qualia of substance whose perception is fundamentally phenomenological based on spectromorphology. They anchor our body in a virtually transmodal experience which, like qualia of

⁵⁹ For further details see chapter 3.6

⁶⁰ SMALLEY, D. (1996) The listening imagination: Listening in the electroacoustic era. *Contemporary Music Review*, 13 (2), pp. 77-107. p. 85

motion and distance, relate to experiential knowledge of the world. These qualia feature the proprioceptive sensations of density, mass and texture that relate to very intimate sensations of touch calling remotely our experiential knowledge of physical properties of our living environment, such as liquidity, hardness, smoothness, ruggedness. The notion of substance also echoes the Schaefferian notion of *facture*. However, this category of quale, less abstract than the other qualia of physical presence seems to be more connected to the materiality of our living environment and draws a substantial link with the recognition of anecdotal features, or physical sound sources, triggering mental images that connect instantly to our multi-sensory experience of the world. A piece of music can embrace a large range of sensations in ways that are essentially transmodal. They could be visual and relate to the quality of the edges of a line—to smoothness or ruggedness, for instance, or to the opacity level of a colour. They can also evoke particular textures, triggering simultaneously tactile and visual sensations, for example my piece *Nyx, extract_01_chapter_3* (from 0'04 to 0'11) features a very dense texture located in the low frequency range, and here its spectromorphological nature provides me with the mental image of the unclear and fuzzy outlines of a muddy texture in motion. Moreover, my *Uni-vers(e)* from 4'44 to 5'10 displays a dense and granular texture rich in heterogeneous timbres, pitches and grain sizes. Some sounds can also transmit qualia of substance strongly related to physical materials such as glass, metallic, wood or water.

1.3.4.2.2. The TSUs and the qualia of energy / motion

Awareness of the spectromorphological features of sound can enable us to imaginatively envision a fusion of the qualia of motion and substance. From a visual arts perspective, this can be thought of as sound animated by what Kandinsky called resonance or inner *pulsation*,⁶¹ and are evocative of bodily sensations. In Régis Renouard Larivière's *Futaie*, for example, the sequence from 8'15 to 8'35 displays a smooth texture animated by an inner motion which

⁶¹ KANDINSKY, W. and REBAY, H. (1979) *Point and Line to Plane*. New York: Dover.

is gentle and discrete while the sequence from 9'53 to 10'03 displays a texture animated from its inside by an oscillatory type of motion that is more overtly iterative than the first, while a third sequence from 12'51 to 12'57 displays a more chaotic granular texture evoking the disorganised crackling of sand grains. The previously mentioned TSUs developed by the MIM further explore the emergence of qualia through the relationship between phenomenological features of sound and listener's experiential knowledge of bodily presence living in the environment. These relate the perception of particular phenomenological features of sounds, connecting typo-morphological attributes to an idea of meaningful behaviours "through their dynamic pattern over time."⁶²

The TSUs are specifically dissociated from Schaeffer's conception of sound object classifications because they are not regarded solely through phenomenological reduction. TSUs aim to encapsulate the way sound structures, behaviours and assemblages might be regarded as meaningful by conveying impressions of energy and interaction analogous to physical agents. For example, qualia of motion can be derived from the "kinetic effect" of sound in time: acceleration, temporal fluctuation or textural composition (including sensations of continuity or discontinuity). The nineteen dynamical patterns of motion developed by the MIM provide a bridge between the strict Schaefferian descriptive terminology for sound objects and ways in which we might infer meaning from them by connecting these experiences to our sense of proprioception and subject-position. More broadly, this kind of holistic view is a way to understand larger scale implications of structure through time.

⁶² See <http://www.labo-mim.org/site/index.php> [accessed 2 February, 2017]

1.3.4.2.3. Two further views of *Futaie*

1.3.4.2.3.1. *Futaie* through the TSUs

Futaie offers us a journey through different qualia of motion and substance, triggered a large array of proprioceptive sensations. My experience listening to this piece is led by my instinctive tendency to seek coherence and meaning out of connections between the phenomenological sonic features of music and my personal experiential knowledge of the world. I propose to describe through the following table the main TSUs I observe in the piece. This perspective, though fundamentally subjective, associates phenomenological features and particular TSUs which seem to serve the genesis of the moving-forward energy of the piece. It starts with a quale of relative stasis that livens up, conveying motion that seems tense, sometimes laborious, with hectic gestures bound by inertia—as if change could not happen without any effort. Featuring a range of qualia of motion, sounds interact and influence each other and sometimes merge displaying complex spectromorphologies and evoking heterogeneous body sensations.

TIMING	TSUs	Description
0'00 to 3'00	Floating	Succession of sound events on a smooth continuum without pulse
0'01, 0'11, 0'39, 8'44	Heaviness	Percussive sounds
1'03 to 1'13, 6'30 to 6'54 7'40 to 8'07	In suspension	Repetition with very little variation, slow pace
1'58	Fading away	High-pitched resonance that dissipate naturally
1'40, 3'38 to 3'58	Divergent	Succession of sounds featuring different and opposed energies (succession of frustrated directions)
4'04 4'41 to 4'45	Wanting to start	Succession of impulses, the sequence is led by a moving forward impetus, aims to realise an intention
11'28 to 12'09	Compressing-stretching out	Two phases process : a first phase described as an acceleration with increase in intensity, mass, pace followed by a second more consistent phase
9'53 to 11'02	Stretching	Sequence that give the sensation of an effort, a moving-forward motion that content tension and feature extended enrichment et evolution
11'07 to 11'24 13'26 to 13'45	Braking	Slowdown of the sequence due to an external force until it stops
1'02, 2'09, 2'19,	Suspending-questioning	A movement that stops in a fixed position
1'19	Propulsion	Succession of impulses engaging a moving forward movement

Table 1. This table describes the TSUs I associate with *Futaie*.

1.3.4.2.3.2. *Futaie* through a parallel with abstract composition

A further way of examining *Futaie* is by drawing parallels between it and Kandinsky's graphical research⁶³ on abstract visual composition and the approach of the qualia of motion categorized by the TSUs. Indeed, this piece explores how the points, lines or abstract shapes can graphically animate a plane to reflect the perception of qualia of motion in our environment, since *Futaie* is a sound world that appears to progressively animate itself. *Futaie* orchestrates over time different types of spectromorphologies, such as low frequency impacts (0'01, 0'11, 0'39), low pitched granular sounds (3'01 to 3'04) middle-range blowing sounds (2'48, 3'12, between 4'04 to 4'08, 11'40), high-pitched streams rich of smooth (1'02 to 1'13) and rugged textures (0'12 to 0'38, 8'46 to 9'05), and short high-pitched percussive sequences (13'32 to 13'45). Varied, developed and interacting with one another, each sound category occupies a particular function within each section of the piece. I associate the low frequency impacts and granular sounds to variation of the 'point', which Kandinsky connects to sensations of stillness and calm; middle-range blowing sounds; medium blowing sounds and high-pitched percussive sounds to a particular type of short line, like a comma or an accent, that initiates a change. In the piece, this type of line indicates a direction, accentuates a tension or a sensation of motion. I associate high-pitched streams with all other types of line, equating with Kandinsky's general definition of a line as a point in motion—namely a tension internally active that emerges out of motion. Moreover each category does not present a single type of point or line but many. For example, the low sounds can be graphically associated with black points of different sizes and morphologies, while I visually associate the medium-to-high sounds with lines that are either straight or curved with variable density and thickness.

⁶³ KANDINSKY, W. and REBAY, H. (1979) *Point and Line to Plane*. New York: Dover. (p.140: FR version) pulsation: p 169 : French version

1.3.5. From phenomenological features to transmodality

What this discussion has demonstrated is that, to me, the experience of listening to acousmatic music is a multi-layered process. It starts in the aural domain with the perception of sounds which I generally consider either as abstract or as variably representative or evocative of my experiential knowledge of the sounding world—that is to say, through recognition of particular physical sound sources (like the sound of running water or a voice) or bodily sensations (for example, qualia of motion or substance). Listeners rarely perceive acousmatic music as exclusively abstract or anecdotal. Their experience is a continuous attunement to how they feel what they perceive, supported by a constant dialogue between phenomenological features presented by a piece and their embodied mind. As a listener and a composer, I am naturally drawn to acousmatic pieces that feature abstract rather than explicitly anecdotal sound materials, as they engage listeners in a “feel-relationship” with music based on perception of qualia. This has the potential effect for listeners to immediately engage their being in perceiving transmodal sensations rather calling on a response based primarily on the cognitive process of sound source recognition. When I compose music, I see each project as an opportunity to create a new sensory experience, inspired by mental images based on perceptual experiences—real or imaginary—rather than inspired by the sound materials I have in my sound library or others I may like to record. From a general perspective, my sources of inspiration are multi-modal—I conceive vision, touch and hearing as channels or containers capable of transmitting similar messages in different ways. That is why my source of inspiration can be as broad as the qualia of vast space, the qualia of motion of the sea, the visual sensation of darkness, the tactile sensation of a fizzy texture, the qualia of violent gesture, and so on. To tackle and implement these mental images into music, my method consists in analysing them through tables of key words, reducing them through sketches to explore how I could feel them through my bodily gestures and or associating them to video clips whose observation is like a way to absorb and remotely feel them. All these methods help me make them ‘mine’ and to associate

them with a spectromorphological design, an element of sound material, a process, a sequence or even a way to structure the form of a piece. The shaping of sound materials, like the visual dimension of my working process, is conducted by this feel-relationship. The sounds I choose and shape also profoundly influence the way I compose sound sequences by triggering new mental images that emerge in turn from the perception of the phenomenological features of the processed sound materials and the sequences in progress. Therefore my compositional process can be perceived as a constant, and recursive, dialogue between mental images, qualia and phenomenological features, using the multi-sensory dimension of my bodily experience as an inspirational tool to compose acousmatic music that is evocative of this multi-sensory dimension of human perception.

Commented [VV2]:

1.3.6. The capacity to imagine

This very personal way of mapping and projecting mental imagery onto a practical compositional approach is directly connected to the enactivist view of perception and the concept of embodied mind in particular. Viewed from the aesthetic perspectives outlined above, we can characterise the tasks of the acousmatic composer as orchestrating through time both the phenomenological features of sound materials and qualities of physical presence they may communicate. The coupling of mind-body then becomes central to the compositional and listening experience in acousmatic music. The ability to imagine is essential when the gestures we detect via spectromorphological characteristics are *firmly rooted in known sounding gestures*⁶⁴ or, on the contrary, when the spectromorphology has been so much processed that its initial gestural impetus becomes dissolved—losing all intimate connection it could have with our personal experience of life we may feel completely detached from a work, *as if "observing" invisible phenomena displayed on a screen or in space*.⁶⁵ Yet a

⁶⁴ SMALLEY, D. (1996) The Listening Imagination: Listening in the electroacoustic era. *Contemporary Music Review*, 13 (2), pp. 77-107 (p. 85).

⁶⁵ Ibid.

feature of acousmatic music is that composers choose to deliberately shape a listening experience with no equivalent in the real world, leading listeners to build bridges between phenomenological features of sounds, associated bodily sensations and the mental images they experientially or imaginatively connect to sounds in order to find meaning. Moreover, when no realistic connection can be drawn between a piece and our physical environment, trying to picture a meaningful sound image of it cannot be only based on our bodily experience of the world but must also be supported by our tendency to imagine. Indeed, a particular texture, the impression of a gesture, or a particular pitch can invite us to experience a conscious dream (*une rêverie consciente*⁶⁶) that progressively influences us and leads us in the flow of thoughts, images, sensations in our mind. Between daydream and sensory reality of a piece, this type of reverie comes to our mind as an alternative space, reassuring and open to the world but also intimate: it is a space where the aural features of the piece connect with our memory, imagination or intuition to reveal transmodal sensations through qualia (visual, tactile, spatial).

1.3.7. Composing

In reality, the past is *with* us, as we press into the future. In this pressure lies the work of memory, the guiding hand of a consciousness that, as it goes along, also remembers the way.⁶⁷

The purpose of the present research is to show how composers could exploit their own perceptual mechanisms, coloured by their instinct, experiential knowledge and ability to imagine a process of composing. This, instead of following any established musical language, would call their listening abilities to trigger transmodal connections based on the interaction between past, present and future—which is to say memories, direct perception of phenomenological or

⁶⁶ BACHELARD, G. (ed.) (1971) *The Poetics of Reverie*. Boston: Beacon Press.

⁶⁷ INGOLD, T. (2016) *Lines: A Brief History*, New-York: Routledge. p.122

anecdotal features of sounds and the imaginative capacity to communicate messages based on sensual qualia. Despite the temporal essence of music, this does not necessarily lead to musical results that are ultimately linear in effect. Like the experience of listening to music, composing is a journey—a journey through the realm of mental imprints of the sonic features of sound material, wishes, expectations, constraints, satisfaction and abandon. When I compose a piece of music I am also a listener in constant motion, wayfaring along the dynamic line of the piece-in-progress. On my journey, every sound I add, every change I make, marks a step. It is also a moment of tension when I review the mental images, the qualia I experience, and look back to what has been accomplished in order to move forward and choose accordingly which further direction I will give a piece. My perspective on composition is very much inspired by Ingold's perspective on ecology.

An ecology of life, in short, must be one of threads and traces, not of nodes and connectors. And its subject of inquiry must consist not of the relation *between* organisms and their external environments but of the relations *along* their severally enmeshed ways of life. Ecology, in short, is the study of the life of lines.⁶⁸

The line, important to Ingold's thinking, embodies the continuous motion of the world around us, of our lives, of each piece of music we compose. The dynamic line has no terminus. Right after a piece of music ceases to sound it leaves its imprint on our mind, mobilising our thoughts. To me, the line incarnates a process in constant evolution. I also associate it with the gestural flow of drawing—to the fluidity of the pen I move above the page. In my compositional process, the practice of sketching occupies a privileged place while I work on a piece. Accompanying me until the piece is completed, sketching allows me to physically connect with the immaterial quality of the ideas that cross my mind.

⁶⁸ Ibid. p.106

From hesitant traces to assertive entangled threads, knots or twists, the sketched-on page becomes a tool, as do video clips or other visual elements that trigger transmodal sensations and musical ideas. As my portfolio features, the use of visual artefacts supported by a customised vocabulary is central to all my electroacoustic pieces. It allows me to apprehend the apparent infinitude of acousmatic music's materials. Indeed, the acousmatic genre, aesthetically positioned outside of traditional concepts of the solfège, rhythm, harmony and melody, offers to composers and listeners a vast range of sonic materials, from sounds drawn directly from the environment to those created through digital synthesis and signal processing. The artistic imperative driving the compositions in the portfolio has been focused on matters of subjectivity, feeling and imagination, rather than any particular material or formal constraints of a particular musical 'language'.

2. From the realm of the ideas to the construction of the project

2.1. First stage of the portfolio

2.1.1. *I belong to the sea* (2015)

2.1.1.1. The start of the project

At the start is an idea, a desire to create a new piece of music, some expectations and a blank page. As a composer, when I start a project, I see myself like a painter staring at the white wall in front of me, waiting to be struck by inspiration. However, since such a revelatory moment rarely happens to me, I rather choose to actively hunt inspiration by exploring my inner world. Like a map reader or a wayfarer, I scan the impressionist landscape of my mind and look for signposts—direction markers or stepping stones to find my way—fuelled by the excitement of starting a new project. I rummage through the tangle of my memories, fantasy and imagination in order to find details that would inspire me on a topic, or particular textures, atmospheres, sonorities that will progressively develop into a work. In remembering past life experiences I cannot see their features as objectively and vividly as I would like, instead I observe them through the filter of my subject-position: they appear to me partial, featuring salient qualities, either aural or extra-aural and also the qualia I associate with them. This was the starting point for *I belong to the sea* (2015), which drew on aural, visual and kinesthetic characteristics of an experience I had on the seaside—a stunning sunset and the feeling of calm given to me by that particular moment. So I started by thinking of the features that remained vivid in my mind: the colours and brightness of the scene, the light's reflections on the water, the fluidity of the waves, the soft breeze, the vastness of the sea, the feeling of beauty and deep serenity. Then I reflected on ways these features could be substantiated and embodied structurally to become the piece. Initially I determined the spatial frame of the piece, a 'traditional' ring of eight channels to offer the audience a body-centered experience, reflecting the immersive nature of my experience. Then my

plan was to use the chronological phases of the sunset to shape the temporal structure of the piece in a way that would convey my visual engagement with and memory of the scenery. It describes the fragile moment when the slow rocking movement of the waves animated by the wind appeared to 'embrace' the sunlight. This part appeared to me as a hypnotic scene with light, and the colours and sounds of the waves apparently dancing and fighting simultaneously. Following my initial plan, I associated the ending part with the fall of night and the disappearance of the sea's colourful, shiny surface—which triggered qualia of melancholy and fearful reaction to the night as the sun disappeared, letting the darkness spread across the sky.

2.1.1.2. The structure

The richest of the details I could recall were predominantly visual, and to these were attached memories of bodily sensations and emotional feelings. This posed a real challenge to capture temporally and translate musically. I identified the source of this difficulty in the fact that the *quality* of sensory interaction and the resulting sensations I experienced were more important than the temporal dimension of this experience. That is why when I started to compose sound sequences I became stuck, observing that I was composing as if I were building a fixed image, in that none of my sequences could extend beyond 10 seconds. Listening to each one was like briefly opening one's eyes to register events, then closing them before perceiving any action happening. This difficulty confronted me with the fundamental difference between visual and musical perception. In fixed images time can only be suggested, while time is the essence of music—music cannot exist without it. So this led me to take a new approach. Rather being a translation of my experience, I took inspiration from my multi-sensory experience to imagine a scenario, like a form of narrative. So I concocted another structure for the piece describing how the evocation of my seascape experience might invite me to daydream and dive into an imaginary underwater world whose peaceful atmosphere brings me slowly back to the surface, leaving me with a bitter-sweet sensation of being back to reality when the sun goes down.

PART ONE : On the surface, Discovery of the seascape	PART TWO : Underwater, Slowly diving	PART THREE : Back to the surface, Darker seascape and more agitation
Peaceful atmosphere	Vivid motion and intense calm and peace	Meditative atmosphere
Sonic textures smooth and pitch centered	Relationship between sounds evokes dance and fight	Melancholic, mysterious atmosphere
Evocation of soft light	Dark colour	Dark colour
Slow motion of waves and wind	Evocation of lines of daylight passing through the surface to reach and illuminate the abyss	Wind sounds and waves

Table 2. This table is the first proposal to structure *I belong to the sea*.
The following images are sketches I drew at the early stage of the compositional process of
this piece.



