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Musical Abstractions

Composing experience through auditory memories

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Résumé

Abstractions musicales : Composer l'expérience à travers la mémoire auditive réfléchit au rôle que joue la mémoire auditive dans le processus de composition. Ma recherche explore les souvenirs auditifs de nature épisodique dans lesquels l'affect émotionnel, la répétition de la mémoire et, par conséquent, la distorsion de la mémoire jouent un rôle important. Cela conduit à une méthodologie d'abstraction, un processus de composition dont le but n'est pas seulement d'explorer le contenu des souvenirs, mais d'examiner les actes mêmes de se souvenir et d'imaginer le son et comment ceux-ci influencent le développement des formes et motifs musicaux.

En présentant ma méthodologie d'abstraction, je cherche à extérioriser et à formaliser la relation largement intérieure et subconsciente que de nombreux compositeurs entretiennent avec leur mémoire auditive. Cela élargit délibérément la portée du processus de composition pour inclure et considérer l'influence de l'écoute profonde et de l'analyse perceptuelle d'œuvres préexistantes.

La thèse est présentée en deux sections. Elle commence par une section théorique, composée d'un chapitre résumant mes recherches sur la mémoire auditive et l'imagination sonore, suivi d'un chapitre exposant la méthodologie qui en découle. Le reste de la thèse est consacré à l'analyse d'une sélection de huit œuvres composées pendant mon doctorat, chacune d'entre elles explorant une relation avec la mémoire auditive et/ou l'imagination. Les œuvres analysées sont organisées en trois catégories : (1) le dialogue et la narration, (2) l'espace (son excavé), (3) identité, culture et ancêtres.

Le but ultime de la thèse est de mettre en lumière des façons dont les compositeurs utilisent la mémoire, l'imagination sonore et l'abstraction pour développer notre matériau musical.

Mots-clés : Mémoire auditive, mémoire échoïque, imagination sonore, composition, affect émotionnel, abstraction.

Abstract

Musical Abstractions: Composing experience through auditory memories reflects on the role that auditory memory plays in the compositional process. My research explores auditory memories of an episodic nature in which emotional affect, rehearsal of memory, and hence memory distortions play an important role. This leads to a methodology of *abstraction*, a compositional process whose goal is not solely to explore the content of memories, but to examine how the very acts of remembering and imagining sound translate to musical motivic development and form.

In presenting my methodology of abstraction, I aim to exteriorize and formalize the mostly subconscious and interior relationship many composers have with their auditory memory. This deliberately broadens the scope of the compositional process to include and consider the influence of deep listening and perceptual analysis of pre-existing works.

The thesis is presented in two sections. It begins with a theoretical section, consisting of a chapter summarizing my research into auditory memory and audiation followed by a chapter outlining the resulting methodology. The rest of the thesis is devoted to the analysis of eight selected works composed during my doctorate, each of which explores a relationship with auditory memory and/or imagination. The analyzed works are organized into three categories: (1) in dialogue and narrative, (2) in space (excavated sound), (3) in our identity, culture, and ancestors.

The ultimate goal of the thesis is to shed light on some ways composers use memory, audiation, and abstraction to develop our musical material.

Key words: Auditory Memory, Echoic Memory, Audiation, Composition, Emotional Affect, Abstraction

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Remerciements / Thank you

Introduction

My doctoral research-creation project, *Musical Abstractions: composing experience through auditory memories* began as a direct continuation of the extra-musical experiential translations I had begun exploring during my Master's studies. During the four years of my Doctorate, both through continued research and composition, my overarching theme and methodology has evolved and clarified. This evolution is not a diversion from my previous interests but rather a change in perspective to define and encapsulate my areas of research and compositional process, not by their subject matter alone, but by their common focus influenced within the methodology. At the beginning of my Doctorate, I was approaching my focus and research as a literal continuation of my various *Translations of Experience* subjects during my Master's that I had broken down into three categories: *Conversations, Emergence,* and *Transparencies*. These themes served to encompass series of works that aimed to break musical habits and help evolve my musical language. *Conversations* translated dialogue from film scenes to create irregular rhythmic gestures, and a more dynamic and organic relationship with silence. *Emergence* aimed to introduce more complex and virtuosic gestures into my language. *Transparencies,* although initially conceived and titled to represent a hybridization of graphic and traditional scores, evolved to encompass the broader methodological approach of superposing contrasting musical material. In the first two years of my Doctorate, I focused on and continued developing my exploration of layering and juxtaposing primarily melodic and harmonic structures from parameters of pre-existing material. Using contrasting and often multiple source materials, I would analyze and distil certain chosen parameters from these sources. These parameters would then be reconstituted and woven together with new material. The methodology that developed turned away from more impressionistic and mimetic approaches that I had previously called 'translations' towards a more electroacoustic collage approach using multiple parameters as highly abstracted structural layers and thematic material. This methodology of *abstraction* became the defining focal point by the second year of my Doctorate and has now reframed my focus away from solely the subject of the extra- or intra-musical content to the process as well. My interest in translations of extra-musical patterns has remained, but has broadened to taking inspiration from pre-existing musical material. This shift in focus was significant for a few principal reasons. Firstly, the extra-musical and intra-musical material were no longer necessarily the subject of the piece, but served as sources for formal and thematic construction. This led to new perspectives on form and development in pieces

that were less predictable. Second, working with pre-existing material in an abstract and non-recognizable manner led to questioning the purpose and role of the sources as well as the relationship between my compositional voice and my analysis and interpretation of others'. Finally, the focus on the overall creation of experience led me to question what I meant by 'experience' itself, and how I could explore this through the faculty of memory, and more specifically auditory memories.

This refocusing on methodology has expanded my research outwards to view my own subjective interest in pre-existing material within the historical context of the relationships that composers—past and present—have had with pre-existing works and how these relationships have affected their compositional process. Viewing and returning to these parallels and comparing my methodology to the processes of other composers has inspired me to consider more concrete literal acts, such as transcription and analysis, from a more creative perspective. Holding this perspective during the various steps in my process of consciously abstracting and reconstructing with sounds from the past evokes a straighter line between listening and creating.

Relationship of research and creation

During my four years of doctoral research, I composed very actively and most of these pieces both feed into and stem out of the research I've conducted in parallel. One of the most fruitful elements of working on multiple and varied works during my research is the wealth of documentation and reflection they provide to my evolving methodology. Analysing the pieces post facto, and reviewing the text and graphic sketches that led to these compositions helped me retrace my mental steps, questions, and findings as well as note salient influences certain pieces had on my methodology. Certain works aimed to clearly explore particular theoretical questions, while others began more intuitively and took shape from the parallel research as they developed. Oscillating between the contrasting approaches of reaction and intuition vs. pre-planned alignment with theoretical questions allowed me to judge what each approach brought to the fundamental character of the resulting work. I will touch on this more within the methodology chapter as well as the conclusion.

Presentation of the thesis

This thesis is in two parts: theory and analysis. In the first chapter the theoretical part, *Theoretical basis,* I will present the topics of interest in the chronological order in which they began influencing my methodology. I will introduce what they are, what is their interest, and discuss which of their parameters I explore within my compositions. The focus and anchor of all these theoretical subjects is auditory memory, or **(1) A Memory of Listening,** and how it interacts with and influences how we compose. As my continued principal interest through these continued translations and abstractions has always been **(2) Composing Experience and Emotional Affect,** it seemed only natural to re-emphasize this as well as at the fact that experience is arguably just a form of memory. Bridging from these two parallel subjects towards the methodology is aural imagination, or (3) **Audiation.** As it is the bridge between memory and composition, I touch on this faculty and its influence on methodology and aural perspective in my later pieces. Moving away from recollection towards audiation also opens up more surreal, non-linear, non-subjective perspectives. The topics that stem from the pivot toward audiation are: (3a) **materialization of sound**, (3b) **excavated sound**, and (3c) **space and sound**.

The second chapter, **Abstraction as Methodology,** presents the methodology that results from my engagement with the above concepts. I will (1) **briefly define** my use of the term, then place it (2) **in context** to compare and discuss this methodology as it sits within a gradient of the various ways composers engage with pre-existing musical material and the questions and considerations this raises. I will also compare it to a few examples of parallel practices that have overlapping and/or similar approaches of working with both recorded and written documentation of pre-existing work. Lastly, I will introduce, in broad strokes, the consistent and variable steps in (3) **my compositional practice** of abstraction. This last point of the abstraction chapter aims to give a generalized overview of the methodology and its dynamic and flexible application. It is important that the lines drawn in this section be broad and clear, as in the second half of this paper I will present the elements of these theoretical and methodological aspects within my specific pieces in much greater detail.

The second part of my thesis consists of Chapter 3: **Analysis of Works**. Here I present a detailed analysis of selected works written during my doctoral studies. These eight works will be organized into three separate series of works: (1) **In dialogue and narrative**, (2) **In space (excavated**

sound), and (3) **As Identity**. Each of these series demonstrates a nuanced approach, both in concept and methodology, in their relationship to the presented theoretical interests.

Chapter 1: Theoretical basis

A memory of listening

How do we remember sound? As a composer, what is my relationship with the musical canon that has come before me, and the prolific volume of sounds being created around me? My primary interest in considering the memory of sound, or of listening, lies in the sensorial experience and emotional affect linked to these remembered moments. It is worth touching on some notable terms and relationships within the highly complex human auditory memory system. Although my relationship with these mechanisms is highly abstract, it serves to clarify that the inspiration does stem from certain scientific theories of our sensory and neurological systems. For the purposes of this paper and how auditory memory influences my compositional process I will briefly introduce four memory processes: echoic memory, short-term memory, long-term memory, and episodic [1]memory.

Echoic Memory is our aural sensory memory in which we passively and actively are receiving a large, unorganized and simultaneous amount of sonic information that we then store temporarily for a few seconds. These uncategorized sounds then pass through what is referred to as perceptual categorization where through feature extraction and perceptual binding the impulses are filtered and grouped due to similarities and proximities (in time). These groups, now events, pass through our *long-term memory* potentially activating any similar past memory events to help inform the focus of our consciousness. Memories in this process are considered semi-activated. When long-term memories are highly activated, they can remain in our consciousness as short-term memories, and can persist longer if we *rehearse* or loop them repeatedly. Figure 1 below depicts this process and although placed in a linear manner, the relationship between long and short-term memory is neither independent nor linear and they are constantly feeding back into and influencing each other. Long-term memory can be considered the permanent storage area of our memories, which largely remain unconscious until needed. **Short-term memories** (STM, 3-5 sec), on the other hand, are temporary memories and, for the most part, can be considered activated

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[1] The scientific questions and theories discussed in this thesis act solely as inspiration and guideposts for the overall exploration of aural memory within my compositional practice.

long-term memories. The much stronger limitation of STM influences the way we perceive and communicate in the world. They help us to form continuous understanding and experiences.

Figure 1. –   Interaction of echoic memory, long-term memory and STM

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Source: *Music and Memory: An Introduction,* B. Snyder, 2000, MIT Press.
© MIT 2000.

I find this fleeting and rehearsed nature of our memory very evocative in how we experience events and in particular, sounds. A type of long-term memory that has strongly influenced my methodology is **episodic memories,** or **flashbulb memories.** Episodic memories are about a specific event in the past and there is a very strong awareness of the 'self' being present. In fact, much of what we refer to when we speak of our memories is episodic memory. *Flashbulb memories* are a type of episodic memory that are very strongly embedded due to a heightened emotional state during the event.[2] What I find particularly interesting to consider in these types of memories is how, due to the heightened emotional state and vividness of the emotion, they are prone to heavier recollection and therefore distortion. As Bob Snyder explains in *Music and Memory: An Introduction:*

> Episodic memories seem highly susceptible to distortion, especially with repeated recollection. That is, when we repeatedly recollect specific episodic memories, they are changed by the very process of recollection. This may be because recalling an episodic memory is itself an episode that becomes remembered, and this copy of the memory replaces the original. There is after all, no way to distinguish between a memory, and a memory of a memory.[3]

Auditory memory is key in how we imagine and craft sounds; therefore, reflecting on its general mechanism and how composers have harnessed it both consciously and subconsciously came to the forefront of my research interests. How does our body choose what to remember? How do we talk about sound in history? These questions are broad and serve mostly as evocative springboards. They bring to the fore several areas of reflection presented earlier, notably: 1) how do I consciously interact with my auditory memories within the composition process, and 2) what are the many approaches both historical and contemporary in which other composers consciously interact with their auditory memories. If we consider only the survival, learning, and adaptation-oriented elements of our auditory memory faculties this can, for the most part, be understood fairly easily. The emotional prosody in language and the recognition of pitch and rhythm patterns in communication and our environment are clear parameters that help us to learn and survive in our environments. These are necessities. However, how does our auditory memory deal with 'unnecessary' sounds, those not essential to survival? Why do we hold onto complex musical works? The scope of this question is perhaps akin to asking why humans appreciate art. In this

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2 Roger Brown and J. Kulik, "Flashbulb Memories," *Cognition,* vol. 5, no. 1, 1977, p.73-99.
3 Bob Snyder, *Music and Memory: An introduction,* Cambridge, MIT Press, 2000, p.75.

sense it is vast, largely unanswerable, and not the point of why I am posing it. I simply wish to emphasize the beautiful quality that humans have for appreciation. We value and seek to create these aesthetic emotions that sounds, including complex musical works, evoke. These auditory experiences are highly subjective, gather autobiographical associations and emotional importance and therefore hold a substantial personal affect and value. In contrast to *utilitarian* emotions such as anger, fear, and joy, *aesthetic* emotions speak more to the sensorial reactions we experience such as goose bumps.[4] The experiences we seek out with music and art are generally of these more appreciative and aesthetic qualities such as love, wonder, nostalgia, etc.

Auditory memory and an individual's memory of listening are interesting to consider as composers, because it is the very matter from which we draw in our work. The link between our musical and sonic experiences or memories and how we aurally imagine, express, and translate these to a compositional work is highly complex and subjective. It is not an original statement to say that what we listen to influences how we compose. However, most written reflections on this relationship consider conscious aesthetic comparisons between stylistically similar composers, shared techniques, overlapping or parallel time periods, and the like. This autobiographical portrait of a composer's listening history has become infinitely more difficult to trace with the ever-increasing quantity of sounds being produced and continually available at our fingertips. As well, many composers tend to compartmentalize what they listen to for inspiration, what they listen to for pleasure, and what they deem 'background' music. Our memory faculties, although hierarchical in their manner, do not distinguish what influences us in the same way. In addition, to remember is an act of recollection. Every time we recollect, we recreate remembered experiences, as Snyder notes:

> In the case of music, our memories of music are constructed largely from other memories of aspects of music previously heard, and our knowledge and metaphorical experience connected with music in our minds.[5]

In the current prolific climate of musical creation and consumption, it is difficult to keep up with and reflect on overall directions or waves of influences. Although highly variable and imperfect, in this age of saturation of sounds it seems even more necessary to reflect consciously on what we are listening to, and how we process it and integrate it into our compositions.

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[4] The distinction between *utilitarian* and *aesthetic* emotions is discussed by Klaus R. Scherer in "Emotion in Action, Interaction, Music, and Speech", Michael Arbib (ed.), *Language, Music and the Brain: A Mysterious Relationship,* Cambridge, MIT Press, 2013, p.107-139.
[5] Snyder, *Music and Memory,* p.72.

Auditory memory is just one form of what we speak of when we say 'experience.' As mentioned in the introduction, the evolution of my thesis' focus began with the inclusion of intra-musical material. This inclusion led me to question and redirect my focus in two primary ways:

(1) I developed an interest in our ability to recognize complex sounds, patterns, styles, etc. and how far one can push this faculty.
(2) I became interested in exploring auditory memory as a tool for the recreation of experiences (particularly those with more nuanced complexity).