Figure 2. This drawing combines a visual representation of my
memory of the view of a seascape by night and various patterns
and lines that I used to imagine various sonic textures. This x/y
axis does not refer to any sonic parameters, it is a free drawing.

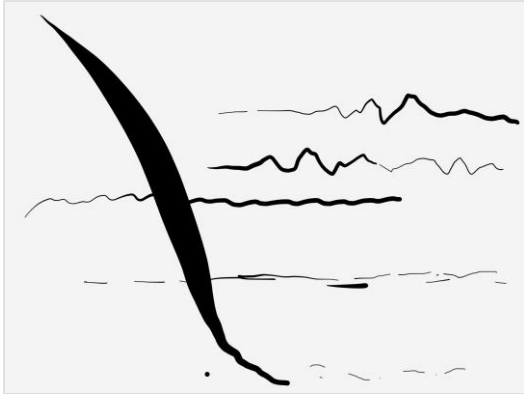


Figure 3. This sketch represents a potential transition between morphologically different sound objects. The *x* axis refers to time, while the *y* axis refers to frequency. The thickness of the lines refers to the spatial distance. The thicker ones correspond to sound located at a proximate distance from the listener (foreground), while the thinner ones are more distant (background).



Figure 4. The *x* axis refers to time, while the *y* axis refers to amplitude. The design evokes a morphological behaviour of two materials. The thick line refers to a sound whose morphology is simple and easily noticeable like a music note, the curve represents the amplitude evolution of this sound. It starts at a medium level, goes up and then declines to reach a very low level. In the middle of the drawing, a new sound emerges before the first one ends. The morphology of the second sound is more complex and dense, it is a superimposition of versions of the same sound, each layer shows a different amplitude curve.

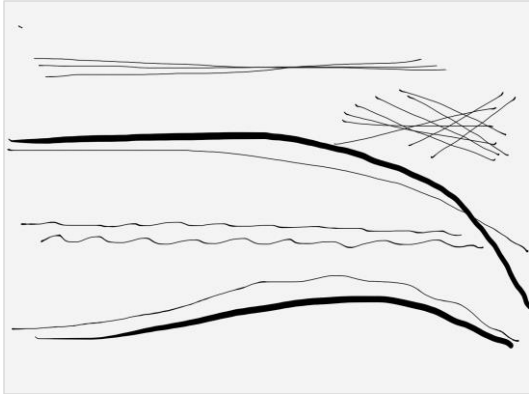


Figure 5. This displays a research on how different sounds and textures could overlap and follow one another through time. The x axis refers to time, the y axis relates to frequency. The sketch connects the thickness of the lines to the sensation of distance. This image is an attempt to visualise how I could edit and superimpose sounds, of diverse durations and spectromorphologies.

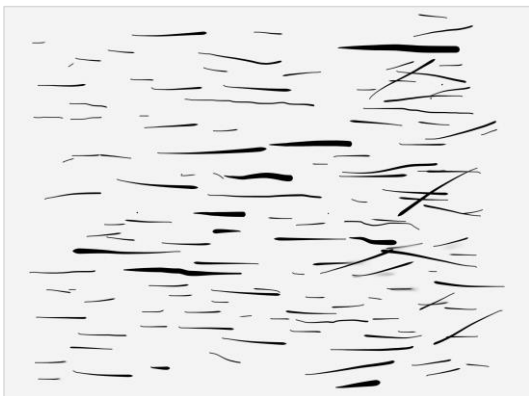


Figure 6. The x axis refers to time, the y axis displays the layering of a sound texture. This sketch is a snippet, like a photograph taken at a particular time of a dense sonic texture. It shows this texture as composed of short sounds whose thickness correspond to how proximate each may appear to the listener's ears. I compare this sketch to a picture of a river taken from above, displaying the stream and all fishes and light reflections that give the impression of flowing water.

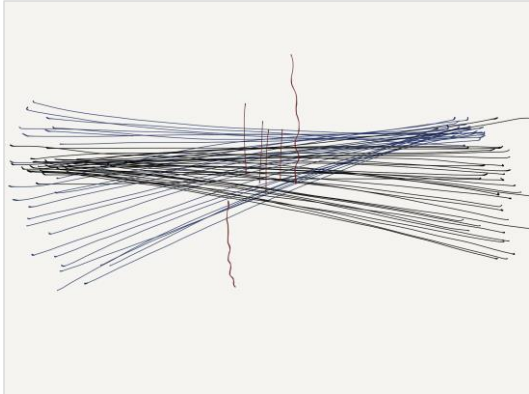


Figure 7. The x axis refers to time, the y axis to frequency. I use colours to highlight the presence of three different sounds. It shows a long fade-in/fade-out between the black and blue sounds which are two different streams that occupy the frequency domain in the same way. At the start, the blue stream covers a large part of the spectrum to become thinner. It is the other way around for the black stream. The middle of this fade-in/fade-out is punctuated by a couple of extremely short percussive sounds, like electronic impulses. They have different pitches.

2.1.2. *Nyx* (2015)

2.1.2.1. The start of the project : general perspective

The process for the second piece, *Nyx*, took a different approach to *I belong to the sea*. In *Nyx*, I aimed to counter the chronologically sequential approach to composition adopted in *I belong to the sea* (and subsequently *Danse Macabre* and *La Dame Blanche*). My main intention was indeed to compose a piece as if it were a large-scale abstract and expressive painted fresco whose inner dynamism would describe the different phases of a journey.

From a general perspective, my aim was to produce a stereo piece whose frontal listening would be as immersive as when we stare at a large painting of

Rothko⁷⁰ and are overwhelmed by vibrating colour—a sensation that is almost tactile. I also wanted the piece to communicate proprioceptive sensations of gesture in reference to the inner swarming of coloured patterns of some of Pollock's works.⁷¹ This piece was the opportunity to investigate how the visual embodiment of bodily felt sensations of gesture, space and texture could be transferred musically into a stereo acousmatic piece. My aim was to compose a journey that starts from darkness—that is to say from the depths of a tormented night—to reach light, as the emergence of a dawn that dissipates the demons and the nightmare.

2.1.2.2. The use of transmodality

I started to connect the imaginary realm of this initial framework to my personal living experience in the environment in order to draw from memory the physical sensations I experience when I slowly or suddenly pass from a dark environment to a brighter one. For instance in the cinema when the lights are suddenly turned on, or when I open the curtains of my room, or waking in the middle of the day after a nap. I was able to form lists of the most common related qualia, proprioceptive and multi-modal sensations by forming an inventory of situations when I could experience a total absence of light (like in the basement of a building, when lying in bed before falling asleep, or simply closing my eyes and covering them with my hands), and also situations when one can experience intense brightness (looking at a bright sky, the reflection of light in glass, observing the horizon of the sea or a flat landscape under dazzling sun, or staring at a light bulb or a fire).

⁷⁰ Figure 9.

⁷¹ Figure 8.

	Qualia	Proprioceptive/ multi-modal sensations
Darkness	Disorder	Black colour
	Narrow space	Sensation of a muddy texture produced by the action of pressing our fingers on our closed eyelids)
	No-control	Sensation of heaviness
	Mystery	
	Unstable motion	Endless spinning
	Insecurity	movements
Light	Transparency	Aquarelle
	Brightness	Shiny glass
	Vastness	Points of pastel colour
	Airy	Light colours
	Reflection	Drops of water
	Slow and smooth movements	Explosion
	Safety	Bubbles / Fizz

Table 3. This table gathers a customised vocabulary based on how I mentally connect darkness and light to particular qualia and multi-modal sensations.

At this stage of the project, the aural dimension of the piece was still not precise but I used these transmodal associations to roughly connect the idea of darkness to slow speeds, low frequency ranges, and the tactile sensation of friction, while I connected the idea of light to high frequency ranges, tight granular textures and breathing sounds. Still at this stage I had difficulty in transferring this strategy into a strong sonic identity for the work. Connecting this extra-aural dimension of the project and material did not present immediate answers. I decided to switch angles and work on the structure of the piece.

2.1.2.3. The structure

Despite having a clear idea of the general form of the piece—namely the journey from darkness to light—the inner structure of the piece was not clear. To resolve this issue, I detached myself from the initial table and reflected

imaginatively on the concept of darkness and light. This led me to search into folk stories and mythologies. My abiding interest in Greek mythology and its imaginary realm, where natural phenomena are embodied in stories through figures of gods and goddesses, led me to connect my project with the myth of Nyx, the goddess of the night, born from chaos. It describes how night turns into day: every day Nyx leaves the underworld to draw a dark veil of mist across the heavens to bring night to the world, while her daughter Hemera, the personification of day, scattered the mist to bring daylight. The mental images I associate with this myth helped me to structure the piece in three parts. I thus linked the idea of darkness to the mental image of night and the underworld. I then imagined the core of the piece as a veil moved by the wind across the sky to reveal more and more of the emerging daylight, like Nyx's veil of mist receding from the sky to bring dawn. The application of the myth was a strong catalyst. It enriched the project at an imaginary level and invited me to establish clear connections between bodily sensations, sections of the piece and sound materials or sonic features. This is described in a new table.⁷² Moreover, alongside the myth, I felt it necessary to employ a couple of visual images (schema, painting or photography) during the manipulation of sounds and composition of the piece as tools to trigger and remind me of the bodily sensations I particularly wanted to emphasise.⁷³

⁷² Table 4.

⁷³ Figures 8 to 12

	DIMENSION ONE Qualia	DIMENSION TWO Mental images	DIMENSION THREE Inspiring pictures	DIMENSION FOUR Sound materials	DIMENSION FIVE Sonic qualities
PART ONE Darkness Underworld (0'00-1'18)	Chaos	Black colour	Figures 8-10	Voices	Low frequency
	Continuous / unstable motion	Muddy texture	Figures 10-11	Shaking of a film sheet	Circular movement
	Dark colour	Rolling sensation		Cello	
	Mystery	Torment		Trumpet	
	Fear				
PART TWO Drawing a veil of mist across the sky (1'18-5'19)	Struggle	Wide movement	Figure 11	Trumpet	A mix between the qualities of part 1 and part 3
	Vastness				
	Airy				
	Reflection				
	Slow and smooth movements			Voices	
PART THREE Emergence of the dawn (5'19-10'34)	Transparency	Soft sunshine	Figure 12	Violin pizzicato	High frequency
	Brightness	Drops of water glass		Wind	Granular texture
	Safety	Pointillism		Percussion	Twittering
	Humidity	Pastel colours		Breath	Lightness
	Airy	Bubbles / fizz			

Table 4. This table features the multi-dimensional frame I elaborate for Nyx.

I used these five following images as inspirational triggers during the compositional process of *Nyx*.



Figure 8. POLLOCK, J., (1947) *Reflection of the big dipper*, canvas (111 x 91.5 cm)

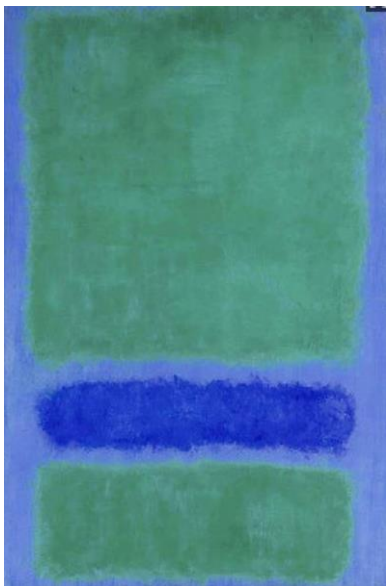


Figure 9. ROTHKO, M., (1968) *Green, Blue, Green on Blue*, canvas (102.9 x 67.3cm)



Figure 10. SOULAGES, S, (1979) *Diptyque 29 juin 1979*, canvas (202 x 453cm)

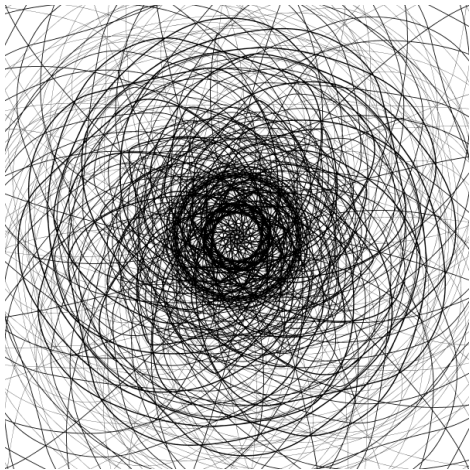


Figure 11. Graphic design (unknown source)



Figure 12. VIEL, V., (2015) *A blooming garden in Leicester*, photography.

Images	Related sensations
Figure 8. (POLLOCK, J., (1947) <i>Reflection of the big dipper</i> , canvas)	The sensation of being in an environment out of time, where everything is disorganized and moves chaotically
Figure 9. (ROTHKO, M., (1968) <i>Green, Blue, Green on Blue</i> , canvas)	The illusion of a space that expands the limit of the Left/Right speakers: it invites me to work on the phases of my sound materials to create the illusion of immersion.
Figure 10. (SOULAGES, S, (1979) <i>Diptyque 29 juin 1979</i> , canvas)	The sensation of being immersed in a deep black environment, the brush marks evoke the sensation of irregular relief I would like to give to the first seconds of the piece.
Figure 11. Graphic Design	(the function of this image is dual) The sensation of spinning movement, regular, increasingly faster with smaller gestures. The sensation of overwhelming and chaotic spinning gestures.
Figure 12. (VIEL, V., (2015) <i>A blooming garden in Leicester</i> , photography)	The sensation of lightness, the presence of colourful points of colour that punctuate the delicate garden.

Table 4. This table describes the array of sensations I aimed to explore musically. Each relates to a particular picture.

2.1.2.4. The elaboration of sound materials

The sound materials used in *Nyx* were newly created for the work. They vary in nature, falling into different categories, as listed in *table 4*. The first is made up of sound materials produced by manipulating various physical sources. These include recordings of me playing with the strings of a piano to obtain resonant sounds, use of percussion instruments to obtain low impact sounds, and the sound of a slowly shaken film sheet that I performed to obtain gestural oscillatory spectromorphology. The second category was created through collaboration with instrumentalists. My aim here was to explore how the use of extra-aural media as triggers of bodily sensations and imagination employed in my compositional process could be used as a method to guide and inspire the improvised sequences performed by instrumentalists, namely cellist Audrey Riley and trumpeter Dr. Rick Nance. Our collaboration started with discussion of my research, the topic of my piece and what would be their contribution to the final music. I asked them to improvise three musical sequences based on three of the five pictures (*figures 10, 11, and 12*). The idea was to invite them to embrace the flow of sensations the pictures transmitted to them, and to attempt to express those sensations through their instrument gesturally and sonically. Both Audrey and Rick asked to play two times for each picture such that the first sequence was like a test, an exploration of how they reacted bodily, sonically and imaginatively—it seemed to be a way to attune to the picture. The first attempt was either very short (thirty seconds) if they indicated they were not inspired, or very long (more than two minutes). The second attempt generally was like an improved version of the first attempt and a sound or a feeling they enjoyed and wanted to develop. Rick and Audrey were more inspired by *figure 11* than by the others, although their reactions were different. For example, Audrey told me that she tried to structure the second improvised sequence on the *figure 11* as a story, imagining herself as being one of the lines of the geometric pattern. Despite the fact that these recordings provided me with interesting sound materials containing strong sonic gestures, my aim was not to use these sequences intact. Instead, my intention was to extract from these improvisations short movements

or sequences (between one and five seconds) that would afterwards be processed and mixed with other sounds. A key aim was to remove any clear anecdotal reference to the timbre of instrument. As an example, the beginning of the piece *extract_01_chapter_04* (from 0'04 to 0'17) is composed of processed cello materials, *extract_02_chapter_4*, combined with the shaking of the film sheet, *extract_03_chapter_4* and samples of recorded voices.

The third sound category is that of vocal sounds, of which there are of two types. The first is used as material to create abstract sequences of granular sounds comprising male and female sources. I used and transformed these sounds as agents for sonic enrichment at particular moments of the piece *extract_04_chapter_4*, and to suggest a subtle human presence shadowing the human embodiment of the figures of Nyx and Hemera. To do so, I asked two people, Evi Manola and Dimitris Savva to read an excerpt from a Greek text that describes the myth of Nyx. The stressed consonances—a characteristic of the Greek language—fitted my purpose perfectly. The second type corresponds to vocal sounds that reference various mental states. My aim was to record someone who would be able to vocally improvise to express particular types of feeling such as sadness, happiness, exhaustion, fear, surprise, release, anger or shock without identifiable words.

To do so, I collaborated with Brona Martin who was able to express all these emotions sonically—through different types of cry, unvoiced utterance, breathing and various onomatopœia, *extract_05_chapter_4*. This collaboration was based on verbal direction, without the previously employed visual stimuli.

Contrary to the first type of vocal sounds, which are not clearly recognisable as such, the processed version of Brona's vocal sounds retains the initial expressivity of her vocal gesture which I used to colour the sequence with an emotional touch aiming to call on the listener's ability to imaginatively connect what they hear to their experiential knowledge. Moreover, by composing a sequence, *extract_06_chapter_04* (from 0'30 to 1'05) made of sounds of breath and voice featuring a strong spatially dynamic human presence, my aim was to imaginatively represent the sensations of fear, torment and mystery that I related

to the experience of darkness. When I composed this sequence, I imagined that Nyx was keeping humans in the dark, within the chaotic torments of their own dream—a sort of moving dark matter.

I processed my sound materials in such a way that no sound sources could be recognizable. I chose bits of the sequences I recorded based on the gestural energy, involving spectrum, motion and texture qualities. The fact that my initial materials were very diverse, instrumental, vocal and concrete offered me the chance to mix them in order to shape rich and beautiful textures. I processed my materials at different stages, I first processed each sound material individually, using mainly filter, pitch shift, reverb and delay from GRM Tools. When I started to mix different sound materials to obtain complex sound objects or textures, I used Shuffler by Waves and other tools to change the pitch and to filter my sounds.

2.1.2.5. The composition

The methods outlined above were successful in supporting the composition of the two outer sections of the work. Yet a middle section remained strangely obscure, as I felt that drawing a straight trajectory from darkness to light was not a sufficient solution. This was a problem of the overall form, which I sought to resolve using visualisation, and for which I produced two possible ways forward, as in *figures 13 and 14* below.

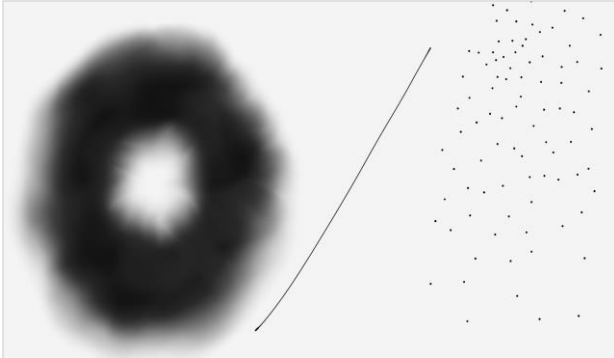


Figure 13. This sketch is a first attempt to represent the structure of the piece:

- the design on the left corresponds to the first part of the piece
- the line in the middle represents the second part of the piece
- the design on the right corresponds to the third part of the piece.

On this sketch, the x axis refers to time.



Figure 14. This sketch is a second attempt to represent the structure of the piece. The x axis refers to time, the y axis to frequency. The left side emphasises the chaotic aspect of the first part, occupying the domain of the low frequencies, while the right side emphasises the lightness and airy aspect of the third part, which I locate in the high frequency domain. In this schema, I started thinking of the second part as a transitional state between parts one and three.

Underpinning these visualisations was the question of how I could imagine and musically embody the idea of “drawing a veil of mist across the sky” as the axis of the work’s design. I began to draw a series of schema that expressed the waving shape of a cloth in different forms. Since this helped me to imagine visually the middle part of the piece, that is to say an illusionary oscillatory motion or the volume of waving shapes.

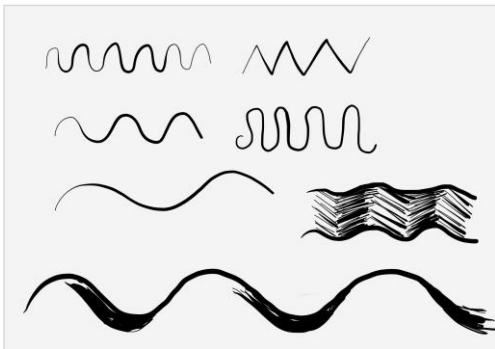


Figure 15. The x axis refers to time, the y axis has to be divided in four independent axis, each corresponding to the frequency domain of each vertical level of this image. The curves displays how some sounds could spectrally evolve through time.

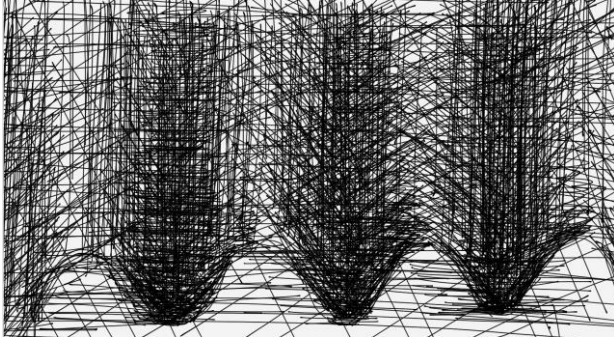


Figure 16. This sketch is a mental representation of the texture of a veil that oscillates between opacity and transparency. The way I mixed sounds that compose the beginning of the piece is based on an alternation between darkness and light, without a clear boundary between them. All sounds are tightly connected, they merge to create a dense texture that evolves spectrally through time. The *x* axis refers to time, like *Figure 6* this sketch is a snippet, of a particular moment, the *y* axis does not refer to a particular sonic parameter.

With regard to the myth, the veil appears more and more as a moving border, either opaque or transparent, revealing, hiding or superimposing two sides. Slowly I started to imagine the piece not as composed of three different parts but instead as being an alternation of the different ways darkness and light interact—either merging, confronting each other or dominating one another. The veil appears as an invisible wavy line that would allow us to progressively leave the darkness to embrace light, following the irregular movement of the wind. In the musical domain, I related this idea to a smooth passage from one sound sequence to another, whose mix would create changing and moving spectromorphologies.

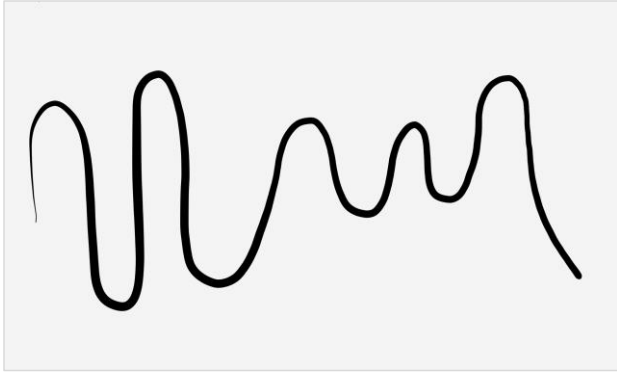


Figure 17. This sketch illustrates a line that would potentially direct the transition between darkness and light. Here the x axis refers to time, the y axis refers to the sensation of light that I associated to the frequency range. The top of the axis refers brightness and bottom to darkness.

The sketch, *figure 17*, led me to imagine how the piece would be structured, alternating darkness and light in different ways as *figure 18* displays.

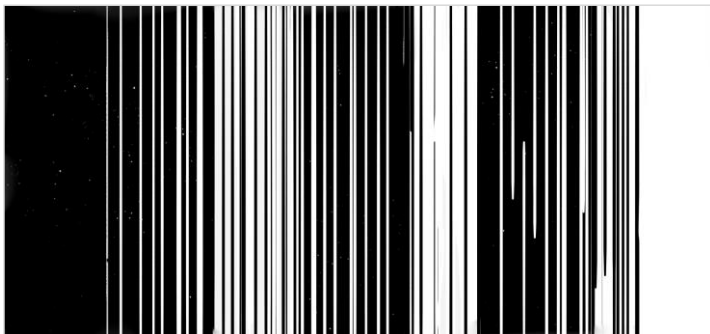


Figure 18. This image represents the final structure of *Nyx*, an alternation of darkness (black strips) and light (white strips). The x axis refers to time, the y axis does not refer to any specific parameter.

2.1.3. *Danse macabre* (2016)

2.1.3.1. The start of the project

This project emerged after the November 2015 terrorist attacks in Paris and the death of my grandmother. My aim was to communicate particular emotions, a story and to explore the ideas of death, despair, terror and sudden emptiness. I also wanted to explore the slow emergence of a new life that results from the metamorphosis of one's state of mind before and after the announcement of a death: from emotional void, to remembrance and the hypothesis that consciousness of the dead has reached a spiritual state of existence. My first source of inspiration was from the old funeral rituals taking place in France and funeral iconography describing the relationship between death and the dying, such as the allegory of the 'danse macabre'—the dance of death.

From these ideas I imagined the form of the piece as a continuous transformation from one state to another. Initially I built a list of keywords that would approach the topic of the piece—as with *Nyx* in tabular form—embracing qualia, extra-aural sensations, imaginary mental images, sound sources and sonic features as an aid to adumbrating the development of the work's identity.

DIMENSION ONE Qualia dimension	DIMENSION TWO Mental images based on experience	DIMENSION THREE Imaginary dimension	DIMENSION FOUR Aural dimension (sounds and sonic features)
Inertia	Death	I dreamt of the ghost of an old woman dancing with a broomstick, too fast to be real, she was turning around me, with a disturbing expression on her face	Wood
Stillness	Life		Rhythms
Juxtaposition	Skeleton		Percussion
Sudden change	Terror		Wind sound / wind instruments
Contrast between regularity and irregularity	Army		Bells
Continuous transformation	Sadness	Images of people having their last breath	Racket
Vibrant texture	Fear	A physical body becomes evanescent	Resonance
Motion	Ghosts		Metallic mechanisms / sewing machines
	Thick blood		Military march
	Dirtiness		Religious choir

Table 5. This table features a set of keywords on which is based the early-stage of the compositional process of *Danse macabre*.

This table (*table 5*) invited me to reflect more intensively on the work's message, and this enabled investigation into ways to communicate my expressive intent. Musically, my aim was to explore how I could compose sound sequences using same sound objects that would be in constant motion spatially and in continuous transformation spectro-morphologically. To do this, I took inspiration from Klee's research in his educational writings⁷⁴ and Delaunay's work in particular. Indeed, my reading of Klee invited me to explore what he describes as the principle of transformation of form and the dichotomy between statics and

⁷⁴ KLEE, P. and SPILLER, J. (1961) *Paul Klee - notebook. [vol. 1], Thinking eye*. London: Lund Humphries.

dynamics. It led me to imagine the piece as a slow evolution from a static to a dynamic state. The works of Delaunay and the techniques he used to represent the motion of colours involved in a rhythmic process, as something almost musical, helped me to reflect on the sound materials and how I could transform texture, space and motion. Notwithstanding this plan, I organised my thoughts and divided the piece into different parts according different atmospheres.

PART ONE	PART TWO	PART THREE
Kingdom of the dead	Surreal dance life with death	Attempt to rebirth
Spirits, ghosts, despair	Deceitful atmosphere	Tense atmosphere
Wind	Voices	Strong percussion
Febrile movements	Cohabitation of strong gestural movements and fragile ones	Suggestive military march
Difficulty to move	Disorganisation	Judgment - fatalism
Narrow frequency range	Frequency range starts to open	Wide frequency range
Breathing sounds	Soft percussion	Something is approaching
Large space	Narrow space	Pain
Nothingness	Dichotomy between immaterial and material worlds	Sensation of physicality

Table 6. This table is a second-stage proposal to structure *Danse Macabre*.

2.1.3.2. The sound materials

My final decision concerning the sound materials used relied on their evocative ability to suggest a human presence. The sound materials of the piece are mainly based on old recordings: a cello, sewing machines and voices. I re-used samples of the recording sessions I did for *Nyx* (cello sounds performed by

Audrey Riley and vocal sounds performed by Brona Martin and Dimitris Savva). New sounds were also recorded: I improvised with a recorder to create very delicate sounds evocative of a soft, fragile and unsure touch. I also asked a percussionist Giorgos Stavridis to improvise a couple of sequences. During our session, I asked him to improvise various rhythmic sequences inspired by *Prismes électriques* (figure 19) then by the picture of a fox walking delicately on the snow and, for the last sequence, I asked him to reflect on his conception of military music in order to produce a sequence that would have a solemn nature. In the second half of our session, I gave him the picture of a fox in a snowy landscape (figure 20) on which he freely improvised, following the same process as the instrumental improvisations recorded for *Nyx*.

While I was collecting all my materials, I was thinking of how I could process these materials based on tables 5 and 6). Most of my sounds were filtered, stretched and pitched using my usual tools (GRMTools, Audiosculpt and the Waves Plug-ins). However, I did not process all instrumental and vocal sounds as much as I did for *Nyx*. Instead of composing dense textures which barely evoked any sound sources, *Danse Macabre* features sounds whose connection with the initial sound sources is not fully broken, the processed sounds keep an evocative touch to the physical world. A large part of the sound processing consisted in carefully adjusting how sounds would mix together, using filters, amplitude curves and panning.



Figure 19. DELAUNAY, S., (1914) *Prismes électriques*, canvas (250cm x 250cm)



Figure 20. Image of a fox in a snowy landscape. (unknown source)

2.1.3.3. The composition

The compositional process for this project proved difficult. The first difficulty concerned my aim to musically translate Delaunay's and Klee's ideas. This led me to confront obstacles similar to those met in the composition of *I belong to the sea*—I felt stuck and dissatisfied. I was not able to translate musically Klee's and Delaunay's graphically embodied sensations of rhythmic motion through elaborate constructions of coloured patterns. While their techniques were clear to me visually, I could not find a way to produce the same sensation musically. Each sequence I produced did not succeed to evoke similar

sensations in me. The motion within my sound sequences seemed too overwhelming, and I felt I was not in control of what I was hearing. A second difficulty concerned the emotional charge of the project—I was frustrated by my incapacity to find a way to express particular emotions. I reflected that the emotions I felt were actually related to my capacity to project my own desire to feel them while listening to particular sequences. For me the composed sequences were not reflective of the emotive charge that inspired them. Thus, as I worked on the piece, I progressively detached myself from my initial intentions and worked without specifically attempting to chase the feelings of despair, death and rebirth, or at least in terms of the way I felt them emotionally.

2.1.4. Remarks at the end of this first stage of my research

From a general perspective, *Danse Macabre* marks a turn in my thesis. The disappointment I felt towards this piece led me to draw some conclusions. The first one concerns the difficulty in building a bridge between visual and aural domains, since they reflect temporal perception differently: fixed images are evocative of time while the essence of music is temporal. As a consequence, attempting to transpose visual features is complex and can be unclear and confusing. The second issue concerns my intention to infuse my projects with an emotional charge. Therefore, the second part of the portfolio moved away from this kind of approach. Moreover, while these three pieces examined ways visual abstraction could inspire musical composition and draw bridges between sound and multi-sensory mental images, my aim for the other half of the portfolio was to explore other ways similar connections could occur, enrich further my compositional method and develop ideas for the deployment of visual analogies to facilitate the evocation of qualia in a piece.

2.2. Second stage of the portfolio

2.2.1. *Uni-vers(e)* (2016)

2.2.1.1. The start of the project – the singularity of the dome

Uni-vers(e) is a multi-channel piece initially composed for a dome of speakers. The dome is a surround setup offering the potential to design an immersive experience beyond many of the capabilities of stereophonic and single plane multichannel spaces such as 5.1 or circular 'ring' configurations. This piece explores the sensation of being bodily immersed in a virtual sound environment 'orchestrated' in such a way that the free positioning of the audience within the diffusion space replaces the more traditional frontal orientation of the audience. The idea of working in such an immersive environment brought me to the mental image of the cosmos. To that end, *Uni-vers(e)* was conceived as a virtual experience in which a listener witnesses the birth of one universe from the inside. For this purpose the dome appeared ideal to rethink my conception of space in composition. While my previous pieces were inspired by painting and theories developed by Kandinsky and Klee in visual abstraction, featuring different ways to compose space, *Uni-vers(e)* follows another path, aiming to abolish the physical and perceptual distance with sounds that we generally feel when the speaker set-up is focused on a frontal image. The potential to create immersive experiences of virtual environments invited me to see spectromorphology as a tool to shape the enveloping space and offer singular perceptual experiences of space. I envisaged such a space as one where motion and gesture are immediate and bodily perceived by listeners as proprioceptive sensations of motion and space akin to experience in the living environment. By allowing listeners to move freely in the performance space, the location and motion of other listeners around them could be considered part of the spatial experience itself.

2.2.1.2. The imaginary and multi-sensory dimensions of the project

When I started this project, I was also led by another purpose, a metaphorical one. I wanted to find ways to describe how a relationship between two people can pass through different stages and change the protagonists over time. I started by associating the two people to two different types of lines (figure 21): one thick, long, slightly curved (A), and the other one (B) as thin, shorter and flexible. Musically, I associated A, *extract_07_chapter_4* (from 0'19 to 0'27) with low frequency sounds, behaving like a stream with very few morphological or spatial changes communicating the proprioceptive sensation of heaviness, slow motion, hard flexibility and grounded on the Earth, while B, *extract_08_chapter_4* (from 1'15 to 1'22) would correspond to the sounds located in the high frequency range, giving the sensation of lightness, speed and mobility, *extract_09_chapter_4* (from 0'47 to 1'11).

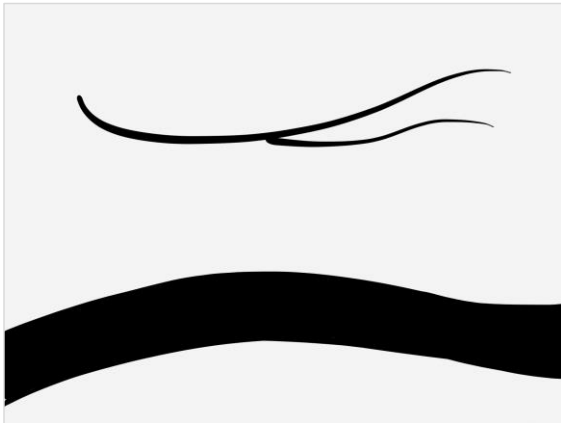


Figure 21. This picture illustrates how I imagined the mix of the entities A and B. The x axis refers to time, the y axis refers to the frequency range while the thickness of the lines corresponds to the sound amplitude. Here the low frequency stream is dominant and lasts longer than the high frequency streams.

I imagined the structure of the piece as a succession of different stages in the relationship—from the encounter to the dialogue, the disagreement and finally the surrender that leads to a state of uncertainty. I associated each part with particular mental images I wanted to explore through composition, namely qualia, quality of motion (motion-quality) and spatial sensation.

	Qualia	Motion-quality	Spatial sensation
PART ONE The encounter	Emergence	Slow	Wrapping
PART TWO The dialog	Soft touch	Slow-medium fast	Blend
Part THREE The disagreement	Attack	Hectic	Bits
Part FOUR The surrender	Disintegration	Slow	Decay

Table 7. This table features the set of mental images I associated to each part of *Uni-vers(e)*.

2.2.1.3. The notion of texture : composing is knitting

As I started to choose my sound materials, I quickly noticed that the processing of sounds located in the low frequency region would not provide a sound pool as rich and varied in terms of motion, typo-morphology or space as the those located in the high frequency range. Indeed, the fact that the human ear is unable to detect as much localisation detail in the low frequency range as it does in the high frequency range was crucial to determine the way I would compose each part of the piece. Thus, I decided to give up an initial idea, which was to equally employ sounds located in the high and low areas of the frequency range. Thus I reflected more closely on the nature of each section, investigating how their overriding individual themes (for example peace in part two, conflict in part three and abandon in part four) could be spatially and spectromorphologically embodied in terms of energy. Since I associated the notion of energy to the quale of a particular atmosphere and to the multi-sensory quality of an environment, I ended up by seeing the space of the dome as the physical framework. In this framework I conceptualised energy states as threads

of particular qualities of an atmosphere in which they could converge and interact. I imaginatively connected these two aspects as the nibs of two different coloured pens whose relationship on the paper would draw three unique textures, corresponding to each part of the piece. This is how the notion of texture came naturally to my mind as the solution to explore three different aspects of the relationship between the two entities.