This latter interest is what spurred my interest in auditory memory and most strongly influenced my methodology, as I will discuss later. These new interests led to further questioning and investigations. What combination or number of parameters distilled from a complex structure allows it to maintain its aural identity? What constitutes remembering something? We can cognitively remember it, but our body can also hold onto semi-activated memories and sensations that have effects on the body. Memory exists in the body in different states, and we are affected and create not only from our cognitive state.

Continued research and reflection of auditory memories helped to further develop and define my methodology, which I refer to as *abstraction*. I will go into further detail about how I employ this term in the context of composition break down this process into concrete steps and examples. For now I will simply note that my interest in experience and auditory memory is what directly triggered this shift in my methodology. As the methodology developed and was put into practice, it fed back into and informed further branches and points of interest within my theoretical basis as well.

Composing Experience and Emotional Affect

Leonard B. Meyer writes in *Emotion and Meaning in Music:*

> It is because the composer is also a listener that he is able to control his inspiration with reference to the listener. For instance, the composer knows how the listener will respond to a deceptive cadence and controls the later stages of the composition with reference to that supposed response... It is precisely because he is continually taking the attitude of the listener that the composer becomes aware and conscious of his own self, his ego, in the process of creation. In this process of differentiation between himself as composer and himself as audience, the composer becomes self-conscious and objective.[6]

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[6] Leonard B. Meyer, *Emotion and Meaning in Music,* Chicago, The University of Chicago Press, 1968, p.40-41.

The compositional process of acting as my own audience to simulate a sense of objectivity is a key step in recreating a desired experience and affective response.[7] Musical codes and our expectations as trained musicians and listeners are learnt, and vary according to cultural and generational experience. However, with the increasing diffusion and cross-pollination of these musical codes from different eras and cultures, we can also find certain basic commonalities and shared patterns within their form, narrative, dynamics, and fundamental melodic and harmonic structures. As mentioned earlier, we all create from our own experiences, whether consciously or not, and I am simply trying to focus and harness this tendency. The central place of auditory memory in my methodology introduced the potential of working with pre-existing musical material. However, several important guidelines were clear and established early on. First, I am not interested in citation or seeking cognitive recognition with pre-existing material, but rather in the affective feeling of familiarity and the many ways that can be harnessed as a compositional tool. Secondly, my aim with these abstracted fragments and layers is to create contrasts and synthesis through contrapuntal or formal dialogues of opposing styles, musical codified language, and sonic textural environments. Although working with abstracted pre-existing fragments or parameters can add a sense of familiarity or patina to a layer, instrument, or sound, my aim is not nostalgia. The interest is in creating more subtle, synthesized, new sonic experiences through these super-positions and juxtapositions.

In adhering to these principal guidelines, my compositional explorations remain anchored in the two main interests mentioned above: using various transformations to push the limits of our capacity for auditory recognition of complex sound patterns and their distortions, and harnessing sonic memory to recreate affective experience.

Defamiliarization

At what point of distillation and abstraction does a complex musical sound or gesture lose its identity? This question will be further explored and demonstrated in the methodology section with various types of analysis, choices of parameters, and distortions/abstractions. Working with abstracted material in a more plastic and physical manner allows not only the creation of familiarity

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[7] The link between the psychological processes and how I explore them through the composed art music language is done primarily through the lens of auto-affection. Ultimately the desire and curiosity is whether these dialogues, manipulations, and layering of abstracted sources are perceived, at any level, when communicated within a certain musical community.

without identification, but also in certain contexts, the exploration of *defamiliarization*, a term coined by Russian formalist Viktor Shklovsky.

> Defamiliarization is found almost everywhere form is found... An image is not a permanent referent for those mutable complexities of life which are revealed through it, its purpose is not to make us perceive meaning, but to create a special perception of the object - it creates a vision of the object instead of serving as a means for knowing it. [8]

Defamiliarization presents the familiar in an unfamiliar way, thereby enhancing and altering perception. By accessing and analysing works from the collective musical canon, I establish a common point of familiarity as a structural auditory base from which to blend, distort, and create different forms and musical gestures in relation to these focal points. This source repertoire can then act as melodic or harmonic musically codified anchors within a more diffuse and textural contemporary language, or be presented as more traditional melodic-rhythmic thematic figures. I will discuss in the analysis chapter how the various abstracted parameters, from primary (e.g. pitch, harmony) to secondary (e.g. nuance, meter) are interwoven and re-synthesized. The distinction between primary and secondary parameters is simply based on fixed versus relative musical attributes.

Episodic/Flashbulb memories

In considering the complex faculty of auditory memory and how to harness it as a compositional tool of experience, it made sense for me to focus on the conscious elements of memory. One type of conscious memory is *episodic memory,* sometimes referred to as autobiographical memory, or *flashbulb memories* when they are strongly embedded. Three elements of such memories are particularly interesting to consider when placed in the context of composing: (1) the phenomenon of distortion through recollection, (2) memory as an act (looping, repetition, recreation, collage), and (3) the role of emotional affect in episodic memories. As repetition and variation are already well-established ways to create clear direction and form in a musical experience, placing more emphasis on the aspect of distortion through recollection became my focal point. What could a distant memory sound like? How would a strongly embedded but fragmented memory sound? How can one represent distortion of clarity or temporal distance sonically? As mentioned earlier, passing a newly formed memory through our long-term memory to activate similar events helps

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[8] Viktor Shklovsky, "Art as technique" [1917], in L.T. Lemon and M.J. Reis (eds. and trans.), *Russian formalist criticism: Four essays,* Lincoln, NE, University of Nebraska Press, 1965.

inform and contextualize this new memory, showing the creation of memory as almost an act of collage. This manifests in the interweaving and superposition of similar or contrasting layers and fragments that form new and different musical gestures.

One also needs to question why certain auditory experiences have a stronger impact or influence on one's memory. These strongly embedded memories are, after all, those that we can reactivate and use to form new memories and experiences. Among the many factors that play into why and how certain memories–and therefore sounds–persist more strongly than others, is the emotional state we were in when the memory was created.

Emotional affect

> When emotional arousal increases rehearsal, often in the form of information seeking, it should lead to a greater amount of recall, but not necessarily to greater accuracy or consistency.[9]

The intensified rehearsal of episodic memories, due to heightened emotions, creates a beautiful paradox: the more vivid the memory, the more susceptible it is to distortion. These rehearsals of memories in our mind not only serve to construct and compare new memories, but also imply that we are constantly tampering with and creating new associations with our existing memories. What results is a juxtaposition of a vivid recall of an event with a sense of 'how one felt' at the time, causing the sensorial qualities of the memory to playback very clearly, like a film, yet also full of error and interference. This relationship between heightened emotional state and distorted memory translates to certain tendencies in how I manipulate and interact with abstracting material. For example, I may loop (rehearse) and increasingly distort a fragment in a piece, causing it to gradually lose coherence. Often, the abstracted materials I introduce into a work represent these 'flashbulbs' of memory themselves. How, and to what extent, I engage and manipulate them is often representative of their significance and weight within the narrative of the memory.

In addition to the role emotional affect plays in building and retaining memories, it is equally interesting to consider how this affect can be manipulated in the recreation of the experience in the composition itself. In speaking about the emotions evoked by music, we return again to the notion of appreciation, and the more nuanced sensorial and qualitative engagements we have

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[9] David C. Rubin, "Constraints on Memory," in E. Winograd and U. Neisser (eds.), *Affect and Accuracy in Recall: Studies of 'Flashbulb' Memories* (Emory Symposia in Cognition) Cambridge, Cambridge University Press, 1992, p.269.

versus more direct and reactionary responses. These were referred to above as *aesthetic* and *utilitarian*. As audience members, and therefore also as composers, we seek out these nuanced, intangible experiences. This is an important distinguishing feature: the proactive nature of the experience; the emotion sought. Although experiences are highly subjective and evoke our own personal memories and associations, some elements remain partially objective. Learned musical codes, though cultural and varied as well, can be utilized to create habituation, deception, and surprise. Variations and blending of instrumentation, technique, and stylization can also play into these manipulations of experience. Whether by crossing or blending genres or periods of music, we are manipulating these expectations and experiences and thereby creating new sounds.

Perception-focused analysis

How does one integrate the above approaches within a compositional methodology? Taking inspiration from the complex and abstract world of auditory memory and emotional affect to create experiences requires common points of reference. To abstract, one needs to start from something recognizable and concrete. Musical memories are a fixed material that can be a point of reference for myself as a composer, and potentially a common point of reference, although never intended to exist as citation. Certain audiences can recognize or sense hybridizations and clashes of style – whether period or genre, tonal language, and even shifts in temporal plane (beyond tempo change). Working with pre-existing work from vastly different repertoires and periods greatly encourages a *broad and interpretive approach to analysis*. Arguably, the act of analysis becomes a central part of the compositional process and exerts great influence on many aspects of the finished composition. The purpose of the analysis stage is to investigate the unique and fundamental elements of a complex musical work. The results of these analyses determine the abstracted materials used and the plasticity and possible functions of these layers or fragments. Equally about the score and auditory perception, the analysis oscillates between the written work, the recording and different interpretations. This added auditory perception-based approach to analysis is greatly inspired by earlier experiments during my master's degree involving the transcription of extra-musical events such as a dialogue in a film. Certain parameters such as explicit or implicit emotion were given equal importance alongside the more concrete element of rhythm of speech. These highly interpretive transcriptions of extra-musical material led to the perception-based analytical approach that I use today. These perception-based analyses, with their errors and limitations, greatly inform both which aspects I deem qualitatively interesting, and

how I then use them to construct and design the composition itself. These questions, concrete steps, and problems will be addressed in greater detail within the Work Analysis chapter of the thesis.

This brief side note on the development of my analytical approach and subsequent manipulation of material is important to mention here, because this process equally influences the direction of my theoretical research. Throughout the composition of works, the way I abstracted musical material grew and evolved beyond purely representing auditory memory. Increasingly, the temporality of experience has become less based on evoking past temporal structures and more weighted towards distorted moments and suspensions of time. In a broader sense, my use of material has gradually shifted from *aural memory* toward *aural imagination*.

Audiation: Imagined sound

> Mental imagery – perceiving with the mind's eye and ear – is considered to be a critical component of vivid remembering of past events – or episodic retrieval (Baddeley, 1992; Greenberg & Rubin, 2003). Theories of memory hold that episodic retrieval does not only involve the activation of previously formed memory traces, but also reconstructive processes that support the generation of mental representation.[10]

Audiation, defined by Edwin Gordon as "the hearing of music in one's mind when the sound is not physically present,"[11] is a necessary term to touch on when discussing auditory memory, as the line between remembering and audiating is fluid and complex. In certain instances, they are arguably the same action. We audiate when we are composing, but we also audiate when we are recalling auditory memories. This blurriness is at the very crux of what is interesting about the relationship between auditory memory and composition. Our culture's historical focus on the visual raises many questions about how we consider and approach the creation of sound. The fact that the phonautograph, the earliest known device for recording sound (patented in 1857 by Edouard-Leon Scott de Martinville), was built with the intent not to record sound but to make it visible is very revealing. As Jonathan Sterne has written:

> This history continues down to the present, where iconic visual representations of sound play an important part in multitracking, sound mixing, and other forms of sound

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[10] Willem Huijbers, Cyriel M.A. Pennartz, David C. Rubin, Sander M. Daselaar, "Imagery and retrieval of auditory and visual information: Neural correlates of successful and unsuccessful performance," *Neuropsychologia* vol. 49, no. 7, 2011, p.1730-1740.
[11] Edwin E. Gordon, "Research Studies in Audiation: I," *Bulletin of the Council for Research in Music Education,* vol. 84, Fall, 1985, p.34.

manipulation. Put simply, now forgotten audiovisual technologies like Chladni's glass plates and Scott's phonautograph subject visual phenomena to the orderings of sound.[12]

Devices such as these represent sound through visual imagery. Do these visualizations of sound aid in our imagination of its transformation? Is our obsession with the visualization of sound driven by a necessity to better understand larger and more complex gestures and forms? These iconic representations aid our auditory memory to understand and retain them. Most research on the inner mechanism of audiation often falls into the sub-category of learning aptitudes of young children regarding retention and recreation of sounds, specifically tonal and rhythmic. It leads one to question further, what role does audiation play in the compositional process? Beyond the smaller concrete elements of shorter rhythms and pitches, how do larger musical schemas, instrumental timbres, dynamic maps, and other less tangible secondary parameters reactivate in our memory, and therefore create auditory sketches? These questions influenced, and in some regards *became*, what is my current methodology of abstraction. However, this imagined interior process of recollection, abstraction, deformation/distortion, and reconstruction is enacted consciously through research (text, score, audio), analysis/reflection, distillations and extractions, and purposeful deformations and manipulations.

Considering this interior memory and audiation-based perspective on composition, one cannot help but interrogate the role of memory and audiation in some artistic practices parallel or adjacent to composition, notably improvisation. This question, far too vast to properly explore here, is addressed more for the value of reflecting on the overlap, and affirming the intrinsic relationship among the activities of memory, audiation, composition and now improvisation. If we begin to blur the line and consider improvisation as active performed audiation, could we then not consider composition as reflective formalized audiation?

More importantly, the lateral shift in focus from auditory memory toward audiation has moved my attention toward more surreal approaches to imagining and reconstructing sound. This shift was organic, as the act of reconstructing the auditory memory process within a musical composition is already highly abstract by nature. Leaning into the overlap of audiation and auditory memory acted more as an embrace of this more surreal approach, less concerned with linear timelines or mimetically-driven, human-centered experiences. Reflecting upon how the themes and focus of

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[12] Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction,* Durham, Duke University Press, 2003, p.50.

my compositional works have shifted during this transition, I have broken them down into three categories: (1) Materialization of sound, (2) Excavated sound, and (3) Space and Sound.

Materialization of sound

During compositional research I came across the apocryphal story that Gugliemo Marconi mused in his later life that sound never dies.[13] He believed we would eventually invent a machine that could tune into sound waves from the distant past and hear sounds and speeches from history. This was so evocative for me that it has become the anchoring inspiration for two large form pieces, one of which will be discussed in detail later: *Echoic Memories*. Mentioning this story briefly here is essential to explain this inclusion and discussion of sound as material. Imagining that sound might never die leads us to consider sound as something existing outside of human experience. In such a surrealistic universe, how might these undying sounds fluctuate through time and space? What would be the limits of audibility and inaudibility of this imagined immortality? What are the many ways to evoke qualities of degradation such as fading, and other forms of disintegration using sound as a mutable material? These hypothetical questions don't require answers but serve to provoke new surreal perspectives. As Rahma Khazam notes in her article "The ambiguous materiality of sound," there is a growing movement of sonic art that explores sound's material qualities, recognizing the very physical nature of the phenomenon of sound and preoccupied with rendering this immaterial experience more visible or even tactile, taking inspiration from the 19th-century techniques described above such as Chladni's resonating plates or Scott's phonoautograph. "Yet," she writes, "the more they attempt to pin sound down, the more they misrepresent its fundamental elusiveness."[14]

Most explorations of the materiality of sound tend to centre on visual and sound installation art, acoustics, architecture, and the craft of instrument design. These lines of research focus on the actual sound waves themselves and how they physically interact within space and with physical objects. My interest, inspired by the story of Marconi, takes cues from these perspectives and sciences, but focuses on creating imagined representations, in my mind, of how sound would evolve, transform, remain dormant, revive, and express itself, entirely outside of a human experience. I realize that for a human to imagine something out of human experience is

[13] Nate DiMeo, "These Words, Forever," *The Memory Palace* podcast, episode 12, June 2009, https://thememorypalace.us/2009/06/episode-12-these-words-forever/, retrieved July 17, 2021.

[14] Rahma Khazam, "The ambiguous materiality of sound," *springerin,* Issue 1/2012, 2012, https://www.springerin.at/en/2012/1/greifbar-ungreifbar/, consulted 17 July 2021.

paradoxical and impossible, but this challenge forced me to push my sense of form, temporal narrative, and dynamic relationships between musical parameters to further extremes. If a sound sounds in the forest and no one is around to hear it — what does it sound like?

Excavated sound

This exploration of the audiation and abstraction of sound as an entity outside of temporal and acoustic experience led to the question of where sound would physically exist if it did exist forever. Naturally one imagines inaudible sound waves filling the air. However, the scientific fact that sound is absorbed into physical objects and turned into other forms of energy, mostly heat, raises other fascinating possibilities. What if the sound waves were absorbed or embedded into the objects and natural world around us? How could we retrieve them? How would they have changed? Following on my fascination with the story of Marconi's belief that sound never dies, these surreal musings drew my research and interest toward scientific musings that are either proven false, or are impossible to prove. David E.H. Jones, who wrote under the pen name Daedalus, wrote a column for *New Scientist* magazine where he mused that "[a] trowel, like any flat plate must vibrate in response to sound: thus, drawn over the wet surface by the singing plasterer, it must emboss a gramophone-type recording of his song in the plaster. Once the surface is dry, it may be played back." His many column entries were compiled in the book *The Inventions of Daedalus: A compendium of Plausible Schemes,*[15] where he modified and expanded on some entries as well as including sketches of these 'plausible schemes' and related ideas, as seen in Figure 2 below. In this particular entry he also includes, and addresses, a letter received from Richard G. Woodbridge III, who in response to the initial *New Scientist* column entry had described his earlier paper titled *"Acoustic Recordings from Antiquity"*[16] that discussed preliminary experiments around this same musing. Woodbridge's experiments were however focused on clay pots and paint strokes, and used a needle to play the sound supposedly embedded in the clay pot or the acrylic strokes on the canvas.

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[15] David E.H. Jones, *The Inventions of Daedalus: A compendium of Plausible Schemes,* Oxford, W.H. Freeman, 1982.
[16] Richard G. Woodbridge, "Acoustic Recordings from Antiquity," *Proceedings of the IEEE,* vol. 57, no. 8, August 1969, p.1465-1466.

Figure 2. –   Speculative sketches from *The Inventions of Daedalu*s

[Image protected by copyright / Image protégée par le droit d'auteur]

Source: *The Inventions of Daedalus: A Compendium of Plausible Schemes,*
David E.H. Jones, 1982, W.H. Freeman & Company.
© David E.H. Jones 1982.

These early and false interpretation of archaeoacoustics and have since been mostly debunked; the current established field of archaeoacoustics studies the acoustics of archaeological sites and artifacts from these sites. Nevertheless, the speculations of Woodbridge and Jones extend naturally from the materiality of sound, and from its imagined immortality. This topic is explored in my works *Dust* and *Echoic Memories*. Just as with my engagement – both concrete and theoretical – with our auditory memory faculties, these musings of excavation, served as useful concrete anchors for audiated and imagined reconstructions of sound itself as an artifact.

Space and Sound

The next compositional element – the acoustic identity of space, or spatial imprint – is the inverse of the preceding imaginings of sound imprinting on objects. Interest in space as acoustic identity began earlier in the research-creation process with the focus on auditory memory. To consider

auditory memory and thus experience is to consider location, spatialization, and other factors that add to this personal and autobiographical experience, real or imagined. Auditory memories are not just about sound but rather recall an entire sonic experience in context. I will expand on this further in the analysis chapter, but the first work to take on the acoustic identity of space very prominently as a driving characteristic in the compositional process was *Tenebræ*. Due to the recreation of a specific event, in particular acoustic environment (Sistine Chapel), and with a spatialized performance (antiphonal), the impact and character of the chapel and spatialization became subjects of study themselves, outside of the music. This addition/inclusion had great influence on the latter pieces to come. What are the different ways that spaces transform our sonic experiences? How can this be abstracted and represented in music? How can these findings also be explored, off the page, in the performance of the works themselves?

The two principal ways this more conscious consideration of acoustic identity has influenced the compositional process and devices are: (1) using spatial changes as a compositional device and (2) composing space as musical character itself.

Space change as compositional device

This particular device took prominence in the work *Echoic Memories,* a commissioned hour-long pocket opera composed in residency at the *Villa Romana* in Florence. As this work was inspired by the concept of sound never dying, I was curious to express the sensation of sound living and existing outside of our human centered experience. The entire opera was formally and conceptually designed around the physical spaces of the Villa, both interior and exterior. This placed the space, and the potential mobility of the audience in full prominence. Multiple radio transmitters and receivers were deployed around the Villa, both mobile and stationary. I was interested in using spatial changes and audience/musician mobility to (1) delineate the sections of the opera, (2) employ extreme distance and proximity of the sound to the audience to establish a sense of its independence, and extreme levels of dynamic range, and (3) to allow the pre-recorded sounds, and sometimes the musicians themselves, to be playing before the audience arrived and after they departed to underline the perception of sound's independence from their experience, as if never dying. I will return to these techniques in the analysis chapter.

Composing Space

What does space sound like? For a room to reveal its acoustic identity, it must be fed a sound. Many composers speak about the importance of space to their work. This is sometimes expressed through silence, sometimes through a continual relationship and dialogue between sound and a particular space. Turning back to the phenomenon of episodic memories and how they are highly distorted in particular ways, it is worth repeating here Snyder's observation that "recalling an episodic memory is itself an episode that becomes remembered, and this copy of the memory replaces the original. There is after all, no way to distinguish between a memory, and a memory of a memory."[17] This immediately evokes a sense of dilution, inundation, and the very particular piece *I am sitting in a Room* by Alvin Lucier. Although the performance consists only of recordings of recordings – compounded ad infinitum – of his composed and recited text, the esthesic effect is that by the end of the piece, one is no longer listening to the text, but to the space. The space has slowly taken over and absorbed the sound, imprinting its character onto it until there is almost nothing left but the space itself. Douglas Kahn has written about this work that:

> All physical voices by default infuse space, but for Lucier sitting in a room this relation is heard because neither the space nor the voice are sublime; both are merely, perhaps sublimely, imperfect. [18]

Whereas Lucier allows the acoustic expression of the space to reveal itself through repeated audio recordings and playback, my approach to composing space involves more mimetic expressions of isolated impulse sound recordings. In one of my more recent works, *Hōrai*, I wanted to create an impression that the audience is moving through different rooms with different acoustic qualities, but with no clear musical figure interacting with the space. Through breath exhalations and simple changes of mouth shape near or around the mouthpiece of the flute, what is heard is only the space itself. This is highly amplified to give the performer the ability of longer duration, range of force, and audibility of vowel changes. Each of these meditative gestures is delineated with sharp, dry rhythmic separations, like snapping one's fingers in a room, and the breath that follows is the reverberation and timbral acoustic quality of the imagined space.

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[17] Snyder, *Music and Memory,* p.75.
[18] Douglas Kahn, "Alvin Lucier : I Am Sitting in a Room, Immersed and Propagated," Immersed. Sound and Architecture, *OASE Journal for Architecture,* Issue 78, 2009, https://www.oasejournal.nl/en/Issues/78/AlvinLucierIAmSittingInARoomImmersedAndPropagated, retrieved 19 July 2021.

Chapter 1 Conclusion

Much of the theoretical research discussed in this chapter derives from concrete neurological and sensorial behaviour. The information, questions and limitations that were raised fed into the compositional processes of the works that in turn influenced the focus of the research towards more intangible fields of study. However, my interest throughout has always remained on the analysis and creation of experience and the different ways this can be approached. The resulting methodology, *abstraction*, was initially referred to as *translation*, which was essentially subjective interpretation of musical and extramusical schemas, forms, gestures, and behaviours. However, as the focus turned more toward the distortion and the dynamic qualities of memory or audiation, 'translation' soon became a less accurate term, although I will show that these concepts exist on a gradient. In the next chapter, I will present my methodology of abstraction in detail, focusing on how I use it to interpret and represent the sensorial and the affective, and to achieve temporal distortions, super-positions, and interruptions.

Chapter 2: Abstraction as methodology

Introduction

As mentioned in the introduction, this second chapter of the thesis' theoretical section lays out a methodology of abstraction in three parts. I will first introduce the concept of abstraction and the various ways the principles I am exploring correlate with the fundamentals of my compositional approach. Next, I will situate this proposed approach within a rich context of overlapping compositional processes, discussing certain shared commonalities and relationships between them. I will also discuss its relationship to other general practices involving pre-existing work, which may not all be classified as composition, but share certain notable similarities. Lastly, leading into the Analysis of Works chapter, I will introduce a general schematic of how this methodology is broken down and utilized in my compositional practice. Although the concrete steps and their order vary somewhat, I will present the most commonly practiced sequence of steps, as a condensed template to help structure and guide the detailed works analysis I will undertake in the following chapter.

Definition of abstraction

Abstract as an adjective is described as *existing as an idea, feeling, or quality, not a material object.* As a verb, it can mean simply to remove or separate, or *to consider apart from application to or association with a particular instance*. I do not propose to summarize the many philosophical and visual art-based nuances of the term, as these are beyond the scope of this thesis. However, certain basic principles continually ring true through its evolution and various interpretations in principally the art world. From a musical composition process perspective, in addition to the two fundamental definitions given above, other essential characteristics that resonate strongly with the proposed methodology are:

(1) the focus on *affect and sensorial experience* rather than on narrative,
(2) encouraging *new perspectives through the imaginative interpretation* of the audience,
(3) a subject *disjointed from reality* and displaying simultaneous different viewpoints,
(4) the desire to reveal the *unconscious mind*, and
(5) *perception-focused expression*, open to interpretation.

The main aspect of my compositional method is to interact with pre-existing material through various distortions: stretching, condensing, layering, looping, cutting, transposing, and interpolating the material. All these manipulations aim to allow the recognizable and accessible elements to exist in a more contemporary and often texturally woven aesthetic context, fluctuating between moments of complete distortion of tonal and harmonic clarity and fragmentary apparitions of coherence striking the listener with a feeling of familiarity. I interweave phrases, stretch time at key moments, loop particular passages, and interact and dialogue with the material until the work has found its own voice. This mixed methodology of placing distilled parameters in dialogue, together with genre blurring between their respective tonal languages and my own textural, noise-gesture, and electroacoustic process-driven explorations, aims to create works that distil a kaleidoscope of influences over generations, cultures, and musical genres.

Abstraction in context

It is important to briefly consider the contemporary and historic artistic practices in which this methodology stems from and interacts with. Abstraction places creative weight and importance on the compositional processes of *active listening, audio and score analysis, transcription,* and *digital manipulation and transformation,* to mention a few of the key tools I use. These processes take inspiration from similar and overlapping contemporary practices, as well as from related ways of working with pre-existing sound material that may not necessarily be considered compositional. Exploring the gradient of relationships between pre-existing works and composers' interpretation or manipulation of this material proves an interesting and reflective exercise. Where are the boundaries between *transcription* and *arrangement,* between *arrangement* and *citation,* between *citation* and *re-composition* and in my case, *abstraction*? Engaging with questions of aural familiarity and reflecting on how we listen and interact with pre-existing work led me to consider our auditory memories and auditory imagination. This is particularly relevant in a context of increasing proliferation and accumulation of sounds at our disposal today. As composers, we have at our fingertips an ever-increasing vast documented history of sound recording and archives. As well, we are inundated with the digital age pace of modern creation of multitudes of various popular and experimental genres. Our aural landscapes are widening and becoming more diffuse. How has our auditory, and specifically our musical memory been affected by these shifts, and how is this reflected in the music and sound art we ourselves create? How do we discuss and document

the experience of these contrasting streams of information, patterns, and sounds? Peter Szendy paraphrases similar questions posed by Theodor Adorno in *Arrangements-dérangements: La transcription musicale aujourd'hui[19]*, and discusses them further in his article "La fabrique de l'oreille moderne" within the collected texts of *L'Écoute.* He explores the possibility of creating a history of listening that is not dominated by descriptive words but seeks to understand the actual experience at that moment of history. "Mon hypothèse ici, c'est que l'histoire de l'arrangement – du fait qu'un arrangeur est un *auditeur qui signe et écrit son écoute* – ouvre bel et bien la possibilité d'une *histoire de l'écoute en musique." [20]*

Placing abstraction along a gradient that shifts between original material and altered material is one perspective, but it is a vaster and more complex exercise to situating it among the many past and current practices whose aim, in working with pre-existing material, is to *compose a transformative new work*. There are countless possible approaches, and no two are exactly alike. What is interesting to note, however, is that the relationship of composer to pre-existing work persists through time and musical genre. Considering any of these compositional approaches independently of others in a disparate manner may allow insight on a single composer or technique but sacrifices the larger picture of how they interconnect. J. Peter Burkholder eloquently argues this in his thorough survey of the history of musical borrowing: "If we see all kinds of borrowing as interrelated and pay attention to all the uses of existing music in any particular work, we can only enhance our understanding of each borrowing procedure, each composer or era, and each piece."[21] The focus and perspectives in the art practices shift and evolve, and technology changes and influences, but there will always be composers engaging with pre-existing work in some manner. Whether to create an explicit dialogue, to use solely as a poietic compositional device, to use representationally, for humor and irony, to pay homage, or to criticize, it is a fundamental relationship that composers have exercised and evolved over centuries.

Parallel practices

The table below, Figure 3, shows a broad overview of the range and variety of compositional practices mentioned above. It plots these relationships both in parallel and in gradient with each

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[19] Peter Szendy, *Arrangements, dérangements : La transcription musicale aujourd'hui,* Paris, Ircam, L'Harmattan, 2000.
[20] Michel Chion *et al.*, *L'Écoute,* Paris, L'Harmattan, Ircam, 2000. Emphasis added.
[21] J. Peter Burkholder, "The Uses of Existing Music: Musical Borrowing as a Field," *Notes (Music Library Association),* Second Series, vol. 50, no. 3, March 1994, p.859.

other. This table, far from being exhaustive, simply illustrates the persistence of practices of interaction with pre-existing works across different aesthetics and genres, and places them along a gradient of alteration of the original work, thus illustrating the wide range of purposes that these various transformation practices can achieve.

Figure 3. –   Compositional transformations of pre-existing works

pre-existing work → gradient of transformation →					
transcription	adaptation	reference		reconstruction	
transcription	arrangement				abstraction
	orchestration				completion
	variation	citation	hauntology		cryptogram
	works composed over existing C.F. melody (organum, motet, hymn, chorale, etc.)	transformation through audio processing (sound collage, plunderphonics, remix etc.)	[arrow]		
	use of pre-existing melody as theme in new form (e.g. sonata)		stylization, imitation, pastiche	intertextuality	[arrow]
	versioning	turntablism / scratch artists	[arrow]		
	covers	sampling, mixing, deformation	[arrow]		
		improvisation	[arrow]		
		quodlibet	[arrow]		
		mash-ups	[arrow]		

Most the techniques and examples listed in the above table are fairly established and well-defined relationships that composers have explored with pre-existing music throughout history. Below I'll discuss several approaches taken from this table, with the intention of drawing less common and obvious lines between some better documented techniques alongside less common approaches and perspectives in music composition.