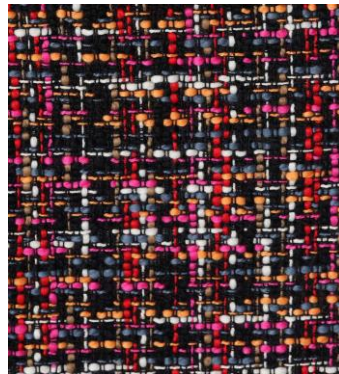
Generally I do not relate the notion of texture exclusively to tactility, connecting it instead to a wide range of instances in which different threads are intermeshed. In that sense the notion of texture is complex, from the micro scale, viz. the yarn and individual points, to the macro scale of pattern and the overall form. This way of viewing texture embraces the practice of drawing, knitting and musical composition. In fact I consider acousmatic composition as a process of knitting sound materials in order to obtain particular patterns, in terms of tactility, spatiality and motion-quality. Similar to a couturier, who employs particular yarns to create particular patterns and constructs a unique piece of cloth, I organise my sound objects, sonic patterns and sequences into a coherent form. For instance, close observation of a piece of cloth can highlight many features, like the tactile quality of its materials (for example the roughness of wool or the softness of silk), the size of the yarns, their colours, the quality of the weave (tight or slackened), the size and shape of each knot (for example big, small, round or square), the way the different yarns intertwine and create a particular pattern of thin and thick strokes and also how their intertwining can also create new coloured tones. The following illustrations feature different types of weaved texture that inspired me to imagine ways to mix my sound materials in the creation and shaping of textures.



Figures 22 and 23. These two pictures show textures that may procure different tactile sensations.



Figures 24 and 25. These two pictures show two different patterns (wool knitting).



Figures 26 and 27. These two pictures show two different ways to compose colourful patterns.

2.2.1.4. Texture and Pointillism

During the compositional process of *Uni-vers(e)*, my research on texture led me to connect with the visual art technique of pointillism. This technique explores how spatially proximate coloured spots can blend and produce new colours that do not exist concretely on the surface of the painting whilst also creating an illusion of space and depth. This is closely analogous to granular synthesis-based time stretching of sound which frequently produces a kind of reverberation effect through micro delays and spatial decorrelation. Close examination of a pointillist painting reveals its individual dots, whereas they blend into a new colour when we distance ourselves from the painted surface. The way Seurat used this technique was particularly inspiring to my project.

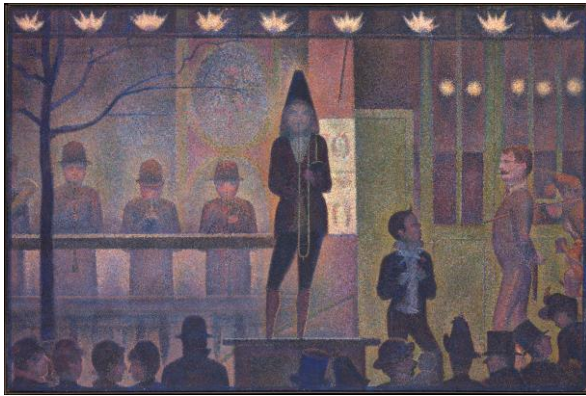


Figure 28. SEURAT, M., (1887-1888) *Parade de cirque*, canvas (99,7cm x 149,9cm)



Figure 29. A detail of the painting above (*Figure 28*).

2.2.1.5. Implementation of the notion of texture in *Uni-vers(e)*

As the idea of associating a particular texture with a particular part of the piece grew in my mind, I examined how each texture could musically inhabit the dome space and how they might communicate a set of bodily sensations. Since the way I would compose the first part (the encounter) was clearly associated with an intertwining of lines, I explored how it might look. The following illustrations describe my search for different types of *texture* (figures 30, 31, 32, 33). Although they did not refer concretely to the dome, or particular temporal or spectral qualities, these visual representations were key in my compositional process, inviting me to reflect on the general sensations of tactility, motion and space, giving rise to the following table of relationships for parts 2-3 and 4 accordingly.



Figure 30.



Figure 31.



Figure 32.



Figure 33.

Figures 30, 31, 32, 33. These four sketches are attempts to visualise different sonic textures and ways to intertwine sound objects.

Figure 30. It displays the morphological evolution of a stream over time. The straight lines refer to a sharp and permeated sonic texture. The *x* axis refers to time but the *y* axis does not refer to any sonic parameter. The thickness of the lines refers to amplitude.

Figure 31. This sketch is a snippet, like a photograph taken at a particular time showing texture as composed of short sounds whose thickness corresponds to amplitude. Each line is a sound object, whose comma shape represents its pitch trajectory on the *y* axis. The length of each line refers to its duration. The *x* axis does not refer to time.

Figure 32. This sketch is a spatial juxtaposition of different pitched sounds. It is a snippet, featuring the dome space from above. The *x* axis refers to left and right and the *y* axis to the front and back of the listening area. Each coloured area is spatially defined and associated to a particular pitch. This sketch is inspired by pointillism.

Figure 33. The *x* axis refers to time and the *y* axis refers to frequency. The round and spiral quality of the lines expresses the repetitive quality of each sound. The thickness of the lines refers to amplitude. The thickness refers to the amplitude.

Musically, the exploration of the notions of tactility, motion and space in my project led me to naturally think of composing music for a surrounding space where I could use the distance (proximate or distant), the spatial positioning and motion (precise localization or sprawl) in a different way than for a stereo piece. My aim was to make listening experience of music similar to a listening experience in the outside environment. For this project, I chose to use sound materials I collected from previous projects only. For a first approach to a multi-channel sound system, like the dome, I felt more comfortable using stereo materials than using multichannel sound recordings. Practically when I composed this piece, I was mainly working in a 16-channels studio as I could not work in a dome studio call day long and every day until the end of the project. Thanks to the application Zirkonium moving from a 32-channels to a 16-channels was easy. All actions on my materials like editing, processing were done in stereo, using various filters, pitch shift, time stretch and other processes available on Audiosculpt. When most of my materials were ready to compose a sequence, I positioned them spatially, on the multichannel setup. That stage was also a time to test how their superimposition in space and spatial movements I imagined on paper would work. Despite these sounds were abstract, without any connection

to their sound sources, I felt the necessity to apply automated filters curves each time I drew a movement in space to give to these sounds a natural quality inspired by my own experience of listening to the environment. I aimed to offer to listeners a piece whose spatial and motional qualities would echo to their own experience of motion and space in the outside world. To achieve this, automated curves of reverberation, filters, pitch and amplitude drew live in Reaper were essential.

	TEXTURE CATEGORY ONE	TEXTURE CATEGORY TWO	TEXTURE CATEGORY THREE
Tactility	Smooth	Iterative	Smooth
Pace	Slow	Hectic	Variably fast
Visual images	Lines like slow waves	Under the rain	Arabesque - Tempest
Trajectory	Linear	Downhill/Uphill	Curved
Space	Peripheral – Movement is around us	Complete immersion	Alternation between peripheral and immersive
Visual proposal for texture	Figures 31-33	Figure 30	Figure 32-33

Table 8. This table features keywords used to describe three types of texture.

2.2.1.6. Composing for a dome of speakers

Thanks to the multichannel studio of 32 channels located in the facilities of the Université de Montréal where I composed this piece, I was able to experiment with different ways to compose, position and articulate sounds in space. The size of the dome–space invited me to imagine it as an organic being, an entity in motion that passes through different motion and spatial states, providing listeners with different spatial and textural qualia. The spatial composition of *Uni-vers(e)* was not supported by particular sketches, instead it was conducted by the mental images triggered by the spectromorphology of the sounds I used and shaped. The piece essentially displays alternations of

musically evoked environmental experiences—featuring proprioceptive sensations of being wrapped up by a sonic texture in motion and experiences where the spatial trajectory of sound materials can be precisely localised and followed. For instance, the sequence from 0'05 to 0'45 is relatively still, unfolds its dense texture slowly through space like the spread of fog. Another example is the sequence from 5'11 to 5'34, featuring morphologically granular sound materials whose superimposition and high density may evoke a strong sense of rain drops falling on us, while the sounds in the sequence between 6'37 and 7'14, features sounds that are easily localisable.

2.2.2. *An Ocean on the moon* (2017)

2.2.2.1. The start of the project

An Ocean on the moon is a multichannel piece, composed for a 16 channel system that recreates the shape of a dome in order to offer an immersive listening experience. The sea is the central topic of this project. When I started it, my perspective on the sea was very much influenced by all mental images I had in mind, like the joy of being rocked by the waves, the fear of drowning, the contemplation of its beauty or the experience of living on the seaside. However I wanted to directly use my bodily experience with the sea and the experience of living on the seaside as my main source of inspiration to compose the piece, rather using only early memories or my imagination. That is why I decided to live and compose most of the piece in the city of Corfu.

When I started the project, I decided to record various types of materials, sound, videos and photos in order to find a angle to attack my piece. I spent time wandering in the city of Corfu and on the seaside at different times of the day to record different atmospheres within the city and to also film different types of motion, texture, trajectory and colour displayed by the sea. As I accumulated pictures and video clips⁷⁵ and repeatedly reviewed all of them, I started to

⁷⁵ See: list of video clips : Chapter 6.2. Video clips: Folder n_2, p.11

connect each of them to particular keywords, that were in my opinion, representative of their sensory features and qualia. This led me to build the following table gathering these features (some are repetitive).

Sensory features			Qualia	
Drops	Shimmering	Massive	Fragility	Violence
Streams	Fluidity	Round	Process	Danger
Strong	Transparency	Coloured shades	Disorganisation	Softness
Slow	Protection	Curved lines	Wildness	Cycle
Rolling	Reflection	Silky texture	Craziness	Caress
Wave	Rocking	Temptuous	Safety	Sharp

Table 9. This table features different sensory features and qualia featured in the visual materials collected for *An ocean on the moon*.

2.2.2.2. From the line to the sea

2.2.2.2.1. The line

From this analysis, I noticed that all features could be organised in two different categories, corresponding to different energetic temperaments endorsed by the sea, namely qualia of calm (A) and of violence (B). However, rare were the moments when I could perceive a continuous violent or calm energy from its beginning until the end of the recording. In fact, the sea movements were very much similar to a breathing pattern, a sort of oscillation between calm and violence. Inspired by my observations, I took a pen, a piece of paper and let myself dive into the realm of my imagination where I reduced the sea to a phenomenon of pure motion.

The geometric point is, according to our
conception the ultimate and unique union
of speech and silence ⁷⁶

Any action, any trace, any sketch starts with the mark of the nib of the pen inking the paper: A point. A point is ambivalent and contextual, beyond its apparent stillness, it promises an upcoming change, the emergence of a solution. While it can signify a birth, a beginning, a salience emerging from the void, it can also attest a stop, a conclusion, a decay, a death. However, when my pen touches the paper and slides, the leap from the static to the dynamic happens ⁷⁷, like a drop of water falling on the surface of a sea to become the wave, the initial point in a *movement of growth* ⁷⁸ turns into line. It is taken along the motion of life to become line, like a wave which is firstly intimate, expands into the motion of the ocean. So, pen in hand, I sketch, searching in the intimate space of my mind. On the page I wander, in the gradual darkening of the page, the line is my fellow, a connector between the realm of my mental images and the future piece. Sketching seems like improvising, as I move in the space of a moment, a breath, a simple feature emerges, a gesture, a curved line.

⁷⁶ KANDINSKY, W. and REBAY, H. (1979) *Point and line to plane*. New York: Dover. p.13

⁷⁷ Ibid. p.14

⁷⁸ INGOLD, T. (2013) *Making: Anthropology, Archaeology, Art and Architecture*. London: Routledge. p. 132

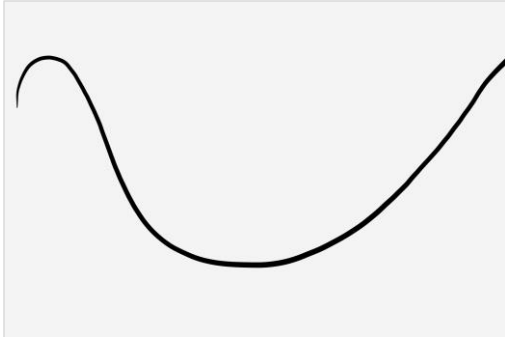


Figure 34. This is a curved line, resulting from a gesture. It is a reductive representation of my mental image of the sea. From left to right, it expresses the temporal motion of the sea. The y axis does not refer to any sonic parameter.

Sketching this line was for me a revealing step because it made me experience proprioceptive sensations that I could relate to a sea wave, like continuity of motion, fluidity, freedom, softness, calm, impetus of expansion. This led me to consider this waveform as the form of the piece and invited me to search how I could consider temporal and spatial dimension of music in relation to this waveform and how I could integrate the opposition between A⁷⁹ and B⁸⁰.

⁷⁹ A : qualia of calm

⁸⁰ B : qualia of violence



Figure 35. This sketch, a variation of the waveform above, uses black and white shades to implement a sensation of space within the abstract waveform. The darker shade corresponds to a proximate space, while the lighter one corresponds to a distant space. The x axis refers to time, the y axis refers to amplitude.

2.2.2.2. Inspiration for a pattern, a sequence

Through sketching, I imagined different patterns that exploit the oscillation between violent and calm moments, like the impetus of the waves and the calm motion of the sea.

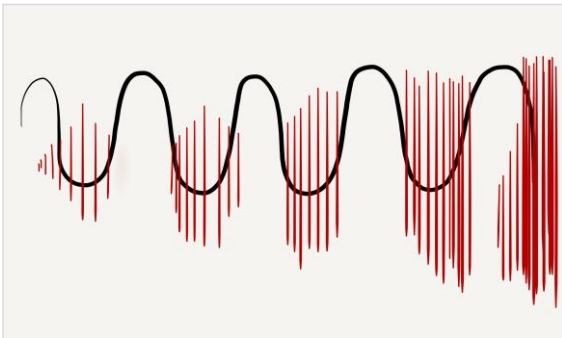


Figure 36. This sketch is a first attempt to represent the “breathing cycle of the waves”. This pattern represents an oscillatory movement between the qualia A⁸¹ (black curved line) and B⁸² (red straight lines) evolving over

⁸¹ A : qualia of calm

⁸² B : qualia of violence

time. The x axis refers to time, the y axis does not refer to any sonic parameters. While the curves evoke a cyclic, evolution, round and soft, the straight lines aim to illustrate percussive, aggressive and repetitive sounds.

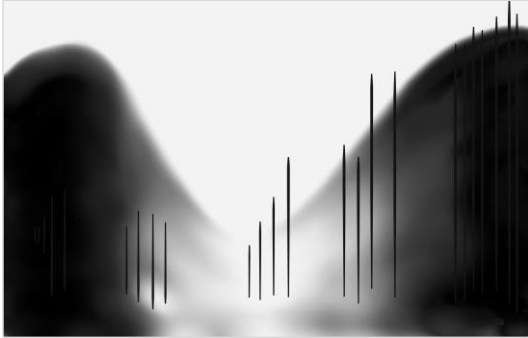


Figure 37. This sketch represents a regular overlapping of B^{83} (black straight lines) on the overall softness of A^{84} (black curved line) over time (horizontal axis). It combines patterns of figure 35 and 36. The length of the vertical straight lines refer to the amplitude, the reiteration (5 times) of this pattern of lines occurs at different amplitude levels.

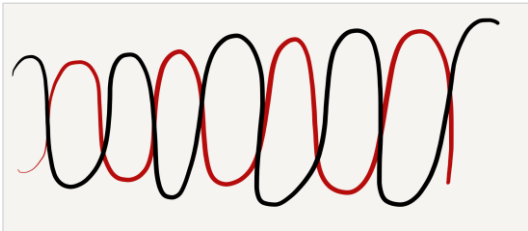


Figure 38. This sketch shows the intertwining of A (in black) and B (in red) over time (x axis). They are complete each other. The y axis refers to the amplitude, the large curves are louder than the smaller ones.

⁸³ B : qualia of violence

⁸⁴ A : qualia of calm

2.2.2.3. First proposal for a structure

I imagined how I could use the visual figure of the wave with the two qualia of violence and calm to structure the piece. This led me to draw a second table to guide me throughout this process.





	Qualia of calm (A)	Qualia of violence (B)
Initial waveform (= each pattern refers to how the energy expresses itself through time, from left to right)	<i>a</i> 	<i>b</i> 
Description of the trajectory of the wave	From the outer to the inner world	From the inner to the outer
	Progression towards a reassuring energy	Progression towards the uncertain danger of the ocean
Mental images (E) that colour the waveform (c-d)	Softness	Tempetuous
	Roundness	Violent
	Rolling waves	Assertive gestures
	Slow rocking movements	Taking risks / danger
	Shimmering	Massive
	Fluidity	Strength
	Lapping	Confidence
Qualia (F) that colour the waveform (c-d)	Curved lines	Messy straight lines
	Being protected Being safe	Being at the edge of a cliff Destruction
Waveform coloured by the mental images above (= each pattern refers to how the energy expresses itself through time, from left to right)	<i>c</i> 	<i>d</i> 

Table 10. Description of the two qualia A and B.

In this table, the two qualia A and B are central, they define clearly the duality of temperament inherent to the sea. The table separates in two the initial waveform⁸⁵, representative of my abstract presentation of the sea, according to their trajectories, downhill (*a*) and uphill (*b*). It also features a panel of mental images⁸⁶ (*E*) and the qualia (*F*) I found the most interesting to use for the project. The bottom of the table features another waveform also divided in two parts (*c* and *d* in the table), each side representing the initial waveform⁸⁷ coloured by the mental images (*E*) and qualia (*F*). The energy expressed by *c* and *d* is complex, it is fragmented in short bits. These drawings display two ways sound materials could interact over time. This table invited me to elaborate a musical structure that is an irregular alternation between A and B.



Figure 39. First proposal to structure *An Ocean on the moon*.

2.2.2.4. The sound materials

This piece features only instrumental and vocal sounds. My aim was to compose a piece made of various textures that would feature different instrumental timbres and gestures: methodical and impulsive. Visually, I imagined the following types of texture.

⁸⁵ Figure 34.

⁸⁶ Table 10.

⁸⁷ Figure 34.