Given my interest in the overall auditory experience and not just formal musical auditory memory, it is important to conjure not just music of our past, but sounds that evoke musical devices and processes of the past. *Hauntology*, a term coined by Jacques Derrida in his *Spectres de Marx* (1993) combines the terms 'haunting' and 'ontology' to evoke the idea of coexistence of present and past, of the living and specters. "Hanter ne veut pas dire être présent, et il faut introduire la hantise dans la construction même d'un concept. De tout concept, à commencer par les concepts

d'être et de temps. Voilà ce que nous appellerions, ici, une hantologie."[22] Katy Shaw, in *Hauntology: The Presence of the Past in Twenty-First Century English Literature*, refers to the duality of this term in its paradoxical definitions:

> In dissolving the separation between now and then, the specter points towards the dual directions of hauntology – the compulsion to repeat the past, and an anticipation of the future. Haunting its own ontology, hauntology draws attention to the ephemeral nature of the present and offers the specter as neither being or non-being, alive or dead – the ultimate conceptual, and cultural, paradox.[23]

By the new millennium, Hauntology resurged as a popular criticism in music as composers confronted the loss of the future. Electronic music, which for a time had been synonymous with the future, became dated itself and creators began looking toward or being haunted by the past, their relationships with sounds and tools of the past providing ways to move into the future. Naturally an interest in the past draws inspiration from recordings on older physical media such as vinyl, cassettes, etc. This interest leads to the search for a certain emotional familiarity within the content, the recording and archival mediums for the works themselves, the hiss and crackle of vinyl, a scratch in the record, or the warbled over-played sound of an old cassette all seeped into the treatment and interpretation of the sounds themselves. Accepting the past and present as coexisting allows us to study musical codes and idioms from the past in a more innovative way. By allowing these fragments of the past to 'haunt' and interact with our present voices, we can renew, re-contextualize, and ideally question these forms.

When we speak about composing with pre-existing work, the most commonly used technique is *citation*. A composer famously known for his use of this technique was Charles Ives. In examining the rationale and various techniques of Ives' use of citation, Kurt Stone remarks:

> [The quotations] seem to have been chosen largely for their non-musical connotations, picked for the role they have played in Ives's personal life. Consequently — since their musical characteristics have been all but disregarded — one cannot escape the suspicion that musically speaking any other tunes would have done just as well...[24]

Ives' use of citation is prolific and very varied. Some citations remain fairly intact and highly recognizable whereas others are embedded, more hidden and carry extra-musical associations that convey an underlying theme through the piece. These evocations of themes and familiar

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[22] Jacques Derrida, *Spectres de Marx,* Paris, Éditions Galilée, 1993, p.255.
[23] Katy Shaw, *Hauntology: The Presence of the Past in the Twenty-First Century Literature,* London, Palgrave MacMillan, 2018, p.2.
[24] Stone, Kurt, "Ives's Fourth Symphony: A Review", *The Musical Quarterly,* vol. 52, no. 1, 1966, p.14.

melodic fragments of songs, as in hauntology, work as devices both privately for the composer to discourse with past idiomatic material, and to explore and express our relationships to them.

It is important to look at perspectives and methodologies that interact with pre-existing work outside of music and sound art, as the word abstraction itself carries a well-established history in the visual art world. The literary term *intertextuality*, first used by Julia Kristeva, a Bulgarian French philosopher, has come to represent a very broad scope of literary devices. What these devices of reference, allusion, imitation, and countless others all share is the design and formation of meaning in one's text through its relationship with a past text. Montréal composer Jean Lesage, whose compositional methodology evokes idioms of our musical memory or history, uses this term to describe how we strive to create connections between present and past materials. His relationship to these sounds and idioms of the past recalls the notion of non-temporality where the past and present exist together. For Lesage, "there is no desire here to regain music's paradise lost. But rather I try to substantiate the utopian idea of a bringing together of all times into the fleeting moment. Have all eras: past and future, connect through a present-day intuition of musical time."[25]

Amongst the plurality of re-composition practices, a large majority exists in the world of electroacoustic and digital music. The techniques in this world that engage pre-existing music have had the most influence on my methodology of abstraction. *Sound collage* is a technique that points to both the musical score collage approach of Charles Ives and to a lineage of electroacoustic composers literally cutting and gluing tape to recompose and create new works. This relationship with pre-existing works continues to expand into practices such as John Oswald's Plunderphonics[26], the vast world of sampling, turntablism, hiphop, mash-ups, remixes, etc. Kid Koala, a Montréal scratch artist DJ and performer/composer, deforms and reconstructs pre-existing works both in studio and in live performance. He is also an avid collector of historic and vintage tools and instruments that he re-appropriates in his compositions and performances and pushes scratch artistry to a virtuosic level. Scratching, the turntablist art of controlling the movement of a record player in both directions to produce various pitches and rhythmic pulses and beats, transforms the work live, sometimes to unrecognizable points and with great precision.

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[25] Jean Lesage, "Compositional Interests," http://www.jeanlesage.net/en/compositional-interests, consulted 3 April 2018.
[26] Plunderphonics is a term coined by John Oswald in his essay "Plunderphonics, or Audio Piracy as a Compositional Prerogative," http://www.plunderphonics.com/xhtml/xplunder.html, retrieved 20 July 2021.

Kid Koala' interpretation of Henry Mancini's "Moon River"[27] was in fact the initial inspiration and launching point for my interest in abstraction and genre blurring in my written instrumental composition. The recognizable and idiomatic power of a classic song such as "Moon River," being manipulated between extreme points of warm familiarity and complete unrecognizability and experimentation brought to the foreground for me the effectiveness and importance of this juxtaposition of experiences and associations.

The important reflection on the diverse field and history of composers' engagement with pre-existing work runs directly parallel to the role our auditory memory and imagination play in how we compose. Therefore, studying these various processes their evolution over time can offer us a more profound understanding of the creative process. Reflecting on the boundaries between various acts of translation and adaptation and more transformative acts poses the question of what constitutes transformation and perhaps encourages a broader perspective on how we view creative work and creation in general. In addition, it encourages perspectives on past and current composers, defined not just by their creative voices but by their aural listening history. Vast and imperfect as it may always be, we can study how this engagement has evolved through history and perhaps even question how this engagement has been, and continues to be, influenced by the climate of sound creation, distribution, and consumption.

Abstraction: In Practice

Introduction

As introduced earlier, one of the aims of the methodology of abstraction is to present the *sensorial* rather than the narrative. Rendering auditory memory and imagination as a composed experience requires an approach that feels simultaneously highly intimate and subjective as well open and transferable and open to interpretation. To focus on the perceptual experience of the piece places a strong emphasis on a *human-centered* approach throughout this process. With computer assisted research, analysis, and manipulation and simulations of the material as integral steps in the process, the composer as listener remains the constant deciding factor. The *distillation of elements* is the most important part of the abstraction process, as it allows the audience to gain new perspectives on the material. The *extra- and intra-musical material* serves as anchor of

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[27] Kid Koala, *Moon River*, CD, Ninja Tune, XXEN018, 2010.

familiarity, both for the composer in the compositional process and for the listener. However, these anchors of familiarity are to be felt intuitively, not recognized cognitively as thematic or stylistic features. In this way, these works investigate my central research question: how do we hold onto and remember complex sounds like a symphony, or complex behaviour such as the patterns of a flock of birds? At what point of distillation and distortion do these abstractions lose any sense of identity, yet still retain their ability to activate emotional and unconscious memory associations? These questions aim to provoke the imagination and test the limits of how we can interact with pre-existing forms and parameters and create emotional affect and association.

Overview of methodological steps

Having introduced the principal aims of abstraction as a compositional process, I will now outline the typical methodological sequence used in the majority of the works written during my doctoral studies. I will introduce each step briefly, then develop further the more nuanced considerations for the more involved steps (marked with an asterisk in the overview).

Later, in the Analysis chapter, these steps will be elaborated and discussed in greater detail for each of the analyzed works. The purpose of introducing a standard methodological sequence here is to offer the reader anchor points of commonality across the body of works.

(1) **Question, point of inspiration:** Each piece originates with a curiosity or question that frames the experience, involving both intra and extra musical content. Even in cases where the structure and behaviour of the piece are informed by intra-musical material, the choice of those sources is initially inspired an outside conceptual idea. (For example, the hypothesis that sound never dies.)

(2) **Research:** This step in the process is the most variable from piece to piece. It involves research including the study of musical scores and active listening of musical and sonic material related to the concept. This step may include researching psychoacoustic phenomena and other scientific or historical texts about the subject in question. Basic principles discovered at this point often determine certain behavioural rules and relationships that will be developed in the piece.

(3a) **Form:** The point of inspiration directly determines the form. It can remain flexible to adjustments if necessary, but the macro form is always the first to be determined. This structure delineates what is being explored and questioned with the material used.

(3b) **Choice of source material**: This choice is made either in parallel to the form, or in some cases beforehand. These include intra and extra musical materials and are drawn from score, audio, and other research. At this stage, the general roles and relationships of these materials are set, though the specifics are determined later in the process.

(4) *Analysis of source material**: This step integrates the findings from the research step in the process to influence and further clarify the role and relationship of the pre-existing material in the transformed work. What is its purpose? This is sometimes clear when the material is chosen but is often deduced after an exhaustive traditional and perceptual based analysis. I do this using computer-assisted software analysis, traditional musical analysis on the score or transcription, and perception-based analysis of secondary parameters (e.g. more subjective analysis of experience). The use of computer-assisted methods helps greatly to understand and better articulate certain nuances of complex subject matter such as natural/acoustic phenomena, spectral composition, and emergent behaviours. The results of the computer-assisted analysis serve to inform – though not to dictate — what remains a human-centered, subjectively-guided methodology. Overall, this step aims to clarify which parameters of these complex sources are essential to their character and relevant to the piece. It is these essential characteristics that will be abstracted in the subsequent step.

(5) **Distillation of source material:** Once the exhaustive analysis of the extra-musical, sonic, and intra-musical material is completed, the distillation process begins. This includes the separation of the various parameters of the analysis into independent layers or fragments. These chosen elements vary greatly depending on the source and piece, from skeletal melodic pole notes to rapid fragmented stylistic gestures.

(6) **Determination of roles and manipulation:** With all the distilled material and structures extracted, the next step is to decide and map their role and relationships within the piece. The original impetus for the piece and the choice of source material itself determines how strong a presence each source will have and when and how it will develop throughout the piece. Also determined at this point is how the multiple source materials interact with each other. Preliminary choices about how to manipulate and distort the materials are made here, and continue to develop throughout the rest of the process.

(7) **Temporal mapping and continued manipulation of events:** The temporal mapping of events consists of placing the entry points of the abstracted parameters and materials, as well as

their variations and developments, physically on the macro form of the score. This requires a general estimation of duration for each section and sub-section, which can then be metrically and temporally mapped onto the score paper to delineate the macro and micro sections. This is where active audiation is most present in the process. I achieve this by audiating through the temporal structure of the piece and choosing the main entry points and pivotal changes in sonic events. I plot these events using post-it notes, or lightly sketching on the score itself. In addition to the placement of these micro gestures, their duration and general behaviour is equally noted, as some are fragmented and momentary in nature, whereas others are stretched and structural. In addition to temporal placement, there are also orchestral assignments of these parameters to one or several instruments. Also mapped at this point are the dispositions of the abstracted parameters and a preliminary mapping of the fluctuation and tension between moments of noise and tonality, familiarity and ambiguity, and in general their foreground and background relationship.

(8) **Technique and textural composition:** Before beginning the detailed left to right composition, there is a preliminary choice of instrumental techniques and general textural characteristics per section and layer.

(9) **Detailed composition:** This process is conducted left to right and begins with the primary tonal material that anchors each section. Once these are fully written out and developed, the secondary and contrapuntal voices are fleshed out, often acting as extensions or responses to the primary material.

Methodological steps: further considerations

I will now discuss some more nuanced considerations related to the more involved and complex steps listed above.

Of the above steps one of the most fundamental parts in this process is *analyzing* intra- and extra-musical material that engages me, the composer as an audience, in an experiential way. This desire to analyse and better understand certain subjective experiences and convey them to an audience is achieved by persistent listening to and audiating the work throughout the process. Here is where that importance of 'familiarity' comes into play in my methodology. The desire to engage yet surprise the audience means that the work needs to provide *access points,* or *anchors of familiarity* from which to manipulate and deviate. These points of accessibility are where the source materials interact. This allows a play on tension and release not only in the traditional

harmonic sense of dissonance verses consonance, but also with the weaving of abstracted familiar musical codes within a more contemporary aesthetic and schematic on both the micro and macro level.

Choice of Sound Material

The various types of source material can be grouped into four categories.

(1) Pre-existing musical works, either whole or fragmented:

These range from the sacred to secular, from ancient music to the 21st century, and draw both from classical and popular music genres.

(2) Psycho-acoustic phenomena, either in theory or from recorded examples:

As human intervention and perception is also key to my methodology, I am interested in the psychoacoustic elements at play within the human experience of these systems. The interest is on the deformation, and ephemeral representation of auditory sound and imagination, so real life distortions and auditory perceptions like the Doppler effect and hydroacoustics play an important role and are chosen parallel to the musical material as fundamental elements. The first acoustic phenomenon implemented, as an abstraction tool, was the cocktail party effect/problem (CPP)[28]: the ability to filter out extraneous auditory information to focus on a singular sound. It is uniquely interesting and applicable in this research as it touches on the aspect of human experience and perception, being a phenomenon unique to the human brain and non-translatable to a machine. In addition, fundamentals of hydroacoustics and in particular the human perception of sound underwater have informed some of my works. This involved researching the general characteristics of sound behaviour in air versus water, how sound propagates and how it is perceived by humans, and the consideration of environmental factors both natural and man-made (such as noise pollution).

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[28] The term "Cocktail Party Problem" was coined by E. Colin Cherry to describe the human capacity for selective auditory focus and recognition. Cherry, E. Colin, "Some Experiments on the Recognition of Speech, with One and with Two Ears," *The Journal of the Acoustical Society of America*. vol. 25, no. 5, September 1953, p.975-979.

(3) Environmental sounds/patterns: mechanical, natural, acoustic quality:

Environmental and mechanical sounds and behaviours such as cicadas, a mechanical loom, or radio static play an important role as secondary, and sometimes primary, layers interacting with and affecting the other parameters. They are the principal inspiration for the textural, rhythmic, and layered density of how the work evolves. This category also includes the acoustic character of the environment, whether that is the spatialization of the experience, or the actual distinct acoustic nature of the space(s).

(4) Spectral analysis of thematic objects, or instruments:

The last material category is the spectral analysis of certain thematic objects and sometimes the instruments engaged in the performance of the composition. These often serve as physical deconstructions to be presented temporally in an emphatic, fantastical manner.

Analysis and Distillation of source material

The distillation or deconstruction of the source material begins with the analysis of the perceived parameters of the entire piece. These analyses range from objective and traditional musical analysis of rhythm and pitch to exploring secondary parameters, sometimes highly abstract and subjective, such as emotional prosody, dynamic form, or range. Depending on the source material I am analyzing and what it evokes for me about the experience of the work, the parameters I choose to distil will vary from case to case. What's important is the perceived experience of the chosen parameter, whether it be the melodic pole notes of the melody, the timbral quality and nuance in technique in a single voice or instrument, or the fluctuating density of layers in an entire section movement. In all cases, I choose something that is particularly unique and distinguishable about the work. It is the fragment or layer that will interact as a structural identity, recurring motif, or timbral layer in the new work, with the hope of maintaining and conveying its original character and affect. Distilling this source material into abstract fragments, layers and forms allows them to be re-introduced and interwoven. The hybridity of the result is not intended to sound like collage, but rather a synthesis of multiple abstracted parameters. With more complex sounds, computer-assisted analysis aids greatly in pinpointing what makes these sonic patterns or impulse attacks so unique. What is the information that I am seeking to isolate and use as a structural or sonic template? Iannis Xenakis, one of the principal pioneers of integrating complex structures into music, explains his motivations as "the effort to reduce certain sound sensations, to understand their logical causes, to dominate them, and then to use them in wanted constructions; the effort to

materialize movements of thought through sounds, and to test them in compositions."[29] In my process, the software-assisted research happens primarily in AudioSculpt and Pratt for acoustic analysis, and Logic Pro, Ableton Live, and Paulstretch for manipulations like stretching, repeating, slicing, looping, and various other distortions. These manipulations serve my process by generating sounds and ideas which I then transcribe to instrumental gestures, either by ear or sometimes with computer assistance for more precise notational transcription. The traditional analysis of pitch, rhythm and form is executed on the physical score, or via transcription when no score exists. In addition to these primary musical parameters, secondary and skeletal elements are given equal importance in the analysis. This includes the identification and extracting of pole notes, important harmonic pivot points, as well as compositional climaxes and other weighted points of importance. Other examples of secondary parameters are expressive interpretive qualities, the acoustic quality of the space, and even the dynamic structural map of the work. These are also notated on the score to create a synthesis of the visual and auditory analysis as well as objective and subjective qualities. Therefore the end analysis is equally weighted between qualitative and quantitative information. This allows for general associations and correlations between the two.

Determining roles and manipulating materials

Once all the material has been chosen, analysed, and extracted, its role and behaviour in the piece needs to be more clearly defined and developed. Aspects of why certain source materials are being used are partially defined at this point, purely based on the concept. However, the analysis of the material often heavily influences its capacities and limitations. Therefore, implementation and mapping of these elements continues in more detail once analysis is complete. One of the principal considerations is whether an element is being used for *poietic* (process) or *esthesic* (reception/perception) purposes. Although the choice of most material aims to have an esthesic role, the reality is that once analyzed and distilled it becomes apparent which will hold a more structural and compositional process driven role within the work.

Types of manipulations

Although the manner in which the material is manipulated and distorted is fairly diverse and each piece approaches it in a unique manner, there are a few consistent manipulations worth

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[29] Iannis Xenakis, *Formalized Music: Thought and Mathematics in Composition* (Harmonologia Series No. 6), Stuyvesant, New York, Pendragon Press, 1992, p.ix.

introducing here. The way material is treated is influenced equally by the interest it provides and the intended role and purpose of the material. My approaches to transforming the material can be roughly grouped into four categories, with evident overlaps and hybridizations, as will be shown.

Category one encapsulates material that is extracted and used on a *macro* level: entire forms and/or significant large phrases/sections of the work. This material is often the skeletal melodic and harmonic pole material of a source. This often comes from strong melodic and harmonic functional devices, (e.g. leading tones, perfect cadences, etc.), that serve as highly dilated and distilled anchor points for a section in the new work. Through extraction of important pivotal vertical and/or horizontal moments, they anchor the interweaving textures and contemporary techniques stretched between them. The distillation or stretching of these lines loses all recognisability, while maintaining rudimentary elements of tonal functionality. These anchored moments can also be offset, contracting or dilating between each other, creating a more blurred, and heterophonic approach. This gives an added layer and aspect of diffusion to the result. These horizontally stretched and diluted layers, when juxtaposed with other planes of tonal functionality, add an even denser element of superposed playback and cross-fading between each other. Overall, the macro level, in addition to creating tonal functionality and structure, focuses on layering and fluctuation between aligned and focused environments and denser layers and polyphony.

Category two focuses on the more detailed *micro* level of melodic, rhythmic, and textural gestures and figures. The choices of manipulation here are highly variable depending on the concept of the piece, but can be broken down into a few commonly used manipulation devices:

(1) **Melodic and harmonic deterioration and distortion** with heavy textural additions to the harmonic/melodic pole notes of techniques, including: flutter-tongue, multiphonics, extreme pulsating changes in dynamics, harmonics, glissandi, exaggerated vibrato, exaggerated bow pressure, etc. These techniques aim to create a distorted or faded quality of the tonal memory of the source material, whether temporarily, systematically between pole notes, and/or gradually increasing or decreasing over time**.**
(2) **Fragmenting** partial melodic or harmonic elements to create a dialogue or synthesis of multiple melodic or harmonic sources via: interweaving fragments together in counterpoint, superposed and layered fragmented material, direct fusing of head and tail of multiple sources to create new fragments, and interlocking fragments using common melodic or harmonic pivot points.
(3) Extraction of brief **melodic-rhythmic motifs** that hold stylistic identity and not melodic or harmonic importance. Here the pitches are changed, and intervals slightly deformed, but the rhythm and phrasing remain the same.
(4) **Parameter pairing and fusion.** As the name suggests, this involves pairing complementary parameters from contrasting sources into fused new material, creating

new parameters that can then potentially be manipulated again and re-used. This manipulation will be discussed in my analysis of the work *Arras*.

Category three is a small but distinct approach to manipulation that focuses on the *imagined, inaudible, or barely audible* sounds of a source. This technique is almost exclusively employed when the conceptual interest of the work surrounds the sound of the space, the imagined decay or aging of sound, or the representation of ghosts and spirits. Among the more prominent instances of this type of manipulation are:

(1) creating an exaggerated reverberation tail of the sound via stretching and *extreme temporal and timbral distortion* of the last expressed attacked note, and
(2) spectral analysis of certain sounds, where the audible frequencies are cut and the **inaudible, but visible, pitches are made audible** and composed into the piece like the shadow or ghost of the sound. They are also often stretched and connected together to create more continuous melodic lines lingering in the air.

Category four focuses on the manipulation and distortion of the *temporality* of sources. It overlaps with the other three categories, but is worth singling out as a distinct type as the temporal domain is one of the more transformative and predominant manipulation types. Just as category one focuses on extreme distillation and stretching of materials to create structure and anchors of a piece, and category two focuses on the micro fragments often expressed as interruptions or passing fragments, one can imagine the potential created by *simultaneous, contrasting temporal planes*. Other temporal distortions worth mentioning are *momentary temporal stretches,* felt as pauses, within a more coherent melodic phrase or harmonic progression. These are intended to be experienced as suspended time. This can be placed also within a background layer with even more extreme stretched moments, that are potentially continued and resolved in other voices, but are sustained in another instrument, or pre-recorded playback, to be felt as frozen time. Another prominent temporal distortion is *looping***,** not in a strongly rhythmic sense, but rather as an evocation of memory rehearsal. This can be approached in a much more complex manner if the looped material is manipulated slightly differently at each repetition, as if recalling the memory slightly differently each time and thus gradually distorting the original version.

Types of roles

In some cases, the way source material is manipulated correlates directly with the role that material plays in the new work. However, the relationship between type of manipulation and role played is not always direct. It is therefore worth listing certain fundamental ways these sources are utilized. The first two categories, (1) structural and organizational roles and (2)

representational devices, correspond respectively to the macro and micro manipulation types described above.

(1) **Structural and organizational:** When substantial sections of source material are distilled down to skeletal pole melodic notes and harmonic points on a macro level, the role they play in the piece is naturally structural and organizational. The musically coded melodic and harmonic pole materials are the structural anchors upon which the more highly distorted material can be aurally organized. This is akin to a contemporary setting of a cantus firmus or basso continuo formed from the skeletal source material. However, this structural approach sometimes integrates momentary fixed harmonic moments and often features extreme temporal distortions. Also within this category is the integration of the distilled and stretched material as singular layers in superposed over multiple other layers. This layered, 'sonic landscape' oriented approach can create a unified and more complex sonic environment with polyphonic, aurally distinct, independent layers.

(2) **Representational devices:** Melodic-rhythmic figures manipulated and created on a micro level often function as representational devices in the extra-musical narrative conception of the piece. These types of representational objects and themes range greatly from piece to piece. For example, the integrated source materials can represent a particular memory, a person that memory symbolizes, different temporal planes or time periods, ghosts or spirits, the act of connectivity and signal, or a collective/ancestral memory or identity.

(3) **Sensorial-memory narrative devices:** Considering my over-arching theme of experience and auditory memory, the abstracted source material can also be used as a sensorial-memory narrative device. Although these integrative approaches overlap with some of the previous ones – superposed layers creating sonic environments, representation of connectivity – their intention within this category is unique to human-centered sensorial experiences. They can act as a representational tool to express connectivity or signal through extreme fluctuations in dynamics as well as shifting the balance between noise – exaggerated texture, distortion, and/or non-pitched techniques – and more coherent tonal language. These same contrasts can also act to express levels of distortion, and hence emotional affect/impact, in an episodic or flashbulb memory. Another overlapping example is the superposition of diffused multiple layers. Whereas they function simply as structural devices in mapping density and complexity throughout the piece, they also play an important role in the sensorial experience of the piece. It evokes the CPP (cocktail

party problem) when layers are dynamically composed to direct the audience's focal point of attention through cross fading, extreme dynamics, and orchestration. Another prominent function of human-centered experience is the illustration of the *reconstruction of memory*. The act of remembering and the act of forgetting can be expressed with looping and repetition, with each iteration slightly altered or heard from a different perspective.

(4) **Construction of contrast:** Lastly, a broader and overarching theme in the purpose and role of the abstracted materials is in the construction of contrast. This contrast can be expressed and employed in several ways: blurring, juxtaposition, and dialogue of contrasting musical genres and/or musical periods, creation of overall sonic environments to shape imagined acoustic spaces formally, and the creation of multiple temporal planes through extreme stratification of contrasting materials. This role and integration is where the approach/tool of defamiliarization, as introduced earlier, becomes relevant in employing and delineating contrasting environments to project new perspectives on familiar sounds.

General resulting approaches

These roles and implementations are dynamic, with some utilized in every piece and others used uniquely in just one or two. However through the post-analysis of these works and devices do show three basic categories of the resulting focuses of the above parameters and how they behave and relate to each other.

The first, and most common is when the abstracted material is primarily used to **represent figures, themes, and sonic environments.** In these works, the sources drive the dialogue, thematic development, and often structure of the piece. They are presented as both esthesic and poietic devices. Works less focused on extra-musical narrative, and aiming to express a more **sensorial experience** use the abstracted material to illustrated focus in attention, heightened emotional affect and cognitive attention. These works place more emphasis on the tension between blurring and focus, fluctuations of temporal planes, and the use of musically coded tonal anchors to anchor them all. These works are generally more focused on the esthesic nature of the piece as experience. The third category of thematic focus of these abstracted materials is the focus of the **source material itself as the principal subject.** Here, the abstracted source is not utilized to create sensorial experience of memory or represent other extra-musical materials but is presented as a three-dimensional material subject that exists on its own. These works focus on the materiality of sound and imagined sonic characteristics of the spaces it exists in. There is much

overlap and cross-pollination between these above-mentioned approaches. As we will see in the analysis chapter where the works are categorized by shared conceptual themes and within each category these above focuses do not run neatly parallel.

Chapter 2 Conclusion

We learn more profoundly about and challenge our identities as composers when we confront and interact consciously with our auditory memories and aesthetic preferences in a broad range of contrasting genres of music. Therefore it is important and informative to question and defy as well as fuse the genres from which we derive source material and inspiration. Interweaving these abstracted sources within our own compositions helps to explore and further define our creative voices from the perspective, not purely as a creator, but as a listener constantly engaged. To clarify, intentional or not, this is, at some level, what all creators do, but the interest here is to harness it consciously and reflect on how it impacts and influences each work. In addition to being a tool to shape and reflect on one's own compositional voice, working with these abstracted parameters allows the composer to actually be an active listener within the process. When working with familiar material, particularly musical, the composer can oscillate between their learned expectation and desire of the experience they want to form and compose. Through this engagement with pre-existing work, we can actively distort an already formed and familiar auditory experience. The principal aim is to create new sensations, associations, and experiences through these reconstructed interactions of abstracted parameters.

Chapter 3: Analysis of Works

Introduction

In this chapter I will present the analysis of several chosen works that best illustrate the questions and subjects of interest described in the previous chapters. Each of these pieces informs and contributes to the continued development of the methodology of abstraction. Although the process moving from piece to piece developed my language and methodology in an organic creative manner, I found that after looking at them every work placed stronger emphasis at different points and aspects in the compositional process. The point of inspiration for each piece also notably influenced these changes and shifts between pieces, beyond simply aesthetic reactive adjustments to previous works. Having built a larger body of work over the past few years has allowed me to reflectively understand better both the conscious and subconscious intent and interest in each piece. In this section I will discuss and analyze the chosen works grouped into three subcategories defined by their shared common traits. Perhaps not fully coincidentally these three categories are almost perfectly chronological. For each category I will define and introduce the overarching inspiration and reasoning for grouping them both through their shared theory and methodology. I will then introduce each piece individually with weighted analysis on these shared attributes. However, part of the interest in these groupings is not only to see the common link that is developed, but also to see how these common interests are explored in contrasting ways. The pieces will be introduced and analyzed as follows:

(1) **Echoic memory: in dialogue:** *Ebb, Salt, À perte de vue...*

(2) **Echoic memory: in space (excavated sound):** *Tenebrae, Dust, Echoic Memories*

(3) **Echoic memory: as an identity:** *Arras, Hōrai*

Echoic memory: in dialogue and narrative

Ebb, Salt, À perte de vue...

My entire interest in working with pre-existing musical material started with these three pieces, *Ebb, Salt,* and *À perte de vue.* The development and evolution of focusing on auditory memory came about very organically as I spent about half of my compositional time listening to other works and sounds and analyzing them. Reflecting habitually upon pre-existing sounds and works forced a deep listening approach where I noted points of familiarity, my emotional response to the piece, expectation and deception within the musical language, and any unique parameters of interest in the piece. *Ebb* was clearly the pivotal piece bridging my earlier interest in emergent behaviour (flocking of birds and other environmental patterns) into working with intra-musical material. Looking to create a more nuanced and thematic shift between the contrasting sections of *Ebb* that represented swarm movement in water and air, I included abstracted musical materials that were representative of these two environments to be used exclusively in their respective sections, eventually blurring between the two of them. I will discuss this in more detail in the analysis of the piece itself, but it is important to note here as it was the reason why I began considering intra-musical material as a tool in itself.

The general common points to these three works are: (1) approach to sensorial memory in a linear, narrative manner, (2) use of pre-existing musical material as a representational tool, and (3) points of inspiration more personal and subjective to me as a composer. The order of these pieces as presented is chronological and demonstrates the discovery and development of the theme of auditory memory throughout the works. The subtitle 'in dialogue and narrative' points to two over-arching common aspects found in these three pieces. *Dialogue* refers to the particular use of intra-musical material in these three works, and how they interacted, or dialogued, with each other. Each of these pieces uses material derived from pre-existing work as representational figures or themes. These themes are then place in various forms of dialogue with each other, either to illustrate contrast or synthesis between two or more sonic environments. These dialogues can exist at various levels: formal in the case of *Ebb*, melodic in *Salt* and *À perte de vue.* Also, within their role they can work to synthesize by emphasizing points of commonality and interweaving (*Salt*), or by maintaining differentiated qualities of timbre, orchestration, and temporal identity (*À perte de vue…*).

As mentioned earlier, a general commonality among these pieces is their more personal and autobiographical conceptual themes that hold strong emotional association for me. Therefore one of the aims and curiosities in implementing these materials was to reflect on what elements of these works are meaningful to me and why, and how these can be conveyed musically. Their emotional impact is sometimes due to learned associated value to an extra-musical event or person, but the associated emotional impact embeds itself into the piece. Sometimes the emotional quality of the piece comes from listening to the work itself. A secondary element common in these works' choice of material is the focus on contrast, both in genre and time period. This quality had more importance in this group of works due to the desire to create a clear sense of dialogue. To illustrate dialogue, one needs to convey multiple voices and delineate boundaries between them. I was also interested in the tools of defamiliarization and genre blurring and how much they are felt, especially when these points of contrast and inspiration are distilled and abstracted within a work.