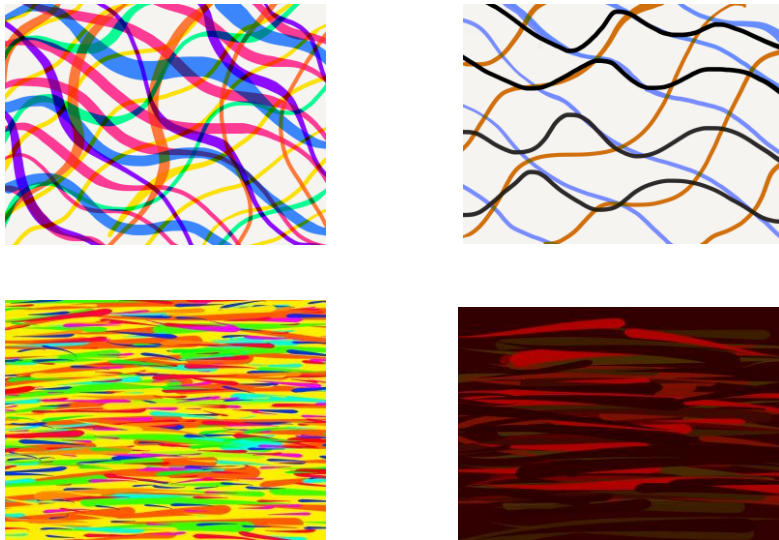


Figure 40. These four images illustrate different textures that I imagined before to start recording the improvised sequences. The x axis refers to time, the y axis does not relate to a particular sonic parameter. These sketches are temporal snippets displaying how 4 different textures, like streams communicating different sensations of movement, density, brightness and colours.

To do so, I chose to collaborate with performers who lived in the city of Corfu or were very familiar with the experience of living nearby the sea: three percussionists, one violinist, one singer, one harpsichord player, one flutist, one saxophonist and one trombone player. My aim was to record series of improvised musical sequences of two kinds, one based on the qualia of calm and the other on the qualia of violence. To do so, I met each instrumentalist individually. Our two or three hour sessions were divided in two parts. Firstly I described orally the general topic of my project and listened to them describing their intimate relationship with the sea, whether they were sensitive to it or not, whether they liked it or not and what feelings they experience when they look at the sea, swim or dive into it. This led me to describe my own perspective and feelings, using some of the video I recorded. As I explained why and how I related each video, or an excerpt, to a particular set of qualia, A or B, I showed them different mind-

maps that I elaborated prior to our meeting. Each one corresponds to a particular sub-section of A or B, it gathers only a couple of mental images extracted from the initial table.⁸⁸

I divided the qualia of calm into three different moods and the qualia of violence into four. These mind-maps were used as a trigger, inviting performers to explore how gesturally⁸⁹ and sonically they could embody the mental images, the imaginary or experienced multi-sensory sensations they associated with each mood. I asked each performer to improvise seven sequences based on these mind-maps. During the recording session of each mood, the instrumentalist had the choice to look at the mind-map and also to play one of the videos representative of A or B. The duration of each sequence varies between thirty seconds and three minutes.

⁸⁸ Table 9

⁸⁹ or a vocal inflexion for the singer.

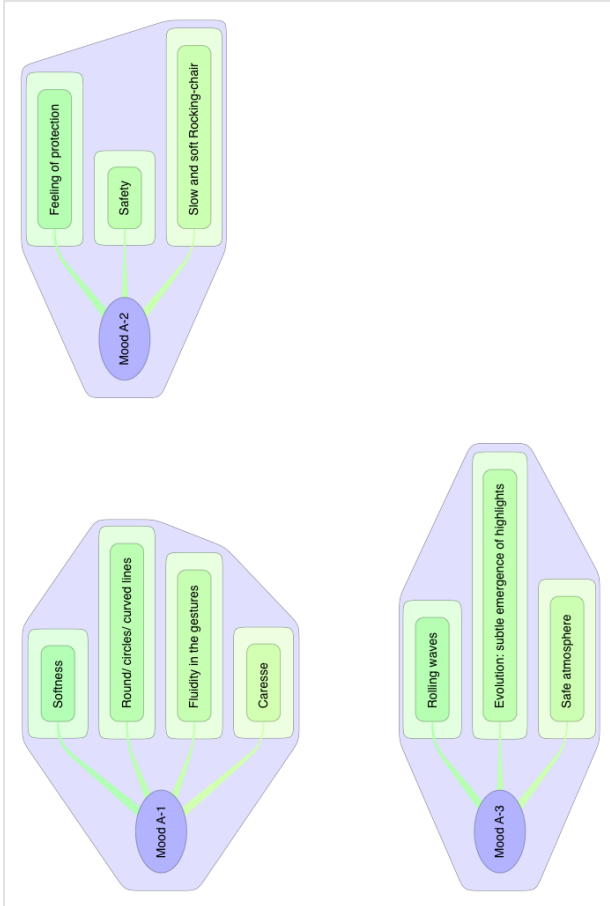


Figure 41. This displays the three mind-maps I used during the recording sessions with the performers. They describe the qualia of calm.

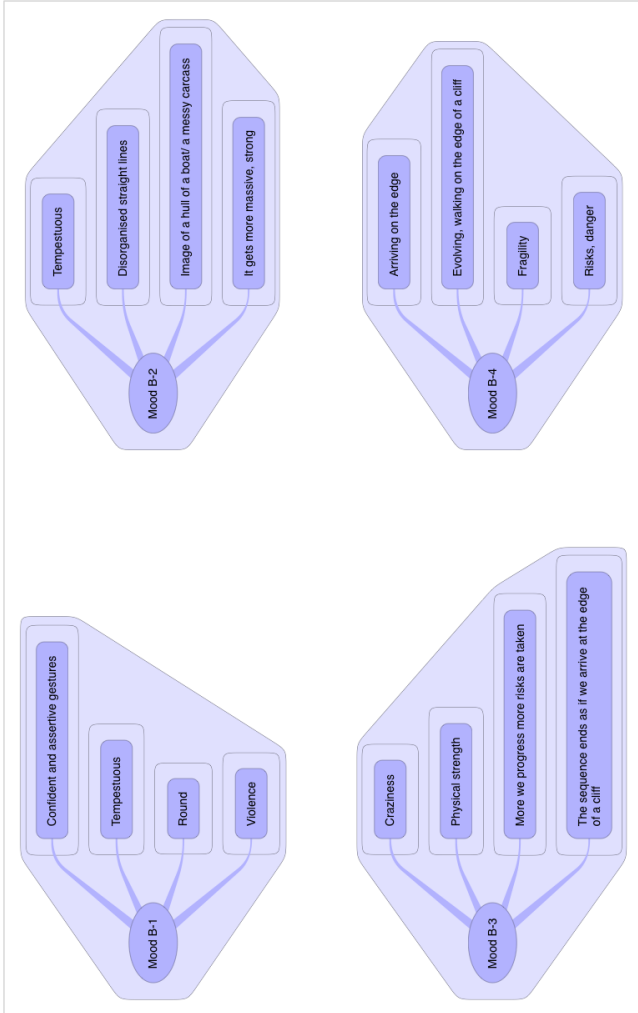


Figure 42. This displays the four mind-maps I used during the recording sessions with the performers. They describe the qualia of violence.

2.2.2.5. The composition of the piece

2.2.2.5.1. Second proposal for a structure

The recording sessions provided me with a significant quantity of sound materials. I created different DAW sessions in Reaper, one each per mood in order to see which energy and sound quality would result from different superimpositions and started composing different textures without applying much sound processing. In this process, I was quickly confronted by different types of gestures regardless of the type of mood. They reflected the greater or weaker fluency of each performer in improvising—some sequences were short featuring expressive, assertive gestures with a strong sound presence (drums, harpsichord, violin and voice) while other sounds reflected hesitant gestures, lack of dynamic and not much expressivity. I used this project as an opportunity to explore a new aesthetic and restrict the amount of sound processing to its minimum in order to explore how different instrumental could interact with one another and create surprising mix. To this purpose, I only used a few effects on my initial sound materials, such as Noise remover, some filters, Pitch, Time stretch, and also very little reverberation. Then I started to mix these different sequences on Reaper, testing different spatial positioning and automating different motion trajectories with Zirkonium. I was also very much influenced by the performer's gestures I could hear within the mix.

While it was necessary to abandon some sequences because the way I designed some movements or their combination with others did not convince me, I was satisfied with others because I could clearly associate them with specific qualia. For example, the combination of different timbres, pitches and gestures, *extract_10_chapter_4* (from 0'40 to 1'44) in some sequences managed to transmit the vision of the shimmering and moving surface of the sea, shiny and colourful. This stage in my compositional process was particularly exciting. The sound sequences I obtained invited me to intuitively rearrange the initial

structure⁹⁰ and refer back to the initial waveform⁹¹ to propose a new structure based on this curved line. Following the idea of a flowing gesture, the new structure describes imaginatively the deployment of the energy-motion of the waves through time. I illustrated this perspective visually through four sketches corresponding to the final four-part structure of the piece, exploring the dichotomy between A and B differently than in my first proposal.⁹² I used this presentation as a guide to achieve the composition of this piece.

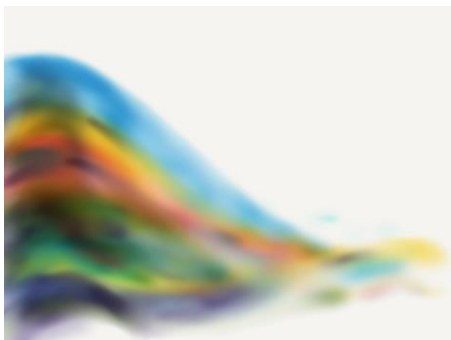


Figure 43. Second proposal of structure of *An Ocean on the moon* – Part One

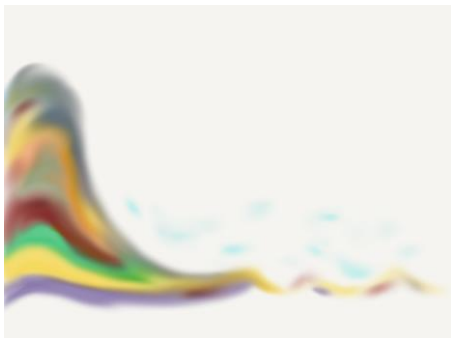


Figure 44. Second proposal of structure of *An Ocean on the moon* – Part Two

⁹⁰ Figure 39.

⁹¹ Figure 34.

⁹² Figure 39.



Figure 45. Final proposal of structure of *An Ocean on the moon* – Part Three

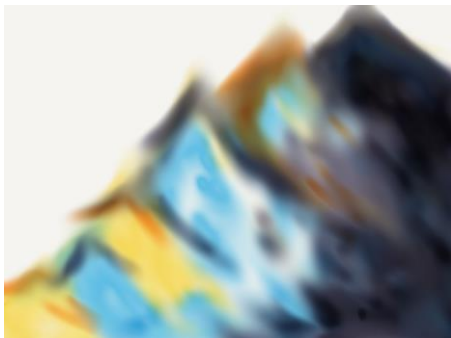


Figure 46. Final proposal of structure of *An Ocean on the moon* – Part Four

The colours used in *Figure 43* to *Figure 46* aim to illustrate the diversity of instrumental timbres I would like to use in these different sections. I chose these colours for their visual aestheticism, away from any synaesthetic purpose.

2.2.2.5.2. From knitting to composing

Similarly to *Uni-vers(e)*, the notion of texture was also very important in this project. I clearly correlated the act of combining and mixing different instrumental sequences with the act of knitting with yarns of different colours in order to create a unique visual and tactile effect. I associated the visual quality of knitting with the spectral quality of each mix and the density of the mix to the

tightness or looseness a piece of knitted cloth. I also linked the tactile sensation of smoothness and roundness to the soft surface of the sea and the gentle rhythm of the seawaves, while I related the tempestuous quality of the sea to a sharp, angular and anarchic organisation of knitted patterns or random organisation of a patchwork composed of diverse elements.

2.2.2.5.3. Shaping the immersive space

As I listened to the first mixes I obtained, hybrid materials and textures emerged, some matched with particular moods, while others needed to be refined. However all confronted me with the necessity to spatialise the sounds within the 16 channel dome as I went along with mixing and composing the different textures. Since I already had a clear idea of which proprioceptive sensations I wanted listeners to experience throughout the piece. I imagined starting the piece with very few sounds that would come from above, giving the sensations of sparkles of water drops. Falling randomly on us, these sounds would progressively accumulate to create a sonic texture that would immerse us in a sound bath, marking the beginning of our journey into an imaginary sea world, made of gentle and sharp rocking movements, some voluptuous gestures that evoke sea streams, and even unpredictable spatial trajectories of some elements.

This following table synthesises all the features that inspired the final version of the piece. It is a guide that helped me to complete the composition of the piece. It combines the second structure proposal ⁹³: a summary of the mental images that emerged while I was listening to and mixing the recordings—which part corresponded to which quale (A or B), how the notion of knitting, texture and the quality of the sound mix have been thought through and finally how I conceived the work's general spatial composition.

⁹³ Figures 43, 44, 45 and 46.

Visual representation	Figure 43	Figure 44	Figure 45	Figure 46	
Mental images	Sensation of being immersed in a dense and smooth texture	Sensation of release of energy	Upcoming change increase of energy	Sensation of being in the middle of a tempest	
	Mix of sparkles of sounds like drops of water and streams	Increasing sensation of calm and peace	Increasing pace	Increase of violence	
	Hot water	Rocking sensation	Progressive change	Danger	
	Softness	Airy	Less roundness	Dense texture	
	Fluidity	Colourful	Sharper attacks	Sharp sound materials	
	High density	Shiny	Sudden emergence of diverse sounds	succession of heterogeneous textural elements	
Qualia	A	A	A-B	B	
Parallel between	knitting	Tight knitting	Loose knitting	Knitting gets tighter	Tight knitting
	texture	Dotted texture	Smooth texture Gentle curves	Broken curves	Mix of broken shapes and straight lines
	quality of the mix	Dense intertwining of heterogeneous spectro-morphologies	Soft intertwining, light density of sound materials	Intertwined sequences are arbitrary punctuated by other materials	Juxtaposition, overlapping and unpredictable emergence of sounds
Spatial composition	1.start = pointillist organisation of space = one sound = one speaker 2.Then, progressive accumulation of sounds on each speaker : sensation of immersion without major gesture across speakers. 3. End of part 2 : emergence of discrete rocking motion		1. sensation of immersion 2. Rocking motion across space (forward – backward and left to right motion) is emphasized presence of wide gestures spread across space	1. sensation of immersion 2. Combination of different spatial trajectories combined with sudden appearance disappearance of sound on different speakers	

Table 11. This table is a final Inspirational guide that I designed to compose the piece *An Ocean on the moon*.

2.2.3. *Where are you?* (2017)

I completed this project in order to explore a different way of composing music based on the concepts of randomness and open-form. From a general perspective, my goal was to shape an immersive sound installation whose evolving and processual aspects would guarantee the uniqueness of each listening, in contrast with the fixed-form of acousmatic pieces.

2.2.3.1. Multiple sources of inspiration

2.2.3.1.1. The elaboration of the project

This project was inspired by the visual observation of the moving foliage of trees. I associate the motion of a tree's foliage with the surface of the sea, both moved by the wind, they take on a large array of characters between tempestuous and apparent stillness. I nourish a very strong fascination for both. As displayed in this video,⁹⁴ dense tree foliage evokes in me a hypnotising sensation of peace and calm, making me forget the passing of time and the physicality of my body as if I were rocked by the oscillatory motion of its formless shapes and swarming textures. When I closely observe dense foliage, I think of a visual choreography of unformed shapes moving at different speeds and following different trajectories. Tree foliage can be also seen as the moving embodiment of Kandinsky's concept of inner pulsation⁹⁵ of a plane as composed of lines, shapes and colours, since it combines motion that is sensorily perceptive, a network of inferred straight lines and different unformed shapes of green shades in a rich swarming texture. My aim in this project was to investigate how I could invite listeners to dive into a sound environment that would immerse them in a spatio-musical experience based on the qualia⁹⁶ I experience when I observe tree foliage. To do so, I chose to compose a sound installation as I would build a tree and let its leaves, branches and colours intertwine, evolving according the

⁹⁴ See: 6. Portfolio contents, video_clips, folder n_2: videoclip_01_chapter4_2_3

⁹⁵ See chapter 3.4.1.

⁹⁶ See chapter 2.6

wind's motion. I naturally conceived this project in an open-form, a 20'00 loop that would evolve organically, displaying interactive relationships between sounds rich in spectromorphological and spatial details. Similar to the inner complexity of foliage that may reveal distant or proximate space, blend heterogeneous textures, colours trajectories and even speeds, I imagined the interaction of sound materials as multi-layered, using randomness and probability on a fixed temporal structure, making it difficult for listeners to detect the loop. However, I imagined that as time passes, with their familiarity increasing, they would be able to perceive some aspects of the interactive relationships between sounds. From a technical perspective, the project relies on a fixed architecture designed in Max software, in a patch that orchestrates the piece in time on a 16'00 loop and spatially on a ring of eight speakers, using probability and randomness.

2.2.3.1.2. The temporal structure of the piece

The installation is based on a 16'00 loop during which the sound materials are selected, played and spatially positioned automatically. The image below attempts to show a synopsis the temporal structure of the piece (*figure 47*).