These dialogues can occur on a macro level, formally shifting between sections, or on a micro level, interweaving or superposing melodic seeds. The focus in using the intra-musical parameters as representational voices in a dialogue meant that they were implemented either as melodic seeds whether interwoven, juxtaposed, or superposed, or as structural melodic/harmonic pole material which was highly temporally distorted to create a sonic environment within a section of the work itself. These are the transformations and implementations I will focus on in the following analyses to illustrate the desired effect, the process, and the result.

What are the elements of these works that have had a personal impact on me? What are the distinct and interesting parameters to therefore distil and use? Can I convey the emotional significance of my own emotional association or sensorial memory to a listener? These are the questions I aimed to explore in these pieces. What level of abstraction of these parameters renders a potentially esthesic gesture purely poietic?

What is lost in translation? The goal is not for the listener to recognize the source material, but to realize that there are two very different types of material at play: emulating or recreating the experience of melodic memory or audiating, where two musical memories come into dialogue.

The word *narrative* is important to touch on in addition to *dialogue*. Whereas the dialogue aspect of this series of works concerns the analysis, processing, and implementation of intra-musical material only, 'narrative' pertains to both intra- and extra-musical material. Other sonic and

rhythmic behavioural analyses serve as important figures and points of inspiration for each piece. These include psychoacoustic phenomena like the Doppler effect or cocktail party problem (CPP), or textural interpretations of the mechanical sound of a plane, technical glitches, or the very human-centered experience of hydroacoustics. These are all more impressionistic in their nature, but interact in parallel and sometimes in tandem with the intra-musical material, creating an overall sensorial experience.

This series of works had a huge impact on my methodology, being the first steps towards my interest in echoic memory abstraction as a methodology. It did in fact lay the groundwork for what became a whole new compositional process for me, that although constantly developing and expanding, formed the majority of its principal abstraction tools within these three pieces.

Ebb

2018

[fl/bfl, ob, 2bcl, cbn, hn, tpt, tbn, perc, pno, 2vn, va, vc, cb]

Duration: 13-14 minutes

General introduction and concept

Ebb was written during my residency with *Le Nouvel Ensemble Moderne*, a residency I began at the end of my master's studies and completed during the first year of my doctorate. The piece was premiered by le NEM and conducted by Dina Gilbert, on June 8, 2018 at Bain Mathieu,[30] Montréal. As this composition straddled the transition between the end of my master's and beginning of my doctorate, and after my preliminary explorations in several pieces of flocking behaviour in starlings, I decided to use it as a synthesis of the gestures I had studied and applied to my musical forms and melodic-rhythmic gestures. In researching the behaviour of starlings and birds in general, I found that the most in-depth studies, of animal auto-organization, focuses on schools of fish and their shoaling behaviour. My interest in these emergent systems was not in the algorithmic precision of these phenomena but in applying the general rules and principles of their behaviour to my musical gestures, as with previous pieces *ere, les étourneaux,* and *Murmurations.* However with *Ebb* I took an even more fantastical approach to the musical interpretation of these movements as I used, and combined, both environments of air and water, thereby juxtaposing the figures I had already explored and established to represent flocking in birds against very similar behaviours of shoaling in fish. As the rules and movements carry many parallels, I chose to highlight the contrast in the impressionistic sonic imagining of their soundscapes. In terms of behaviour, the auto-organizational 'no-leader' characteristic is the principal organizing factor in how the melodic-rhythmic motifs act and develop. Motifs move and develop by listening to one's neighbour. The louder and/or more aggressive the motif, the more rapidly it is transmitted.

The movements of the birds and fish, taken in isolation and abstracted from their environment, become strikingly similar. I therefore decided, in this formal alternation between the two different environmental states, to underline not simply their behaviour but the contrasting sonic environments in which they move. This led me to deeper research in hydroacoustics, as mentioned above. I began with a concrete study of the movement of sound in different states, with

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[30] Bain Mathieu is a former public bath house originally constructed in 1930 later renovated to function as a multifunctional venue for music and social events.

the focus on water and air. However, I then realized that my interest wasn't purely in the physics of how sound waves propagate in these mediums, but also how humans perceive sound in these two different environments. As in all my explorations, the one constant is the imagined experience. There are so many variants and complexities in the comparison of how sound behaves in these two environments that it was impossible to incorporate them all into this piece. I therefore focused on a few primary observations upon listening to underwater field recordings, to use as defining characteristics in the composition. The most distinguishing figure of underwater recordings is the muffled, and chorus-like effect of underwater sounds and movement. Since sounds created underwater mostly stay underwater, and the sea surface and seabed act as giant reflectors for the sound, the underwater environment has a very reverberant nature, with a saturation of pitches blurring together. Although sound travels five times faster in water than in air, the muffled and chorus effect, and resulting blurring of the underwater sounds creates an illusion of slow-motion to our ears. Most importantly in regard to human perception, the human ears designed for airborne propagated waves are not adapted to hear sound efficiently in water. In these environments we 'hear' sounds through the bone conduction of our skull, essentially using our skull as a giant microphone. Due to this, we lose all directionality, combined with the fact that we cannot shut out sounds that our bones are conducting. So although seemingly muted, underwater sound is relentless, and creates a sense of claustrophobia.

As mentioned earlier in the introduction to this series of works, the *dialogue* of intra-musical material can happen on various macro or micro levels within the piece. The dialogue between the two pre-existing works in *Ebb* acts to create contrasting sonic environments for each distinct section within the form of the work. The form of *Ebb* breaks down into five distinct sections (see Figure 5 below). As I was delving into this impressionistic world of the underwater for the first time, most of *Ebb* is spent in this sonic environment. Additionally, I knew I wanted to keep the listener in that environment for long enough to create tension so that when finally released into the air section the contrast and shift in frequencies and techniques would offer a sense of relief. The general qualities I attributed to each section to differentiate between them were (1) defined *frequency* allocation (and movement between registers), (2) *articulation* and attack, and (3) *speed* of motifs and trills/tremolos/vibrato, contrasting melodic themes, and contrasting 'lead' section. For the underwater sections, I focused on low and high frequencies with a sort of muted and blurry middle section, whereas in the air sections the mid-range frequencies are more present. More importantly, in the underwater sections I aimed for a more static and fixed quality in the pitches

with separate layers moving in and out of focus, whereas in the air, individual instruments would occupy a much more dynamic and expressive pitch range. Presence of attack and general articulation was used in the air to contrast the muffled and warbling texture underwater, as were extreme changes of speed in glissandi, trills, tremolos, and vibrato between a slow undulating and detuning sensation underwater against a frenetic and fluttering texture in the air. See Figure 4 below for the list of contrasting techniques employed.

Figure 4. – *Ebb :* contrasting techniques and resulting perceived environments

		water	air
techniques		slow vibrato (detuning)	rapid vibrato, trills
		slow glissando (often downward)	glissando (often upward)
		air	air (articulated attacks, flz.)
		soft mallets (perc)	medium mallets (perc)
		multiphonics (brass)	melodic ornamentation
		superball (piano, perc)	harmonic trills (strings)
		focus on low range of instrument with some very high pitches	circular bowing (strings)
			exaggerated bow pressure (strings)
perceived environment		**frequency:**	**frequency:**
		- no sibilance	- sibilance present
		- focus on very low and very high register, gap in mid range	- conventional balance of pitch ranges
		articulation:	**articulation:**
		- blending of pitches	- mostly distinct clear pitches
		- no articulation (muddiness)	- presence of articulations
		speed:	**speed:**
		- slow motion	- focus on rapid gestures

Figure 5. – *Ebb :* table of form, theme, and sonic environment

section	1	2	3	4	5
measures	1 - 20	21 - 44	45 - 64	65 - 152	153 - 220
sonic environment	air	underwater shallow	underwater deep	underwater/ air	air
theme	*Moon River*	*Tsintskaro*	*Tsintskaro*	*Tsintskaro/ Moon River*	*Moon River*
orchestral foreground	high strings	brass	brass, low strings	brass vs strings	strings, perc, pno, woodwinds

Centered and anchoring these gestural behaviours and timbral qualities are the two principal melodic musical themes. As I was creating a formal contrast between a static, slow, and meditative state and a dynamic and more expressive one, I decided to use melodic seeds from contrasting materials that mirrored them. The two musical source materials for this work were the Georgian folk song "Tsintskaro" and Henry Mancini's "Moon River". Whereas with other sources had more pointed specific autobiographical significance, these two were chosen and juxtaposed for their contrasting harmonic nature. For the underwater theme and sections I took melodic fragments from a popular Georgian folk song titled "Tsintskaro," which translates to 'at the spring water.' This piece has a slow, haunting melody that remains quite static over a held bass note, with the melody often wavering in pitch and often in descent, around held notes often a 4th or 5th above the bass (see Figure 6). For the air theme and sections, I integrated melodic seeds from Henry Mancini's "Moon River," a cinematic and nostalgic gem that is endlessly lifting in its melodic fragments, and lush and romantic in its harmonic movements (see Figure 7).

Figure 6. – *Ebb* : source material from "Tsintskaro"

Figure 7. – *Ebb* : source material from "Moon River"

Extracting melodic seeds, usually 2-3 notes, and distorting them either temporally, or by noise and register, my aim was for these thematic materials to further emphasize the shifting between these two states in the form (see Figure 5, above). Aside from the brief air intro in measures 1-20, the piece spends the majority of time in the underwater environments transitioning from shallow to deeper water, which is simply represented as increased expressivity and extremity within each of

the technical parameters assigned to the underwater environment. Section 4 of the piece alternates fairly frequently between the two states, creating a gradually increasing tension that is finally released into the final air environment in section 5. Figure 8 below demonstrates the transition between the air theme (m. 99-104) and the water theme (m. 105-107). In addition to assigning recurring melodic seeds to identify these formal states, I also assigned sections of the ensemble to be the thematic and foreground voice in each. Thus air was represented by strings, and underwater by brass. The woodwinds act as a background reflection and transitional voice between these two states, both to seam them together and to create dissonance against them. In Figure 8 we also see the thematic 4ths and 5ths of the "Tsintskaro" theme in the brass and woodwind section begin to introduce themselves in measures 105-107.

Figure 8. – *Ebb* : water theme, m. 99-107, fl, ob, b.cl, b.cl, cbsn, hn, tp, b.tbn

Harmonically it establishes a meditative, static, drone-like environment with stable 4ths, 5ths and octaves primarily in the brass section. The stable quality of these intervals creates a sudden shift to a sense of suspended time. The wide, wavy line above most of the pitches in this section indicates a wide and slow detuning vibrato (speed of 1 sec). This is intended to give an impressionistic sense of our human perception underwater of slow motion, as well as the warbled sound. In reference to the lilting vocal wavering of the higher voices in Georgian chant, the flute and oboe ornament their held harmonies with chromatic oscillations in tuning.

Whereas the water sections favour intervals of 4ths, 5ths, and octaves inspired by Georgian chant, the air sections turn to the contrasting harmonic language of 3rds and 6ths. In addition, as mentioned earlier, the orchestrational focus of each section's driving motif and melody shifts between brass in the water sections and strings in the wind sections, with the woodwinds acting as support and transitional voices. Whereas the stable intervals and held pedals in the underwater sections create a static temporal energy focused on timbral and textural modifications, the use of more disassembled triadic intervals of 3rds and 6ths propel the narrative of the air section forward, creating a clearer harmonic relationship between tension and release. The ascending intervallic themes of Mancini's "Moon River" are exaggerated in the long rising vibrato interval in violins 1 and 2 as seen in figure 9 below. As well, the strings' textural focus on harmonic trills, glissandi, rapid vibrato and often ascending melodic seeds instils an ambiance of heightened expectation, liberated musical articulations and lightness.

Figure 9. – *Ebb* : air theme, m. 97-105, vln1

The formal alternation between the air and water sections acts as a macroscopic call and response of tension and release, with intensifying romantic harmonic language releasing into stable and

neutral harmonic language. Conversely, the denser timbral qualities of the brass and gongs used in the water section create a sonic tension that is released into the lighter and forward propelling musical language of the air sections. The assignment of contrasting musical attributes as well as thematic materials to the shifting environmental sections of the piece allowed me to experiment with the possibilities of creating musical identities to an impressionistic and imagined physical state of a piece. As the thematic material is quite abstracted and not used as a citation, but rather in fragmented melodic pole notes, the question was whether the dilution of these themes using certain musical properties (articulate/muted, register changes etc.) was enough to create a sensation of shift in acoustic medium.

Salt

2018

String quartet

Duration: 9 minutes

Salt was composed during my second year composition master class with Maestro Salvatore Sciarrino at the Chigiana Academy in Siena. The work was premiered on July 20th, 2018 at the Palazzo Chigi-Saracini by *Quartetto* Prometeo. Salt absorbs experiences and memories of experience cumulatively, like a sponge. Although the form is built around two incidents – technological noise glitch in a conversation, and the distorted memory of a conversation about two melodies – it essentially is music describing a conversation about music. The ostensibly extra-musical inspiration of this piece is in fact arguably musical in nature, but through the intermediary of distorted memory, dialogue, and technology. During an online Skype conversation with a friend, we were disrupted by the pulsing tone of a truck backing up on his end of the call. Due to poor connection, this sound created a feedback of pulsing delays of the tone, G4, mixed with distorted static and white noise. It was such a unique sound that I immediately pulled out my phone and recorded it.

> Je me suis dans un premier temps concentrée sur l'axe son/bruit pour élaborer soit des phrases musicales, soit des formes plus importantes, et façonner par ce biais les tensions intérieures de la musique. Dans un sens abstrait et atonal, l'axe son/bruit peut d'une certaine manière se substituter à la notion de consonance/dissonance. Une texture bruitée et granulaire serait ainsi assimilable à la dissonance, tandis qu'une texture lisse et limpide correspondrait à la consonance. Il est vrai que le bruit au sens purement physique est une forme de dissonance poussée à l'extrême.[31]

Building off the "noise/tone axis" that Saariaho discusses in her book *Le Passage des Frontières,* I use a similar axis, but not only as a replacement for harmonic tension and release. As mentioned earlier, what interests me is the use of idiomatic melodic and harmonic sensibilities that are disrupted, distorted, and blurred. The relationship between noise and tone is not purely about tension and release for me, as I believe we can find so much tension in tone, and so much release in noise. I am interested in offering an accessible and sometimes recognizable idiomatic access point for listeners to enter into pieces, and then disrupting and distorting their experience.

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[31] Kaija Saariaho, *Le Passage des Frontières : Écrits sur la musique,* Paris, éditions MF, 2013, p.85-86.

During the conversation that inspired the piece, my friend and I discussed the emotional power of nostalgia within music and songs that had had a particular effect on us. Specifically, we discussed "La Chanson d'Hélène" by Philippe Sarde, and Roberta Flack's rendition of "The first time ever I saw your face" by Robert MacColl. This literal dialogue about these two works was the impetus for creating an abstracted musical dialogue within my composition. After the conversation, I found both songs stuck in my head, but distorted and interwoven with each other. In my head I had transposed them to share a common tonic and after repeated audiations alternating between them, I began to blur the two together by finding common pitch pivot points. I then asked myself, how could I translate this conversation, and this distorted recollection of the conversation, into musical form? Their momentary passage through my consciousness had distorted in my memory until they essentially begun dialoguing with each other. My experience of this remembered conversation directly inspired the form of the work and how I would integrate these melodies. Where in *Ebb* I had alternated between contrasting thematic environments by dividing them into sections, in *Salt* I chose to interweave them on a more microscopic level, in melodic fragments throughout the piece. Figure 10 below shows the melodic seed fragments of "The first time ever I saw your face" rising and distorting in the first violin and cello. The inner voices of the second violin and viola represent harmonic fragments from "La Chanson d'Hélène" that enter slightly offset, drawing the ear away. This oscillation of attention back and forth between the two pairs helped spatially organize the sound within the quartet.