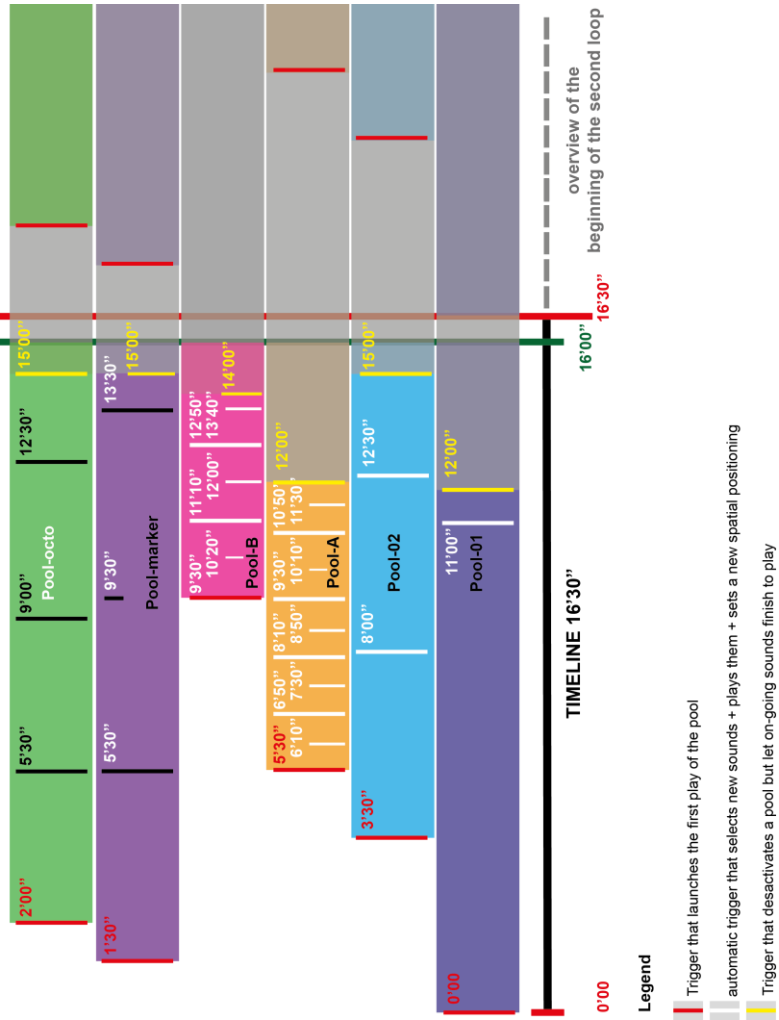


Figure 47. Temporal structure of *Where are you?*

For example, *pool-01* initiates the piece and is then triggered every 11'00. However it cannot be triggered a third time at 22'00 because at 12'00 the possibility of it being triggered has been activated. *Pool 02* starts at 3'30 and is then triggered every 4'50 until 15'00. I conceived the patch in such a way that from 15'00, the installation displays very few sounds, setting a quiet atmosphere which, similar to a tree's foliage becoming progressively still, invites us to embrace calm and quietness and appreciate this present moment before more motion and sound density emerge once more. Indeed, as soon as we reach 16'30, the patch has been automatically reset, setting new parameters for all pools, triggering a new perspective on the materials and their interactions. As we can easily observe, the temporal structure of *Where are you?* is fixed, but the sound files selected and their spatial positioning varies every time a new loop begins.

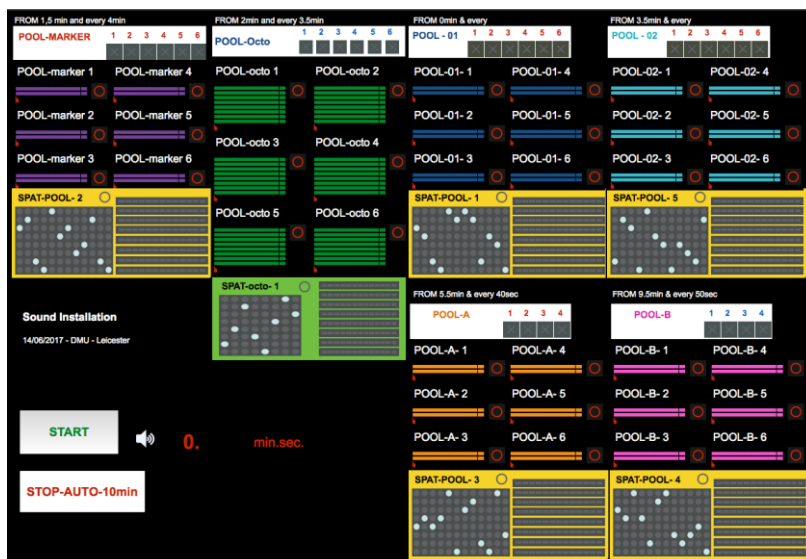


Figure 48. Screenshot of the max patch for *Where are you?*

2.2.3.1.3. From a technical perspective

Fundamentally acousmatic, the installation creates a space that immerses listeners in the dark with just enough lighting to locate speakers and other audience members. Listeners inhabit the space as a landscape where they freely choose to wander or sit in response to the sonic stimuli. This setting aims to give listeners the time, space and freedom of movement to be open to connecting the sonic experience to the kinds of proprioceptive sensations that might be felt in the lived environment.

From a general perspective, the Max patch is like the wind animating a tree's foliage. It is the engine that orchestrates the interactive relationship between six different pools of sound, each one containing six sound files whose selection and spatial positioning changes randomly every time a pool is triggered. It allows me to offer a large range of spatial sensations to listeners. With the notion of unpredictability at its center reflecting the uncertain motion of a tree's foliage, the installation creates moments of pure calm and minimal sound density, and others when listeners experience a sound environment that is spatially dynamic and texturally dense, featuring different degrees of sonic overlapping and of spatial envelopment.

Technically I established some constraints to avoid having too many sound files assigned to the same channel. For example, a channel cannot simultaneously diffuse two sound files of the same pool, but it can host two sound files coming from different pools. For instance one sound from *pool-02* and another one from *pool-A* can overlap one another, in this case they will both play at a lower amplitude. The patch features only one pool of 8-channel sounds (*pool-octo*), while the others contain only stereophonic files. Generally, each of these pools *pool-01*, *pool-02*, *pool-A* or *pool-B* can trigger up to four files simultaneously, randomly allocated to two different channels. The *pool-octo* can only play one sound at a time but *pool-marker* is the only one that can trigger more than four sound files simultaneously.

Moreover, it is important to keep in mind that all sound files I used in this project are not sound objects but musical sequences. The purpose of

orchestrating such sounds is to invite listeners to perceive the installation as a process. That is to say, a sensory experience that invites listeners to adopt an attitude as contemplative as when I observe a tree's foliage.

2.2.3.1.4. Features of space and motion

The installation explores motion in different ways to orchestrate an immersive experience analogous to the intertwining of different types of motion constituting tree foliage. To do so, the slow and broad movements of shapes that have no clear outlines, the long, short, curved or straight trajectories, the diverse swarming textures that constitute the foliage and the apparent stillness or slow motion of the branches and trunk invited me to carefully choose and process my sound materials according to spectromorphology characteristics. In fact, my sounds could be divided in two categories. The first one is composed of sounds I processed using High-Pass filters, Pitch and Time of Waves, and delay, I also edited them in order to get granular materials made of short and repetitive gestures and then communicate a strong sensation of tactility. The second category features long streams or sounds morphologically flat but spectrally rich. I processed them using mostly filters, Pitch and Time, Pitch shift in Audiosculpt. I also used Shuffler by Waves and Zirkonium to design slow spatiotemporal gestures and make tiny spectral changes. While all sounds of the first category are stereo, I mixed most sounds of the second category and automated their spatialization on a 8-channels setup, as the Max patch I built does not design spatial trajectories. In fact, it only determines spatial positioning (actually inspired by the pointillist technique discussed earlier)⁹⁷. This approach helped me to project how the interaction between these different types of sounds would procure specific sensations of space and motion—sensations of trajectory through space, distant or proximate spaces, the evocation of gesture and swarming textures.

⁹⁷ See chapter 2.2.1.4

The patch features only one pool of 8-channel sound files, *pool-octo*. Some of its files use all channels to create two types of texture, either overall swarming textures whose slight movements to the left or to the right may give the imaginary sensation of being set in motion by a breeze, or granular ones that does not communicate any sensation of spatial motion. Stereo files tend to be used to sketch clear spatial trajectories and give the impression of listening to curved lines moving across space. The five remaining sound pools contain only stereo sequences. They can be divided into different categories. The first category does not use panning to define motion or trajectory but employs the swarming energy of some files rich in granular morphology to evoke motion. I imaginatively associate these sounds with coloured, textured areas of foliage. They are present in *pool-A* and *pool-B*. The second category features sounds whose left and right channels can be perceived as independent. When their panning is asymmetrical, they can be perceived as two vaguely similar mono files. As they do not give particular sensation of motion I associate them with landmarks or fixed branches of a tree. The third category of sounds is distinct from the others spatially and spectromorphologically. Their smooth, tonic characteristics break with the complex and rugged morphologies of the sounds of *pool-A*, *pool-B* and *pool-octo*. They are intended to refresh listening. While the sounds of *pool-02* suggest to me the sensation of being suspended in the air without much motion, the sounds of *pool-01* feature a smoothly evolving texture whose spectral richness is deployed through time. While the sounds of *pool-marker* are more gestural, they seem to be animated by an impetus that smoothly unfolds in spectral richness across space. I imaginatively associate the sounds of this pool with the immaterial grounded force of nature—simultaneously calm, strong, peaceful, yet potentially dangerous. Moreover, the sounds of this category generally provide a sensation of distant and sometimes vast spaces that contrast with the general feeling of proximate space transmitted by *pool-A*, *pool-B* and *pool-octo*.

2.2.4. *La Dame blanche* (2017)

2.2.4.1. The start of the project

The initial purpose of this project was to explore further the relationship between the nature of textiles and music—knitting textural patterns and composition of musical sequences based on abstract sound materials rich in spectromorphological variety. Composed during a residency at the Visby International Centre for Composers, this piece was inspired at different levels by my experience of that coastal medieval city on the Swedish island of Gotland. During my stay I embraced moments of profound calm and peacefulness when, all around me, the extremely slow pace of the sea, the tranquility of the city and its inhabitants, the beautiful shades of white colour that illuminate the sky and are reflected on the seaside seemed to be animated by an energy miles away from the usual hectic life of big cities. On the other side of the spectrum, the dark colour of the surrounding vegetation and the view of the massive architecture of the city made me feel I was living a sort of mysterious dream where the city walls, laden with their medieval past, were hiding some hidden force. This invited me to see the piece as the intertwining of two yarns, one that I associate with the imaginary realm I created around Visby's medieval history and the second that I connect to bodily experienced qualia of clarity, peace, calm and brightness. While this perspective echoes somehow the opposition between darkness and light of *Nyx*, the compositional process I followed for *La Dame blanche* was fundamentally different.

2.2.4.2. The structure of the piece

The sources of inspiration for this project were multiple. Beyond my living experience in Visby, *La Dame blanche* explores further the relationship between composing and knitting initiated by *Uni-vers(e)* through my approach to mixing techniques, spectromorphological shaping of sound and spatial articulation. Imaginatively, I related the structure of the piece to the reading and progressive

discovery of the patterns in a medieval tapestry. We start by discovering its fabric, a soft and continuous surface, then we start to notice its knots, small patterns scattered here and there and then as these patterns, lines and knots start to connect and intertwine, we are progressively led to a stage where the fabric of the tapestry merges with its content to build an imaginary world. Compositionally, my plan was to structure the piece accordingly, with four sections, each corresponding to qualia determined by spectromorphology, knitting features, type of mix, pace, density and space.

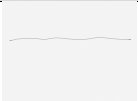



	Part 1	Part 2	Part 3	Part 4
Visual representation	 A	 B	 C	 D
Qualia	Tension	Wait	Awakening	Transformation
Spectromorphology	Long tonic streams No gesture	Short and complex sound objects Localised motion	Spectral trajectory Large spatial deployment	Circular gestures Tonic sounds Complex sounds
Knitting features	Yarns	Knots of different size	Patterns of different sizes	Yarns, knots and patterns
Type of mix	Intertwining	Temporally scattered	Succession (fade in/out)	Intertwining
Pace	Slow	Slow	Fast	Very fast
Density	High density	Very low density	Medium density	High density
Space	Oscillation between narrow and large space	Large space	Large space	Oscillation between narrow and large space

Table 12. Description of how I imagined the structure of *La Dame blanche* and the features I attached to each part.

2.2.4.3. The sound materials

Sound materials for the *La Dame blanche* were chosen in conjunction with the elaboration of the piece's structure, as described above. Most of them are electronic sounds, coming from either old recording sessions I did, playing with synths in Leicester or recording sessions I did in Visby with the synths available in Studio Alpha. For the project, I wanted to explore new sonorities, and to work on how tactile and movement sensations could be communicated musically using electronic sounds as primary materials. How these sounds which for me would not be as gestural and spectrally rich as any recording of live performance could fit in my project? This apparent challenge invited me to come back to a stereo format and explore how these smooth, fuzzy or rubbing textures could communicate with the support of sound processing, various proprioceptive sensations of stasis, fall, gestural impetus and swarming movements. Like *Nyx*, the restriction inherent to the stereo format invited me to design with accuracy the spectromorphology of my sounds, their position, their motion within this frontal frame and to create abstract textures. To do so, I used GRM Shuffler, Shuffler of Waves, Pitch and Time, Reverberation with convolution, and various filters. The following table describes four categories of sound materials I obtained and liked. I selected based on their spectromorphology. It is also a guide describing the types of features I relate to each: around sensations of tactility, spatiality and motion.

Initial sound materials		Future sequences			
Categories of sound	Spectro-morphology	Spectro-morphology	Tactile sensations	Sensations of motion	Spatial sensations
Sound type 1	Tonic Smooth morphology high frequency	Tonic long streams high frequency	Regular and soft surface of a glass	Slow motion	Trajectory from proximate to large space
Sound type 2	Mechanism Complex morphology med/low frequencies	Complex morphology regularity long sound objects medium frequency	Rugged texture	Trajectory from slow to fast motion	Complex mix of different spatial trajectories Strong sensation of short gestures
Sound type 3	Percussive morphology high /med frequencies	Granular sequences Full frequency range	Fizzy texture	No motion	Long distance
Sound type 4	Flabby impact Full frequency range	Tonic stream short sequences unpredictable evolution	Rubbing texture Roundness	Slow motion Fast motion	Proximate space Long distance Spatial gesture from left to right

Table 13. This table displays the initial sound materials I used for the piece.

2.2.4.4. The practice of sketching in *La Dame blanche*

In this project, I approached sketching from two different perspectives. One consists of using sketching as a tool to graphically embody techniques I would use to shape the sonic features of particular sound materials and sequences temporally, spectromorphologically and spatially. The second explores ways in which graphics could evoke qualia of proprioceptive sensations, namely the TSU⁹⁸ thanks to the orchestration of particular spectromorphological behaviours. In both cases, the lines are thoughtfully drawn around the horizontal axis, like yarns ornamenting the leading and strong sewing line of a cloth, the

⁹⁸ See chapter 3.4.2.1

horizontal line is the timeline alongside different qualia are articulated. The following two sketches illustrate different qualia. *Figure 49* is an irregular horizontal line evoking softness and a spectromorphological and spatial unity of sound identity. Its faintness on the 'page' also suggests an evolving state of quasi-imperceptibly. *Figure 50* features a horizontal straight line that evokes a condensed energy moving toward the right and stopping abruptly, conveying a radical change of state. Implying different curved lines spread above and below the horizon, each one has a unique energetic impetus that seem to pursue the trajectory of the initial straight line, a movement toward the right. Differentiation in the qualities of their curves and lengths could be associated with spectral density and spatial movement between speakers left and right. From a general perspective this sketch evokes a liberating expulsion of energy latent within the straight line.

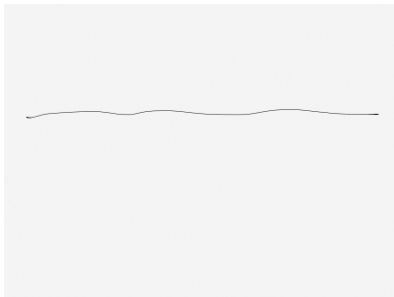


Figure 49.

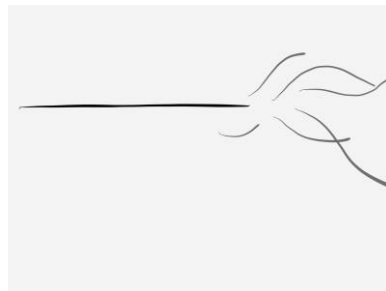


Figure 50.

Figure 49. The x axis refers to time, while the y axis refers to frequency. The thickness of the lines refers to amplitude.

Figure 50. The x axis refers to time, while the y axis refers to space. The thickness of the lines refers to amplitude.

From a general perspective, sketching was here a formalised act, less instinctive and more thoughtful than in my previous use of it. The common thread between all my sketches is actually the quasi-systematic use of the horizontal axis as knitted timeline. This perspective invited me to bring the graphical 'line'

closer to 'yarn' and also to connect the complexity of a sketch made of points, lines, shapes, colours to the intertwining of yarns, displaying knots, textures or patterns, recalling tactile sensations one can feel when touching a piece of knitted cloth.

2.2.4.4.1. A practical example: the beginning of *La Dame blanche*

2.2.4.4.1.1. From sketching to knitting

I propose to examine how sketching led me to compose the beginning sequence of *La Dame blanche*, *extract_11_chapter_4* (from 0'00 to 3'32). The following sketches propose two types of texture for the beginning of the piece. In the first one (figure51), each line corresponds to a monophonic stream, and the colour of each one is randomly used to differentiate the pitch of each stream. The horizontal axis represents time while the vertical axis corresponds to the amplitude. The crossing point of the lines represents a switch in the amplitude equilibrium—that is, the streams with low amplitude become the ones with the highest amplitude level and vice-versa.

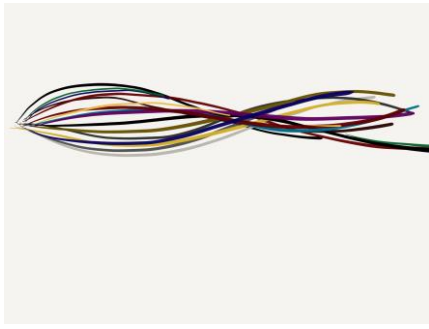


Figure 51. This image features a first proposal for the beginning of *La Dame blanche*. The *x* axis refers to time, while the *y* axis does not refer to any particular sonic parameter.

However, the second sketch (*figure 52*) displays a succession of yarns and knots, linking the vertical axis to the frequency domain and the horizontal one to the time domain. Indeed, I imagined the knots as moments of release where the spectral energy of the sequence remains calm, stable. These moments are transitional stages between two gestures, which are represented by the yarns or curved lines on the image. The curves they describe here correspond to the spectral enlargement of the sequence between two knots, reaching simultaneously higher and lower areas of the spectrum as we progress through time. This sketch repeats this pattern two times.

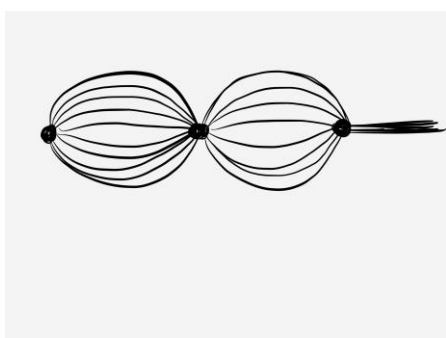


Figure 52. This image features a second proposal for the beginning of *La Dame blanche*. The *x* axis refers to time, while the *y* axis refers to the frequency domain.