Figure 10. – *Salt :* integration of melodic seed fragments, m. 92-97

On a formal macroscopic level, the overarching development of the dialogue between the melodic themes is to become gradually closer together until completely superposed and in vertical alignment. The dialogue between these two melodies is primarily in Sections C and D. The first three sections of the piece, (Intro, A, B: m. 1-55), represent the interference of the truck and its delay and distortion through the poor connection. The middle sections, (C and D: m. 56-97), present the two interwoven melodies. The final section, (E: 98-113), was written more intuitively from a dream I had during the last two nights of composition, which I roughly transcribed from memory. Figure 11 below shows an excerpt, m. 1-7, of the pitch and textural dynamic representing the pulsing G4 pitch of the truck and the distorted feedback (white noise). As this interplay continues and develops, the pulse overtakes the white noise and eventually transitions into the first melodic seeds.

Figure 11. – *Salt :* pulsing pitch and feedback figure, m. 1-7

I incorporated two further extra-musical interventions on a micro-gestural level: the screaming calls of the European common swift, and rhythmic durational cells based on a breathing meditation exercise. As I was composing this piece, swifts were incessantly screaming and circling outside my window, and I was frequently using breathing exercises to curb stress. These two inspirations allowed me to structure the smaller tonal and noise cells into a larger narrative over which they evolved. In my breathing exercises I inhaled for four seconds and exhaled for six consistently, for about ten minutes. I used this ratio of 4:6 in the phrasing of my crescendos and diminuendos for creating a sense of relaxation, and the inverted ratio 6:4, when building excitement or tension. Figure 12 below is an example of these gestures mounting in tension with the inverted ratios of 6:4 and the augmented 9:6. As these sections develop, the ratios dilate and contract. The screech and trill of the swifts is represented by exaggerated bow pressure with a slow bow action, which then abruptly releases into a fast bow on a fast or slow trill. These two musical techniques representing the two distinct elements of the trill are equally segmented by the division in the ratio.

Figure 12. – *Salt :* scream and trill gesture, m. 24-28

The general rules from the swift calls I applied were as follows: (1) the call of the swifts are structured in two parts, a 'scream' followed by a 'trill,' (2) the female's pitch is a little higher, and the male's pitch is able to rise above, but remains fundamentally lower, (3) the male's trill is faster than the female's. Because the section of the piece where I applied this was meant to center around the same repeating frequency (with some flexibility), I mostly applied rules (1) and (3), although I did at points allude to (2). In the first violin part in Figure 12 above, the female swift's scream and trill are represented as an over-pressure harmonic trill followed by a slow, undulating tremolo. The viola (male swift) responds with the same gesture pitching upwards, and finishes with an irregular but rapid trill at the tail of the gesture.

Goals and influences on methodology

Salt most pointedly explores the limitations of distillation and abstraction. At what point do we lose a sense of individual voice and therefore of dialogue? This piece offered me two principal discoveries: first, that the predominance of extra-material melodic-rhythmic gestures allows a more patient quality to the melodic and harmonic character of the piece; secondly, interweaving brief fragmented seeds, particularly in a string quartet, dissolves their individual character and creates a synthesis, rendering the intra-musical material largely poietic. Moving forward, this latter discovery inspired me to develop similar interwoven dialogues but within the context of a more

heterogeneous ensemble. It is worth noting here that *Salt* was significant in further developing my compositional voice with the string quartet. The homogeneity of this classic ensemble forced me to focus on developing the textural and timbral nuances available within this instrument family. This work in particular, as it focused on much more minimal pitch sources in certain sections, allowed the dynamics, bow pressure and speed, harmonics, and various other contemporary techniques to be the driving tension and dialogue. The intimate relationship developed in quartets pulled my focus as a composer toward considering how these gestures and techniques would allow the performers to feel and understand their role within it. As I will explore further in the two string quartets that follow, this piece and particular instrumentation have had a strong influence on my methodology. As the source inspiration often draws from lyrical sources, the translation from voice to string instrument is quite natural. Various manipulations I commonly apply to the melodic and harmonic seeds, such as extreme time stretching and pitch bending, also translate very naturally to this family of instruments. Lastly, and something I realized more clearly in retrospect, entering into string quartet composition using this methodology helped to further affirm my interest in exploring the synthesis between contemporary and more traditional gestures in a layered, but juxtaposed manner. The classic and traditional string quartet acts as an aural anchor of familiarity allowing the expressions of manipulations both temporal and timbral to slip in and out seamlessly. This will be further explored and discussed in *Dust*.

À perte de vue...

2018

[3(1picc.).3(1eh).3(1bcl).3 - 4.3.3.1 - timp.perc(3) - harp- strings]

Duration: 7 minutes

À perte de vue... was created for the *Orchestre de l'Université de Montréal* (OUM) under the guest direction of Walter Boudreau in co-production between l'Université de Montréal and the Société de musique contemporaine du Québec. Having won the composition contest of the Orchestre de l'Université de Montréal on the occasion of their 25th anniversary, I was given the opportunity to compose this work, which was premiered at *La Maison Symphonique* on December 8th, 2018.

General introduction and concept

The inspiration for this piece comes from my childhood habit of watching planes disappear from sight. The ritual starts with my ears being alerted to the familiar sound of a plane overhead; I then stop in my tracks, look up to the sky and follow the plane's path until it disappears. Similar to the habit of listening to a note decay, when watching an object recede from view there comes a point of ambiguity between still seeing and no longer seeing it, causing a momentary experience of augmented awareness. My personal relationship to this ritual stems from having had a pilot as a father who died in a plane crash when I was very young. Taking moments of stillness to watch planes pass from view became a way for me to pay daily remembrance to him. In addition, my father was a lover of music, and while traveling as a young man wrote in aerogrammes to his parents about discovering classical music, and in particular the piano sonatas of Beethoven. There are melodic fragments unveiled and embedded in *À perte de vue* that act as distorted 'mirages' of passages from these sonatas, but often pale, muted, and distant, as if in memory. To embed these mirages of Beethoven melodies, it was important for me to create two harmonic and melodic layers of sound that, although not extremely dissonant with each other, work on distinct temporal maps, phrasings, and registers of the orchestra. The foreground represents popular music styles I associate with my own youth, with a background of these classical musical mirages weaving in and out of the first harmonic plan. In contrast to *Salt* where the two musical materials were interwoven in melodic counterpoint, with *À perte de vue* I was interested in utilizing the potential breadth, range, complexity and density that the orchestra offers. I was interested in creating an exchange where each voice maintained greater autonomy in its identity. This autonomy or differentiation offers a more clearly expressed feeling of actual dialogue, as the audience is better

able to distinguish the voices. It also allows for more room to push the contrasting stylistic elements (genre-blurring) and temporal pulse (level of distortion) in each separately, thus allowing a more three-dimensional and layered listening experience. I will explain below how the two principal intra-musical materials are manipulated in contrasting manners in order to preserve this delineation.

Many of the techniques employed in this piece evoke sounds of a plane flying overhead. Solo instruments and sections of the orchestra take inspiration from the Doppler effect, shifting pitch upward as the sound source approaches and downward as it recedes. Since my habit involves watching planes move away from view, the micro and macro pitch gestures of this piece see the sustained notes slowly moving downward by intervals between a major 2nd and a major 3rd, and sometimes stratified over many octaves. I employ several other textural techniques to evoke not just the pitch shift but movement through these gestures. Air sounds in the brass and woodwinds, low rumblings in the percussion, and circular and vertical bowing in the string section are all techniques used to evoke physical aerodynamic movement, the noise generated by a large body moving rapidly through the air, and the sounds of the engine and propeller. As the plane appears to be flying 'ahead' of its sound, what we see and what we hear are out of sync. Therefore these gestures are often offset both within sections of the orchestra – like the staggered entrances of the horn section – and between orchestra sections, to represent the impressive physicality of the plane and its sonic offset in time. The use of extra-musical material representing the various points within the sensorial experience of watching the aircraft pass overhead created formal contrast and textural and gestural blending with the intra-musical abstracted material.

Echoic Memory as a representational device

À perte de vue superposes fragmented melodies from my father's young adult life of listening to Beethoven with contrasting fragmented melodies from my own young adult life listening to popular music, specifically a song by the group Radiohead. More precisely, *À perte de vue* superposes fragmented popular melodies and harmonies from Beethoven's Piano Sonata No. 8 movement II (*Adagio cantabile*), with certain fragmented melodies and harmonies from Radiohead's "How to Disappear Completely*.*" Superposing the memory of someone else's listening experience from the past with a more contemporary experience of my own allowed me to deepen my methodology of abstracting source material. Not only is the material interwoven at moments, but there are defined leitmotifs and pivot points to allow for clearer demarcations between the source materials. I initially intended to use and connect these two musical materials to represent the co-existence, albeit on

different temporal planes, of these shared and learned memories. However, as is the case throughout this series of works, the focus is not actually of the individual's memory of listening to these works. Rather the works are representative devices to illustrate the individuals themselves.

Choice and analysis of source material

The choice of source material was particular, as it took some trial and error to find contrasting works that could maintain their distinct identity, while still presenting opportunities for synthesis that is generative of new sounds and harmonic tensions and resolution. "How to Disappear completely" was chosen first, and not purely out of musical interest. The theme of this song, implied in the title itself, has always evoked my habit of watching planes disappear from view, the very impetus for this piece. Also, the musical characteristics of this song, though seemingly simple and repetitive upon first listen, include several fascinating nuances that brought it to my attention years ago as a song to be analyzed and studied further. The aim of the piece is to create a dialogue between the subject on the ground and the plane overhead that she is observing. I chose to represent this dialogue by superposing my own echoic memories with those of my father's. I chose the second movement of Beethoven's Piano Sonata no 8 because it has a very reflective and slightly lifting quality moving between A flat Major and F minor. The first step in my methodology, as mentioned previously, was an exhaustive analysis of both pieces both through traditional means and more intuitively, to decide on the nature of relationship between the two. In "How to Disappear completely" there is a recurring motif in the synthesizer of an A bending down to an F sharp, often demarcating the transition between sections as well as the end of significant vocal response phrases. It is the 'leitmotif' of this song and therefore seemed appropriate as the pivot point or pivot motif to create vertical alignments and relationships with the chosen fragments of Beethoven's Sonata. After having analyzed both works, the next step was to choose fragments and pole melodic seeds from both to use in the re-composition framework. Figure 13 below shows the selection of the melodic and contrapuntal fragments from the *Adagio* movement of the Beethoven's *Sonata no 8.*

Figure 13. – Beethoven *Piano Sonata no. 8, Adagio cantabile:* m. 1-8, melodic seeds

Figure 14. – Beethoven *Piano Sonata no. 8, Adagio cantabile:* m. 17-24, melodic seeds

As we will see in Figure 15 below, the recurring motif (A to F#) in the synthesizer of the Radiohead song acts as pivot points to move smoothly toward momentary melodic fragments from Beethoven's Sonata. Fragments beginning exclusively on A or F sharp were chosen from the Sonata. These were intended not just as common meeting points of pitches, but a kind of overlapping call and response between the mirages of each work. To achieve this fluid commonality, I transposed the Adagio section from A flat major to D major strategically resulting in the some of the most recognizable motifs beginning on one of the desired pivot pitch points. Figure 15 below illustrates the chosen Beethoven fragments, not yet distorted, but distilled and

transposed with their melodic meeting points against the recurring melodic motif in the Radiohead song.

Figure 15. – *À perte de vue* : melodic fragments 1-7

The use of the two source materials is contrasting. Whereas the melodic fragments from the Sonata are almost exclusively condensed splices, as if phantoms from a memory are appearing, the Radiohead melody and harmony is incorporated on a macro scale, although with heavy dilation and skeletal distillation of notes and harmony. The intention, in certain sections, was to convey the overall, slow motion, emotional arc of the Radiohead structure as opposed to momentary and clearer mirages. The placement of the two source materials is for the most part distinguished and assigned to different sections of the orchestra, with the woodwinds typically illustrating the ephemeral mirages of the sonata, and the string section creating the stretched and distorted bed of lyrical movement from the Radiohead fragments. However, in some cases the Beethoven source material, normally stated in the winds, moves into the string section. Figure 16 below illustrates an example of this, also showing where the earlier Radiohead fragment continues thereby superposing the layers as opposed to pivoting between them. Measures 63 to 68 in the cello and double bass illustrate a stretched pole note fragment from the second verse of "How to Disappear completely," triggering and essentially *evolving into* a fragment from the Sonata no.9 in the Violin I section. Similarly in Figure 17 below, we see a variation of the 'A to F#' Radiohead motif in the Violin II section evolve into the Beethoven melodic fragment #2 in Violin I.

Figure 16. – *À perte de vue* : m. 63-60, vln I a/b, vln II a/b, vla, vlc, db

Figure 17. – *À perte de vue :* m. 101-106, vln I, vln II, vln III, vln IV

Computer-assisted research and intuitive integration: The Doppler Effect

The interaction between these two different source materials was intended to evoke the *dialogue* and synthesis between a person, in the present, watching a plane fly overhead, and the plane itself, or indeed the person the plane symbolizes. The visceral experience of hearing certain low flying aircrafts, especially some older models, can be very moving. I had therefore decided from the start to represent these sounds more literally, not just abstractly. The research and analysis of the sound of planes flying, including various models and at various distances, along with the Doppler effect all happened in parallel to the research and analysis of the two musical sources. Using AudioSculpt and OpenMusic, I analyzed multiple recordings, found on the *freesound* website[32], that offered recordings of various plane models. After doing a chord-sequence analysis in AudioSculpt, I used the visualizer patch to set parameters of pitch precision to the nearest quartertone and within the playable range of the orchestra. I set several analysis markers through the recording in Audiosculpt and transcribed the analysis results of the Doppler effect, illustrated in Figure 18 below. These seven points are all derived sequentially from the same recording as the plane approaches, flies overheard, and disappears from view.

Figure 18. – *À perte de vue* : harmonic analysis of Doppler effect, 7 time markers

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32 Freesound website, https://freesound.org/, consulted 26 May 2019.

Figures 19 and 20 below show the implementation of the above Doppler effect analysis voiced in the brass section of the orchestra in measures 5 to 25.

Figure 19. – *À perte de vue* : m. 5-15, brass section, time markers #1-#4

Figure 20. – *À perte de vue :* m. 16-25, brass section, time markers #5-#7

Form

The work is divided into seven sections. The **Introduction** presents gently and from a distance, the Doppler effect in the brass section whilst the violins play a high detuning 'A' evoking the high synth 'A' of the Radiohead song. The winds and percussion provide the noise mimicry of the engine and wind movement around this plane representation with wind sounds in sweeps, and jazz-inspired accelerating and decelerating circular brush movements on the two bass drums to evoke the propellers. **Section A** introduces, in the violas, the distorted and stretched theme from the Radiohead verse as parts of the woodwinds begin to allude gently to the sonata. Moving into **Section B** the two layers (strings and woodwinds) gradually become more and more distinct in their contrasting source material, with the winds section, percussion, and sometimes a string section alluding to the synth triplet and eighth note pulse in the Radiohead song that sounds a bit reminiscent of the Doppler effect of a passing siren in traffic. **Section C** is the dynamic and

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romantic climax of the melodic form of the piece where the two source materials start to fuse and superpose over each other instead of interweaving. The strings build in long arching melodic phrases that then release into the pulse and melodic mirages of the winds, both supported by the brass. **Section D** sees the sections of the orchestra merge together into a complete synthesis of both foreground and background and is the one of the few sections completely devoid of any musical source material. **Section E** is the aftermath of this climax; as the harmonies and melodies dissolve into textures we hear again the allusion to the Doppler effect, this time in the timpani, double bass and cello section, with the rest of the orchestra evoking the mechanics of the propellers and movement of this body through air. In the final **Section F,** the passing noise of the plane that has drowned out the 'song' material lifts, and we hear a more subdued and distant re-appearance of fragments similar to Section B, gradually fading out of ear and eye's view.