This sketch, which initially aimed to represent the spectral evolution of the sounds in the beginning of the sequence, has been used finally as a model on which I based the structure of the piece. When I actually composed the beginning of the piece, I chose to use the *figure 51* rather than *figure 52* because it matches my intention to express a continuous tension that I would express on the spectral and amplitude level. However, the alternation of knots and curved yarns in *figure 52* served as a base on which to structure the piece, I did not restrict the use of this pattern to the spectral domain, as I also associated it to the quality of the gestural energy that animates the piece on amplitude, spatial and spectromorphological

levels. I related knots to calm and very little gestures, and the yarns to the deployment of a gestural energy. For example, the sequence located between 2'33 and 2'55, *extract_12_chapter_4*, is for me a knot, it deploys an energy that invites to release all the tension we experienced previously, featuring little gestures. The piece features also a condensed alternation of knots and curved lines. That sequence is located between 4'51 and 5'56, *extract_13_chapter_4*.

2.2.4.4.1.2. From knitting to composing

Bringing together sketching, composing and knitting, the beginning of *La Dame blanche*, *extract_11_chapter_4* (from 0'00 to 3'32) inspired by the two sketches above, consists of a tight intertwining of different streams that are variations of the same sequence. That is to say each stream has been either filtered or pitch shifted and processed with vibrato. I wanted the beginning of the piece to be radical, brutal—like a straight line which, as time goes by, sees its spectral range growing and its spectromorphology becoming more complex. When I started composing this sequence, *extract_14_chapter_4* (from 0'00 to 1'56), I chose streams that were very high in the frequency range, giving the sensation of listening to an artificial sound, empty of life, akin to a sine wave. My aim was also to communicate the quale of tension. In practice, I started positioning two streams, pitched slightly differently and hard-panned to the left and right channels. To this was added another stream positioned in the centre of the stereo image while drawing subtle spatial movements from left to right and with subtle variations in amplitude. A further stream pitched lower than the others was spread between left and right channels and variations in amplitude levels were introduced for all streams. As the mix appeared to me too flat, like a texture without volume, I added two new streams one on the left, the other on the right, processed with a light vibrato. I mixed these new streams with the rest of the sequence. In this way I considered the streams as threads, enlivened by idiosyncratic amplitude curves, as if these two new yarns that are intertwined around this sewing thread. As the sequence progressed, I added doppler-based

panning to progressively widen the stereo image. From 1'20 I slowly decreased the amplitude of the initial flat streams, adding new streams pitched differently and processed with filters and vibrato (fast and slow ones), with the effect of diversifying the spectromorphological richness (ergo liveliness) of the sequence. The remainder of this section was composed in the same way, with streams of more complex spectromorphology, tending toward rich and rougher textures giving the sensation of grains animated by inner pulsation. When I composed the subsequent part of the piece, I drew a granular stream moving slowly from left to right, starting from 1'56. From this moment until 4'23, my aim was to keep a sense of continuity throughout the different morphologies we experience. That is why I drew transitions that were as subtle and smooth as possible between sound materials, as if each sound was like a discrete trace turning into a yarn and to a thread. For example, I shaped the granular texture and made it progressively emerge from the ongoing pitched streams from 1'56, like a thick yarn turning around a dense, tense and tightly knitted sonic thread. Moreover, as the sequence begins to gently slow down—getting less dense from 2'15—the music becomes progressively more gestural, describing smooth and slow spatial trajectories from left to right until 3'44. The “synth pattern” at 4'24 marks an important turning point in the piece, I used this pattern as a punctuation sign, it opens another side of the piece, more dynamic and rich in gestural sensations. From 4'24, rather than a mix of lines, the piece is a threading of yarns, displays heterogeneous spectromorphologies, featuring diverse sensations of textural volume, gestural motion and space, as if we were observing visual and knitted patterns of a piece of fabric.

I chose to compose this piece in stereo for two reasons. The first was to explore further what I started with *Nyx*, that is employing the frontal quality of stereo in such a way that the listening experience becomes an experience into which the body is drawn, featuring spatial and virtually visual, tactile sensations. The second reason was to constrain my scope for design of spatial gestures (which are obviously more numerous in a multi-channel project) in order to focus on the spectromorphological shaping of the piece. My goal was to carefully

design each sequence as if I were weaving, knotting, twisting, threading or just knitting with a set of yarns in my hands as a way to compose the complex colours and textural patterns of a piece of fabric. I consider *La Dame blanche* as a musical deployment of a sonic piece of fabric that is revealed through time.

2.2.5. Multi-form visualisation, a synthesis

The second stage of my research allowed me to strengthen my compositional method. Visuals through sketches mainly but also images, photos or videos work together with tables of keywords to help me visualising which sound sources and sonic qualities I would employ in a piece and how I would shape the spectromorphological evolution of a composition over time. This, named multi-form visualisation, is a compositional method I propose to composers of electroacoustic music to support them in their creative process and to stimulate the production of raw sound materials by third parties. Its appeal lies in the freedom given to instrumentalists to improvise and also to composers to use multi-media resources for conceiving a musical discourse as the expression of particular qualia. Multi-form visualisation can be used in two ways, inspirational and prescriptive.

As observed throughout the description of my compositional process, each of my projects starts by building a broad network of visuals and keywords. This stage, inspirational, helps me to visualise ideas and organise what I want to explore musically in the future piece (qualia, bodily sensations, lived or imaginary experiences). In this process, I collect various figurative images (photography, painting, video) and draw abstract sketches. Most of them do not show obvious connection with the sounding world, in fact, neither colours or x/y axis refer exclusively to pitch, amplitude or any other sonic parameters. For instance, some refer to memories of landscapes, bodily sensations of motion (examples: figures 17, 19), space (examples: figures 2, 12, 20), and also touch (examples: figures 22 to 27).

As I select the sound materials I want to use, the sketches I draw become more abstract. Some sketches embody how I imaginatively visualise the morphology of a particular shape, a texture (figure 34), or a motion, a pattern (figures 16, 30, 40). The act of sketching helps me to reflect on how texture, space or gesture could work together to convey particular qualia rather than applying a prescribed visual language of correspondence with particular sonic features.⁹⁹

As I enrich my research with new keywords that strongly relate to various sonic parameters, my sketches follow the same path. The x axis tends to systematically be used as a timeline (examples: figures 16, 18, 35, 36), the y axis appear to refer either to amplitude (figure 4, 38) or frequency range (figure 14, 17, 31, 33) and the thickness of the lines corresponds to either amplitude (figure 21), or alternatively the feeling of distance (figure 35). The legend always specifies it.

The second aspect of multi-form visualisation aims to guide composers in the processes of transforming sounds, editing sequences and structuring the piece. The sketches and tables of keywords become more prescriptive. The sketches show for instance how the sound materials of a sequence could be mixed dynamically (figures 3, 43 to 46, 51), how a sequence could be structured spectrally (figure 52), how we could shift one morphology to another (figure 4). The tables at this stage are used to structure the piece and to define different parts that would be associated with particular features that emerged through previous tables and sketches (qualia, sound parameters, sound materials, mixing technics). For me, the tables 10, 11 and 12 mark a very important step in the compositional process of a piece, as they allow composers to get an overview on all essential features of the future piece.

⁹⁹ Blackburn's perspective is to find a visual language descriptive of spectromorphological evolution of the sound materials that she may employ in her music. Her designs are precise visual shapes of how the sound may look like, featuring *onsets*, *continuants* and *termination*.

Conclusion

This research has been framed by two key questions arising from the inherently complex nature of acousmatic composition: the extreme diversity of available materials and the issue of grasping mental images of sound and realising them in compositional practice. I addressed these questions through strategies of visualisation, used both before and during my actual engagement with sound in composition. My method is the practice of multi-form visualisation, which integrates sketching, observation of painting, videos and the use of a customised set of keywords employed to stimulate sound production—to guide my compositional process but also for its capacity to reduce sound materials to some essential sensory qualities or process to be considered out-of-time. The aesthetic underpinning of my portfolio is one emphasising a fascination with taking time to absorb the experience of natural phenomena. I used multi-form visualisation as a method of detaching from innately meditative immersion and connecting with mental images that I relate to my experiential knowledge and capacity to imagine and build bridges with the sonic domain.

Multi-form visualisation is therefore central: this research presents it as a powerful method to assist composers of electroacoustic music in their creative process by forming essential reductions of imagined sound into something that can be embraced and extended through direct auditory sensation in the studio, as a stimulus for production, the processing of raw sound materials and also as a guide to building a piece. Multi-form visualisation is a method I invite composers of electroacoustic music to follow in order to profoundly connect with qualia and also engage in the shaping of sound materials, in such way that their phenomenological complexity leads to an intertwining of the realms of memory and the imaginary.

Finally, the analysis of my portfolio features multi-form visualisation as a compositional method whose application is unique to each project. It shows that a piece can be composed using original and customized means based on their personal ability to draw transmodal connections. I therefore invite composers to

take inspiration from my research to elaborate their own way to use multi-form visualisation to compose music that would be evocative of the richness of their perceptual experience.

4. Portfolio Contents (USB)

4.1. Sound examples: Folder n_1

The following table displays the file names of the sound examples I used to illustrate my thoughts, i.e. sound extracts of my own works.

File names	E = extract P = piece	Reference	Duration
extract_01_chapter_2	E	VIEL V. <i>I belong to the sea</i> (2015)	0'38
extract_02_chapter_2	E	VIEL V. <i>Uni-vers(e)</i> (2016)	0'47
extract_01_chapter_3	E	VIEL V. <i>Nyx</i> (2015) (from 0'04 to 0'11)	0'07
extract_01_chapter_04	E	VIEL V. <i>Nyx</i> (2015) (from 0'04 to 0'17)	0'13
extract_02_chapter_4	E	Processed cello sound	0'11
extract_03_chapter_4	E	Film sheet	0'35
extract_04_chapter_4	E	Processed male voice	0'04
extract_05_chapter_4	E	Various onomatopœia	0'23
extract_06_chapter_4	E	VIEL V. <i>Nyx</i> (2015) (from 0'30 to 1'05)	0'35
extract_07_chapter_4	E	VIEL V. <i>Uni-vers(e)</i> (2016) (from 0'19 to 0'27)	0'08
extract_08_chapter_4	E	VIEL V. <i>Uni-vers(e)</i> (2016) (from 1'15 to 1'22)	0'07
extract_09_chapter_4	E	VIEL V. <i>Uni-vers(e)</i> (2016) (from 0'47 to 1'11)	0'24
extract_10_chapter_4	E	VIEL V. <i>An Ocean on the moon</i> (2016) (from 0'40 to 1'44)	1'04
extract_11_chapter_4	E	VIEL V. <i>La Dame blanche</i> (2017) (from 0'00 to 3'32)	3'32

extract_12_chapter_4	E	VIEL V. <i>La Dame blanche</i> (2017) (from 2'33 to 2'55)	0'22
extract_13_chapter_4	E	VIEL V. <i>La Dame blanche</i> (2017) (from 4'51 to 5'56)	1'05
extract_14_chapter_4	R	VIEL V. <i>La Dame blanche</i> (2017) (from 0'00 to 1'56)	1'56

4. 2. Video clips : Folder n_2

The following table lists the video clips that support my compositional process for some pieces.

Pieces	File names	Qualia associated to each video clip: A : qualia of calm B : qualia of violence	Duration
<i>An Ocean on the moon</i>	videoclip_01_chapter4_2_2.m p4	A	2'58
	videoclip_02_chapter4_2_2.m p4	A	0'58
	videoclip_03_chapter4_2_2.m ov	A	1'30
	videoclip_04_chapter4_2_2.m p4	B	1'00
	videoclip_05_chapter4_2_2.m p4	B	1'08
	videoclip_06_chapter4_2_2.m p4	B	1'16
Pieces	Name of video clip	Duration	
<i>Where are you?</i>	videoclip_01_chapter4_2_3.mov	1'28	

4.3. Portfolio: Folder n_3

The following table shows in which folder each piece I composed during my research period is located on the USB stick. It also gives others basic details of each work.

N. folder	Titles of the pieces	Year of composition	Format	Duration
1	<i>I belong to the sea</i>	2015	8-channels (original)	11'00
			Stereo version	
2	<i>Nyx</i>		Stereo	10'34
3	<i>Danse macabre</i>	2016	Stereo	8'37
4	<i>Uni-vers(e)</i>		16-channels (original)	10'12
			Stereo version	
5	<i>An ocean on the moon</i>	2017	16-channels (original)	10'21
			Stereo version	
6	<i>Where are you?</i>		8-channels	16'00
7	<i>La Dame blanche</i>		Stereo	8'41

Appendix A. Glossary

Affordance: It is defined by Gibson¹⁰⁰ as particular qualities of an environment, object or an event that enable perceivers to take actions in relation to the individual development of their perceptual skills.

Alerting capacity: A feature used by Noë's and O'Regan¹⁰¹ to define perceptual experience phenomenologically as a mutual co-determining relationship between body and environment. It considers any perceived change in the environment, like the arrival of the rain, as an invitation to take a sensorimotor action and adjust my bodily attitude by covering my head with my umbrella to continue observing the forest. In this situation, I adapt my bodily position to the environmental change to remain focused on the forest as the object of my attention.

Attunement: It is a process of adjustment to and seeking understanding of the affordances of the sounds before us.

Corporeality: A second feature used by Noë and O'Regan to define phenomenologically perceptual experience as a mutual co-determining relationship between body and environment.¹⁰² It is a characteristic whereby bodily movements affect how the environment offers information to our sensory apparatus. For instance when I observe a forest from far away or from inside, it is clear that my bodily position influences the way I relate to the forest. From a general perspective, a corporeal quality can define anything that has a body or material existence.

¹⁰⁰ GIBSON, J.J. (1986) *The Ecological Approach to Visual Perception*. New Jersey; London: Lawrence Erlbaum Associates (chapter 8).

¹⁰¹ O'REGAN, K. J., & NOË, A. (2001). A Sensorimotor account of vision and visual consciousness. *Behavioral and Brain Sciences* (24), pp.939-1031.

¹⁰² *Ibid.*

Enactivism: A process whereby body and mind are of mutual influence on how one perceives oneself and one's environment, creating and maintaining its own domain of meaningfulness. From this emerge a sense of self-identity.

Scarlinzi defines the term *enact* as follows:

“it has become a commonplace in research [...] to use the term 'enact' or 'enactive' to refer to intrinsically active perception and to the understanding of cognition as based on knowing how and hence on understanding what enables us to move and engage with the world we co-determinate through our sensori-motor skills and abilities.”¹⁰³

Exteroceptive sense: A sensory modality that is outward-oriented. It turns to an object to the external world or to material features.

Facture : In the Schaefferian typology¹⁰⁴ facture is a criterion to describe the way the energy is communicated and evolves through time. It determines whether the energy of a sound is maintained continuously, iteratively or weakly.

Interoceptive sense: It is a sensory modality that is inward-oriented. It has a self-reflective structure, which allows the perceiver to be bodily self-aware.

Qualia: Results from our capacity to feel and experience subjectively the materiality of the world thanks to our embodied mind and the dynamic performance of our senses. They are subjective sensations that accompany sensory experiences, they are personal and phenomenal.¹⁰⁵

¹⁰³ SCARINZI, A. (2014) How enactive is the dynamic sensorimotor account of raw feel? : Discussing some insights from phenomenology and cognitive sciences. *Contemporary Sensorimotor Theory*, pp. 67-81 (p. 67).

¹⁰⁴ SCHAEFFER, P. (1966) *Traité des Objets Musicaux*. Paris: Seuil.

¹⁰⁵ HURON, D. (2006) Are scale degree qualia a consequence of statistical learning?. In: University of Bologna (ed.) *ICMPC 9, Bologna, August 22-26 2006*, pp. 1675-1680 (p. 1676).

Raw feel: A phenomenological concept developed by O'Regan. It emerges from the phenomenological process of *epoché*. It defines itself as a root sensation that is free from any mental connections or bodily and emotional reactions one may be drawn to construe. As described by Lamedica¹⁰⁶ these criteria are: the richness of details provided by our sensory interaction with the world (*richness*), our ability to bodily react to any change occurring in our perceptual field (*bodiliness*), ones inability to bodily control what is going to be perceived (*partial insubordinateness*) and finally the capacity of any sensory stimulation to grab and keep our attention (*grabbiness*).

Subject-position: Defines what constitutes the subjectivity of perceiver, that is their experience, cultural background, needs, expectations and perceptual skills which altogether are colouring their perspective on the perceived object.¹⁰⁷

Transmodal: Perceptions in which one sensory modality triggers those of another. For example, sound and vision can provide me with spatial, tactile or kinesthetic information whose intermeshing imbues a particular scene, or a landscape, with multi-modal qualities.

¹⁰⁶ LAMEDICA, E. (2014) *The aesthesiological paradigm: a resonant cycle between movement and perception*. p.4, <http://www.ed1.ulg.ac.be/sd/textes/20140220-Lamedica.pdf> [accessed 23 May, 2018]

¹⁰⁷ See CLARKE, E. (2005) *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*, Oxford: Oxford University Press for a wider discussion of subject-position in relation to music.

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Appendix C. Programme notes

1. *I belong to the sea* - Acousmatic music – 8 channels – 2015

Duration : 11 '00

This piece comes from a souvenir,
The souvenir of a landscape,
Blue,

All around, the sea was shining,
Slowly,
The sun was going down,
Calmly,

Breath,

My heart was rolling across the sand,
Slowly,
The night was creaking along my neck,
Calmly,

One is colouring the end,
My mind is going away,
The waves are caressing my eyes,
Where are you?

Sweet darkness,

Black, Lost, Back,
I am still singing the sounds of your land,
But you are gone,

Speechless,
I am the wind,
I am the fire,
Undulating like no one,
I belong to the sea.

This piece was composed in the Music, Technology and Innovation Research Centre at De Montfort University in Leicester, UK.

2. Nyx - Acousmatic music – stereo – 2015

Duration : 10'34

This piece is an epic poem. It is a journey through the night—black, dense and mysterious—that ends with the appearance of dawn. It is inspired by Nyx, the Goddess of night in Greek mythology. The Theogony of Hesiod describes Nyx, daughter of Chaos, as one of the first-born element gods. The myth says that each day at twilight, she leaves hell to travel in the sky and deposits a veil of dark mist drawn forth from the underworld, which blots out the light of Aither (shining upper atmosphere) until dawn comes.

This piece is composed of transparent, slow transformations and strong contrasts in term of sound morphology. *Nyx* can be perceived as a cubist work, describing an object from different perspectives. This piece is also dramatic, expressing the despair of living in a world that refuses to show its reality.

I dedicate this piece to those who believe in the impossible...

I thank the performers Audrey Riley, Rick Nance, Brona Martin, Evi Manola and Dimitris Savva.

This piece was composed in the Music, Technology and Innovation Research Centre at De Montfort University in Leicester, UK.

3. *Danse macabre* - Acousmatic music – stereo – 2016

Duration : 8'37

Nothing never ends.
But some people won't be seen again.

Is there any logic, any rules to follow?
Why are they not moving?

Give me your hands
I want to draw a smile on their face

You are flirting with your own end.
Give me your eyes

Let's start again.

I dedicate this piece to Paris...

This piece was composed in the Music, Technology and Innovation Research
Centre at De Montfort University in Leicester, UK.

4. *Uni-vers(e)* - Acousmatic music – 16 channels – 2016

Duration : 10'12

Uni-vers(e) is an acousmatic piece that immerses the listener in an ambivalent world, between fragility and determination. The form of the piece illustrates the start and the evolution of a relationship between two individuals, a mix of joy and torment. The concepts of duality and contrast are omnipresent within *Uni-vers(e)*. This can be observed spectrally with the heaviness of the percussion and the lightness of the grains. One can also perceive a morphological duality regarding the excitement of the iterations and the fluidity of the harmonic profiles. The spatial composition puts in opposition large spatial trajectories and the inertia of various sounds.

This piece was composed during a residency in the studios of the Université de Montréal (CA), in response to an invitation from Robert Normandeau, and completed in Music Technology and Innovation Research Centre of De Montfort University, Leicester (UK). I thank Robert Normandeau for his welcome, support and listening. I also thank the staff of the department Musiques Numériques and Monique Jean, Pauline Tranchant, Christophe Lengelé, Vincent Monastesse, Vincent Berthiaume and Kévin Gironnay.

5. *An ocean on the moon* - Acousmatic music – 16 channels – 2017

Duration : 10'21

An Ocean on the moon is an acousmatic piece that explores a maritime theme through the evolution of a soft yet shiny, joyful and destructive instrumental netting texture. A particular emphasis is placed on the diversity of sensations that may overwhelm a viewer in front of the sea, between memories of joyful moments, lonely wandering and sudden fear. This piece is an evocation of visual and kinetic experiences of the sea. Through this project, I studied the rich expressivity of instrumental gestures, sometimes methodically, sometimes impulsively. I have also explored composerly gestures which at each stage of the creative process works from the fluidity of drawn shapes: curved, voluptuous, and sometimes extreme. This project resulted from collaboration with several instrumentalists who performed musical sequences based on visual images and video clips.

This piece was partly composed at the Ionian University, located in Corfu, Greece and was completed in the Music Technology and Innovation Research Centre, at De Montfort University, located in Leicester, United Kingdom.

I thank very much Theodoros Lotis for his warm welcome at the Ionian University, for his listening and support during the accomplishment of this project. I also thank Andreas Mniestris, Dionissis Batjakis for their help, and I thank the beautiful people and talented musicians who participated in this project : Alex Retsis, Elesia Papakosta-Smyri, Giorgos Stavridis, Rrezarta Krougia, Sevastianos Motorinos, Niki Kokkoli, Ektoras Remsak, Nafsika Karagianaki, Stelios Michas-Eglezos, Anna Katagi and Sofia Ketentzian.

6. *Where are you?* – Sound installation – 8 channels – 2017

Duration : min. 16'00

This sound installation is an immersive, evolving sound environment. The visual observation of natural phenomena is an important source of inspiration in my research. For this project, I have chosen to explore the visual observation of tree foliage and to evoke musically its visual and tactile features, and the proprioceptive sensations it provides. The tree is also a symbol. It echoes the life energy of nature that nourishes each living creature. A tree is life and also death, motion and stillness. Here, the temporal and spatial deployment of sounds is automatically generated. In a future version of the project, this will be interactive. The installation is a journey where the audience is invited to sit or to wander in space.

Derrière un arbre, se cache une forêt...

I thank Pete Batchelor very much for his support in his project.

This project was composed in the Music, Technology and Innovation Research Centre at De Montfort University in Leicester, UK.

7. *La Dame blanche* – Acousmatic music – stereo – 2017

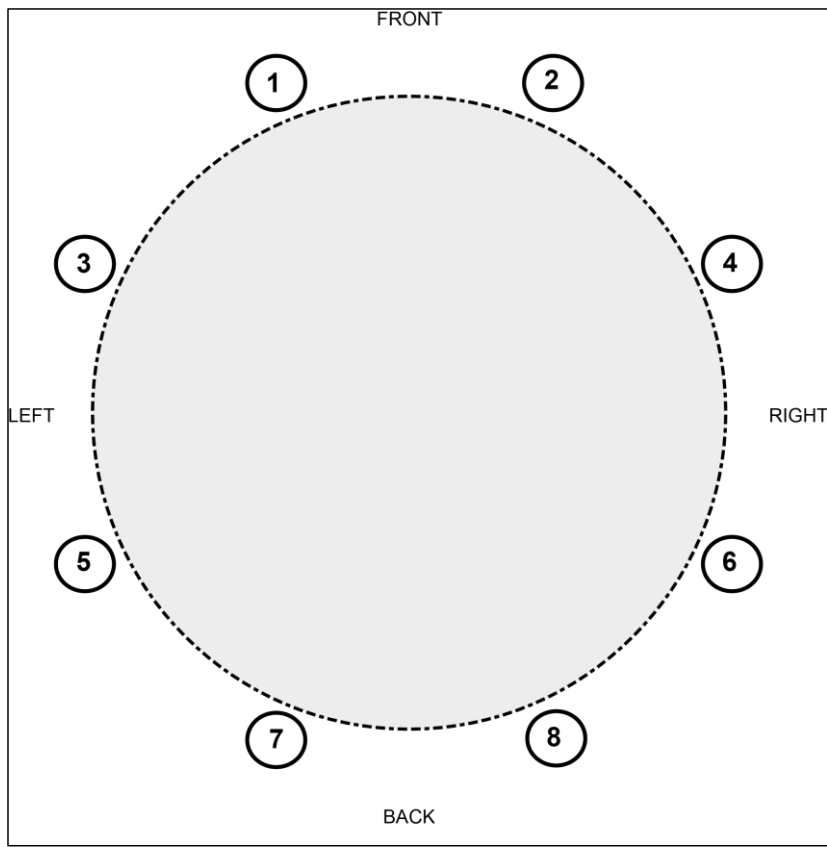
Duration : 8'41

This piece was composed at the VICC (Visby International Centre for Composers) in Studio Alpha. This piece has been inspired by my living experience in Visby. During this one-month residency I embraced the tranquility of the city and its inhabitants. For me, Visby's seascape is a sleepy and mysterious beauty, rich in bright and light colours. I imaginatively connected the mysterious past of this city to an old legend from Normandy, called *La Dame Blanche of Tonneville*. The title of this piece refers directly to it. The legend says that the ghost of a young woman dressed in white might appear suddenly in the area of Tonneville (les Landes de Tonneville) or in the middle of a lake to mislead travellers who find themselves lost. The legend of the Dame Blanche can also be found in other areas of France, known as ghosts of female hitchhikers who emerge and vanish suddenly at a particular spot on the roadside in order to warn the driver.

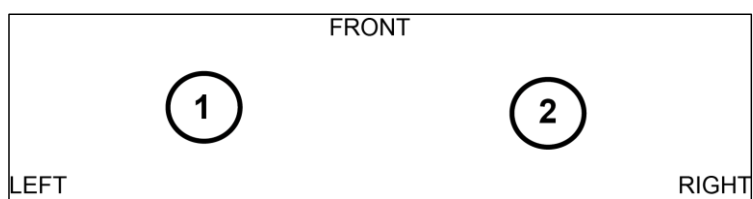
Broadly, the piece results from a profound reflection on the relationship between sketching, knitting and composing.

I thank Sten Melin and Jesper Elen of the VICC for their invitation and warm welcome during my stay in Visby.

Appendix D. Sound projection plans

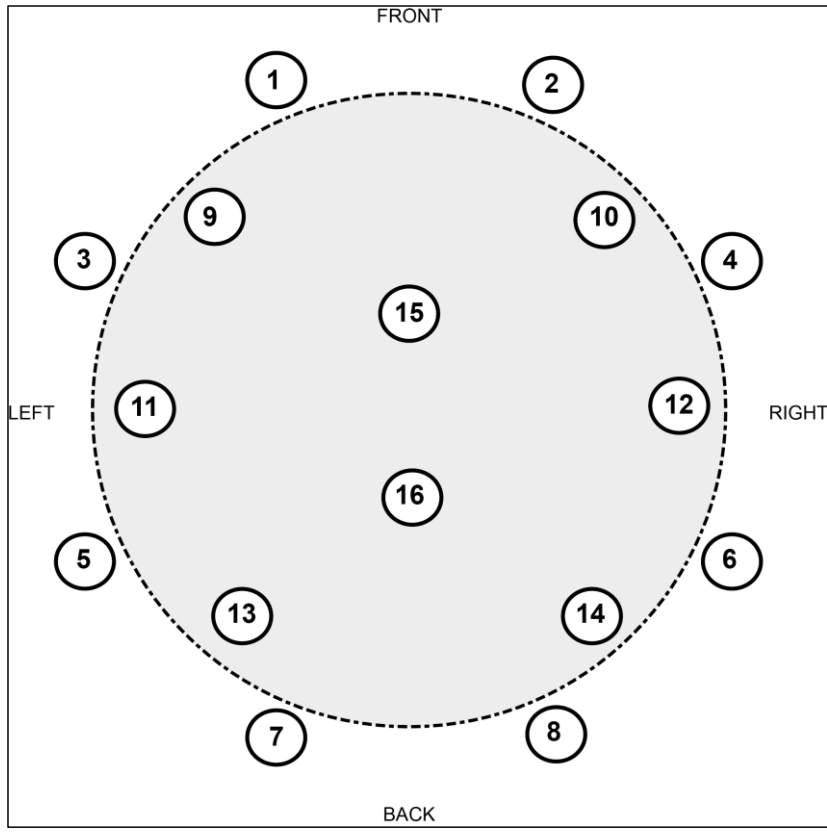


1. 8-channel configuration for:
- I belong to the sea

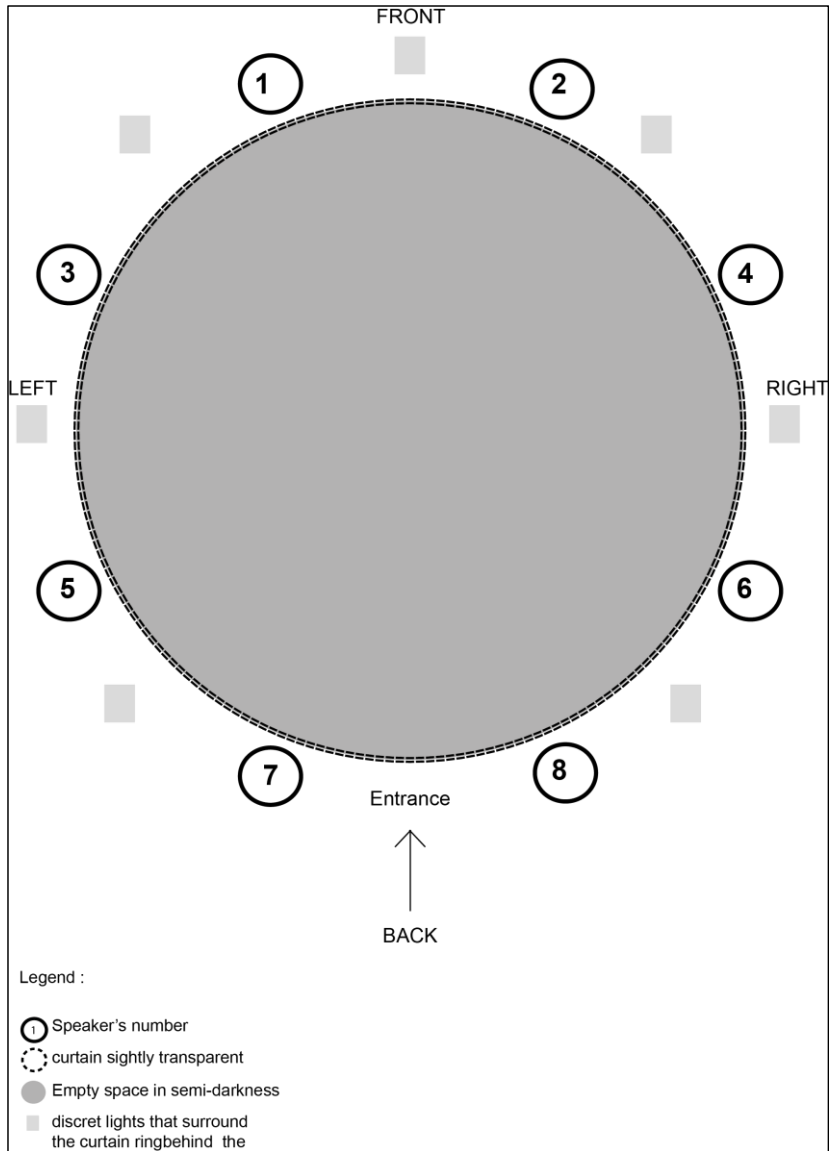


2. Standard stereophonic configuration for :

- *Nyx*
- *Danse Macabre*
- *La Dame Blanche*



3. 16-channel configuration for :
- *Uni-vers(e)*
- *An ocean on the moon*



4. 8-channel configuration for:
- *Where are you?*

Appendix E. List of presentations

1. List of performances

1.1 *I belong to the sea*

- 13/11/2015 Concert in Symposium "Women in sound", Lancaster (UK)
- 23/10/2015 Concierto multicanal MUSLAB, Mexico (Mexico)
- 23/11/2015 Café OTO, London (UK)
- 31/07/2015 Full of Noises Festival, Barrow in Furness (UK)
- 11/03/2015 Concert Electrobelge, Brussels (Belgium)
- 25/02/2015 World Premiere, Leicester (UK)

1.2. *Nyx*

- 16/06/2016 Concert "Spectral Journeys..." curated by John Young, New York City Electroacoustic Music Festival, New York (USA)
- 11/12/2015 Finalist Competition Musica Nova, Prague (Czech Republic)
- 24/11/2015 Concert Echochroma XIV/ Metanast, Leeds (UK)
- 07/11/2015 Evi Music 2015 festival, Saarbrücken (Germany)
(following a competition)
- 25/10/2015 World Premiere, Festival L'Espace du Son, Brussels (Belgium)

1.3. *Danse macabre*

- 09/03/2016 World Premiere, Concert in MTI, Leicester (UK)
- 03-04/09/17 **Sound Gallery Series** curated by SONORAmusic,
BIFEM 2017, Bendigo (Australia)

1.4. *Uni-vers(e)*

- 13-18/11/17 OUA Electroacoustic Music Festival 2017 - Art Information Center
Osaka University of Arts (Japan)
- 21/06/2017 Concert curated by John Young, Influx/M&R, Brussels
(Belgium)

- 13/10/2017 ConcerttFeBeME-BeFEM @ Brussels Electronic
Marathon - Salle LaVallée Brussels (Belgium)
- 30/11/2016 World Premiere, Concert in MTI, Leicester (UK)

1.5. *An ocean on the moon*

- 14/06/2017 Concert MTI series, Leicester (UK)
- 21/05/2017 World Premiere - Audiovisual Arts Festival Megaron –
Athens (Greece)
- 14/10/2017 Contemporanea Acusmatica” - Taukay Edizioni Musicali
Festival Udine (Italy)
- 15/10/2017 ConcerttFeBeME-BeFEM @ Brussels Electronic
Marathon - Salle LaVallée Brussels (Belgium)

1.6. *Where are you?*

- 14/06/2017 World Premiere, Concert MTI series, Leicester (UK)

1.7. *La Dame blanche*

- 14/06/2017 World Premiere, Concert MTI series, Leicester (UK)
- 04/10/18 Concert XXII Jornadas Internacionales de Música
Electroacústica, Cordoba (Argentina)

2. Publications

- 09/09/2016 **Nyx** is released on **#Singularities01**, label Singularities, Paris
(France)
This CD is a compilation featuring pieces of various composers.
- 05/03/2017 **Pearl**, album released by the label Obs, Modern Electroacoustics
Moscow (Russia)
The CD features all my pieces composed between 2014 and
2016.

3. Research presentations

- 08/02/2016 **Invitation by Annie Mahtani**,
Department of Music, University of Birmingham (UK)
- 10/10/2016 **Invitation by Bruno Letort** to the broadcast Tapage Nocturne,
France Musique, Radio France (France)
- 28/10/2017 **Research Presentation**
Title : *Intertwining visual sensibilities and
musical domains in the composition of acousmatic music*
Music and Space Study Day
University of Manchester, Manchester (UK)

4. Composer-in-residence

- 09/2017 **Composer in residence**
Visby International Centre for Composer
Visby (Sweden)
- 01/10/2016 -
30/01/2017 Exchange **Erasmus+ - Composer in residence** -
Music Department
Ionian University, Corfu (Greece)
- 12/04/2016 -
30/06/2016 **Composer in residence**
Invitation by Robert Normandeau
Université de Montréal, Montreal (Canada)

5. Other works / performances

11/08/18 *Athenian soundscape* (58'00) Acousmatic music, 8 channels
Concert Vauxhall, Brussels (Belgium)

11/09/2016 **Carla's Carousel** : audiovisual performance
(Kyma processing and video) World Premiere,
Kyma International Sound Symposium 2016 (KISS2016)
De Montfort University, Leicester (UK)
This project is a collaboration with the composer Brian Belet.

6. Awards and Commissions

05/2016 **Graduate School Travel Award and MTI Student Research funding of De Montfort University** for a residency at the
Université de Montréal (Canada)
Composition of *Uni-vers(e)*, acousmatic music, 32 channels

09/2015 **Commission by Musiques&Recherches** (Belgium)
Composition of *Nyx*, acousmatic music, stereo

01/2015 **Commission by the Fédération Wallonie-Bruxelles,**
Administration Générale de la Culture, Service de la Musique
(Belgium): Composition of *I belong to the sea*, acousmatic music,
8 channels

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