Goals and influences on methodology

My initial interest and curiosity when I set out to compose this piece was to capture the experience of watching a plane overhead. Of course, this practice has strong emotional association for me, but as a purely sensorial exercise, it has always struck me as something that might translate well to a musical form. Aside from the mechanical sounds, motor, and Doppler effect, I was also keenly interested in the visual practice of tracking something with one's eye until one could no longer see it, and how this might translate sonically. Beyond literally having sound fade out at the end of gesture, I was interested in playing with sonic acuity, the strain of listening to something as it fades out underneath other layers. As the piece developed, the intra-musical works were abstracted and integrated to represent the relationship between the person on ground (myself), and the plane (my father). I realized these relationships, both physical – between ground and sky – and through musical memories – my father's and mine – could be musically represented as dialogue exploring this distance and differentiation. Most importantly this led to the structuring of two contrasting temporal frames between the two abstracted works in dialogue. The process of maintaining distance and distinction between the two dialoguing layers within the piece was achieved in three ways: contrast in orchestration, stratification, and temporal contrast. Establishing this last point of temporal contrast encouraged me to imagine the abstraction of musical material beyond the distillation of just one or two parameters and focused on temporal manipulation (dilution and dilation). *À perte de vue* was my first piece to employ musical source material in a highly fragmentary, spliced way. It introduced micro-segmentations of material within a more continuous, melodic and harmonic pole-structured work. This added two important new tools to my

methodology. First, it introduced me to the concept of defamiliarization as a tool to distort the perception of abstracted musical material. Secondly, it provided me with tools to abstract material not just through deformation of the material itself, but by using contrasting contextual placement.

In Dialogue and Narrative: Conclusion

This succession of three works acted as a first exploration of the methodology that I was trying to expand and clarify at the same time. In *Ebb* the use of extra-musical material was a tool in tandem with opposing instrumental techniques and sonic environments. I wanted to achieve a more nuanced but marked shift in contrast between sections in the form, and to create this shift via contrasting musical worlds. The interest with *Salt* was simply to contract the scale of musical dialogue, to occur between or within phrases instead of between sections. However, as the piece developed it organically moved away from an exploration of contrast in dialogue, to a synthesis. This helped me develop a new approach to interweaving contrasting material that has remained with me through subsequent pieces. *À perte de vue* acted as a kind of synthesis between the previous two works. I was interested in creating a dialogue between contrasting musical works at the level of phrases, like in *Salt,* but wanted the voices to exist in separate sonic spaces, and on different temporal planes. The last piece clarified to me how fundamental heterogenous instrumentation is in creating this delineation in dialogue. In addition, wanting to create two different levels of clarity with musical dialogues is what sparked the next idea of imagining what would happen if sound never died but instead aged and degraded over time.

Echoic memory: excavated sound / imagined sound

Tenebræ, Dust, Echoic Memories

The previous series of works, focused on engaging with musical material as a representational device in various forms of dialogue, were constructed around my personal and associated or learned memories. The next three works, *Tenebræ, Dust,* and *Echoic Memories,* evolved naturally, but not intentionally as a series focusing on excavated and imagined sound (i.e. audiation[33]). The final piece in this series integrated re-worked, orchestrated and mixed versions of the first two. The impetus toward audiation from more experiential memory came about when I was commissioned to compose a work, *Tenebræ*, that reflected on Mozart. Choosing to compose work inspired by Mozart's life, rather than respond directly to his music, I created the work in response to an echoic memory of the composer himself. The act of memory is just that, an *act*. It is an act of creation and therefore the pivot from impressionistic representation of echoic memory to simply considering audiation was a natural one. Thus, contrary to the first series, where the starting points were my remembered sonic experiences, here the inspiration is other people's (echoic) memories and therefore imagined memories. *Dust* continues the theme of audiation, or more specifically, imagining someone else's echoic memory. This second work in the series takes inspiration from Marcel Proust's fictitious composer Vinteuil and his hypothetical works described in *À la recherche du temps perdu*. Lastly, *Echoic Memories*, a larger-scale mobile pocket opera, incorporates reconfigurations of both these works combined with two new movements. This operatic multi-movement piece offers an assembled reflection on imagined sound and memory from different third person perspectives, both historical and fictitious. It further materializes the memory and imagination of sound as an object in its own right, incorporated into the works through the use of radio transmitters, receivers, and other mixed music elements. The main inspiration point here was Gugliemo Marconi's fabled hypothesis that sound never dies and that sound waves live in the air forever.

This evolution toward representing echoic memory and imagined sound as a subject itself rather than simply thematically representative in a sensorial narrative led to imaging the *materiality* of sound as a physical substance. This material can be manipulated, modified, degraded etc. The sound itself, its history and geography, become their own characters in the works. Due to a more

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[33] Gordon, "Research Studies in Audiation: I," p.34.

three-dimensional imagining of the echoic experience, this group of works places greater focus on the spatialization of sound, and the acoustic nature of the current and or remembered/imagined space. If sound never died, how would it age? How would the age of sound affect its quality and timbre? Would it remain in the air? Would it absorb into the walls, or the earth? These fantastical and evocative questions led to visually-inspired sonic representations of sound as a dynamic, aging, and decaying material.

In contrast to the first series of works where the sounds represent characters in a sensorial experience, here sound itself is the primary subject of interest. As this group of works imagines the aural experience and echoic memories of other people, all of the source musical material is chosen from literature and historical accounts. Instead of a linear, first-person narrative, the process of audiating someone else's memory creates a more three-dimensional and fantastical representation. It is an augmented sensorial experience that considers the relationship of a past sound with the space in which it existed. It is not just about the musical work, but the entire context: the location, performance, the listener, and their described experience. Because the chosen content for this group of works relies on this consideration of the experience, the study and analysis of these inspiration points derive not just from scores but also audio recordings and text descriptions of the experience and piece. While *Tenebræ* is about imagining an auditor's memory of a piece, it is an old memory, and the sound, being represented as the 'thought of a sound' is weak and suspended at points, then bright and clear in other moments. *Dust* represents the imagination of sound through interruption and weakness of signal, as processed through an actual radio. *Echoic Memories* combines these two in separate movements, and adds the elements of audience mobility and fixed and mobile sound movements to present more fantastically the everlasting sound in the air. Although each approach is unique, the series as a whole marks the evolution from a more linear narrative experience with sound as compositional device, to the use of sound and its abstraction as the subject matter itself. This abstraction of sound as a mirage, a phantom, a weak signal, or an excavated object engenders various forms of distortions and manipulations aimed at representing these various forms. From extreme equalization deformation to time deformation with audio software, to dilation and dissolution of tone to pitch in written notation, the behaviour and character of each voice acts as an audio mimesis of material degradation. The abstracted musical sources for these three pieces act as the principal object of memory and audiation. Therefore, any deformation, glitch, interruption, or interference with their musical coherence had the narrative function of unveiling or decaying the sound.

The overarching interest of this series was that it allowed me to push the boundaries of my musical gestural distortion. Equally important was the shift from personal and subjective toward a more external, shared experience. This approach is more audacious and fantastical. The series of works had an equally important impact on my developing methodology and overall approach. The added analyses and considerations of acoustics, reverberation, timbral qualities of site-specific recordings, and spatialization of performances became new features in my pieces as well as expanding the manner in which sound could be deformed. As the sound is represented as a mirage, a phantom, or an ancient radio wave the element and expression of no signal, weak signal, and neutral space becomes an active character within all these pieces thus developing a more prominent and relationship between tonal coherence and textural noise.

Tenebræ

2018

String Quartet

Duration: 7 minutes

> You have often heard of the famous Miserere in Rome, which is so greatly prized that the performers in the chapel are forbidden on pain of excommunication to take away a single part of it, to copy it or to give it to anyone. *But we have it already.* Wolfgang has written it down and we would have sent it to Salzburg in this letter, if it were not necessary for us to be there to perform it. But the manner of performance contributes more to its effect than the composition itself. So we shall bring it home with us. Moreover, as it is one of the secrets of Rome, we do not wish to let it fall into other hands.[34]

> - Leopold Mozart in a letter to his wife April 14th, 1770

General introduction and concept

Tenebræ was commissioned by Thorsten Encke, musical director of *musica assoluta* to be performed at the Christuskirche as part of their festival in Hannover, Germany on September 16th, 2018. The festival invited three composers from various countries to reflect on their relationship with Mozart in their piece in any way they choose. I chose to base my piece on the famously told story of Mozart visiting the Sistine Chapel when he was 14 years old and transcribing from memory *Miserere mei, Deus,* Gregorio Allegri's setting of Psalm 51 for Holy Week. This piece was kept strictly secret with only a few private transcriptions in existence. My piece is a reflection on Mozart's act of transcription from memory, based on my abstraction of a recent performance in the Sistine Chapel of the same work, performed from the original codex score. I am drawn to the idea of how emotionally moved this young composer was by this piece and how I can abstract or re-imagine this moment within the context of my own aural experience. *Musica assoluta*'s string quartet premiered the work on September 16, 2018 at the Christuskirche in Hannover.

Tenebræ, Latin for 'darkness', refers to the service observed in the final part of Holy Week where candles were extinguished after each psalm save for the final which remained alight and was then hidden, leaving the room in total darkness where the congregation would then all rise and leave in silence. *Miserere mei, Deus* (1638) is one of the most well-known settings of Psalm 51 and, at the time, remained exclusively within the Vatican's walls due to the Pope having forbidden its transcription, the secret *abbellimenti* ornamentations never to be written down. The Italian

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[34] Leopold Mozart to his wife, Letter dated 14 April 1770 (Easter Saturday), in Emily Anderson (ed.), *The Letters of Mozart and his Family*, London, Macmillan and Co., 1938, p.127.

composer Gregorio Allegri was himself a contralto in the Sistine Chapel Choir. *Miserere mei, Deus*, an example of Renaissance polyphony, is composed for two choirs (one four-voice choir, and one five-voice choir). The first choir sings a simple version of the original chant, and the second sings an ornamented version in response. The form of the work is a *falsobordone*, alternating two choirs and separated each by verses of plainsong. The antiphonal singing of this piece continues until the last verse when all nine voices sing together.

Memory: research and transcription

The choice of this work as principal source material is twofold. As the commission was to reflect on my relationship with Mozart, I spent time reflecting on the life of Mozart and his voice as a composer. Upon reading this famous story of his transcription of Allegri's setting of *Miserere,* I began questioning how much we really know about the artistic identity of a composer based purely on the content they create. Listening to recordings of this work in alternation with Mozart's own body of work inspired questions about the relationship between one's history of listening and one's history of creating. As the anecdote goes, Mozart listened to the piece once and went home to transcribe it, only to return a second time to 'fix' a few errors. As gifted as he is, one can only wonder what small errors or distortions of memory might have altered the piece in this act. Secondly, my continued reading about this famous story of transcription uncovered the equally fascinating lineage of the piece itself and how it has been composed, set, transcribed, incorrectly reproduced, and interpreted over time. Mozart's transcription was followed by a transcription, transposed a fourth higher, by Felix Mendelssohn. Mendelssohn's was accidently reproduced as the standard. It's a very popular version due in part to the famous high 'C' that comes soaring in, which only came into existence in the transposed version. The beautiful ornamentations executed in many of the widespread recordings are not written into the original unadorned version, essentially creating a new piece with a life of its own. In my research for this piece, I listened to the five most popular interpretations of the work in addition to the 2015 release from the Sistine Chapel Choir.[35] This release is the first commercial studio recording, apart from handful of live recordings. Its aim was to reproduce the original fauxbourdon version found in the Sistine Codex of 1661 and lacking the transcribed ornamentation. I used the Vatican Library Sistine Codex of

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[35] *Cantate Domino : La Cappella Sistina e la musica dei Papi,* Sistine Chapel Choir, Massimo Palombella, 1 CD, recorded 2015, Deutsche Grammaphon 0289 479 5300 5.

1661 Manuscript[36] as my visual reference, noting several common ornamentations by hand when desired. This work embodies most clearly my exploration of the blurry lines between memory, audiation, transcription, and composition. The main purpose was not only to compose a piece that expresses this auditory memory of Mozart, but the entire acoustic experience of where he was, and the representation of his episodic memory around a complex musical work.

Methodology

For *Tenebræ* I took the first two falsobordone verses separated by the first plainchant as structure for my form. I wanted to emphasize the contrast between the more polyphonic and contrapuntal sections ending with cadences against the alternation with plainchant, as well as the similar nature of the first chord of each verse. I began by researching the nature of the acoustics in the Sistine Chapel itself referencing a chart, from the article *Room Impulse Response Measurements in Ten Churches of Rome*[37], that outlines the reverberation time to octave band mid frequency. I assigned reverberation time in seconds to frequency ranges of the Sistine Chapel in a chart (Figure 21), as an inspirational starting point for how I might distort and stretch certain pitches and sections in the piece.

Figure 21. – Octave Band Mid Frequency [Hz] to Reverberation Time [s] of Sistine Chapel

[s]	9.25	9	8.75	8.5	8.25	8	7.75	7.5	7.33	7.25
[Hz]	0	100	200	300	400	500	600	700	800	900
[s]	7	6	5.25	4.75	4	3.5	3	2.75	2.25	2
[Hz]	1K	2K	3K	4K	5K	6K	7K	8K	9K	10K

Measures 1-4 of Figure 22 below show the offset entrances of the four attacks of the speech rhythm on *Mi-se-re-re* followed or preceded by a seven-second harmonic trill. These figures, occurring on the B flat harmonic, contain approximately seven seconds of composed reverberation time. Each instrument in the quartet either provides the delay to its own chant, or is triggered by

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36 Gregorio Allegri, *Miserere mei, Deus,* [c. 1638], in *Sistine Codex of 1661,* Vatican Library, Mss, Capp. Sist. 205 & 206, edited by Ben Maloney 2018.
37 J. Fricke and K.-H. Lorenz, "Room Impulse Response Measurements in Ten Churches of Rome: Hörsamkeit, Intelligibility and Possible Suitable Positions for Performances of Church Music," *AIA-DAGA 2013: proceedings of the International Conference on Acoustics, Berlin,* 21 March 2013, p.2079-2082.

another voice. This use of reverberation time analysis occurs at each speech-sung entrance to the more embellished, harmonized section. To accentuate this opening or widening, I transposed the pitch up two octaves, emphasizing the contrast between a thinner, more austere sound and a richer, ornamented chorale.

Figure 22. – *Tenebræ :* m. 1-4, offset entrances of section A

Figure 23 shows the structure of *Tenebræ* translated from the formal analysis of the first two verses and interpolated Psalm of the original work of the original 1661 Sistine Codex of 1661.

Figure 23. – *Misere mei, Deus* micro-formal analysis to *Tenebræ* formal plan

Tenebræ	A	B	AA	BB	P	PP	C	D	CC	DD
measures	1-5	6-16	17-20	21-34	35-50	51-58	59-60	61-70	71	72-78
Miserere	1	2	3	4	5	6	7	8	9	10

## Melodic and harmonic treatment

Working with fragments of the chorale sections I played with many forms of distortions: using only pole notes, looping and evolving fragmented melodies, reproducing incomplete passages,

omitting passages, and advancing and delaying the arrival of certain pitches or whole fragments in the different voices in the choir. For example, Figure 24 illustrates the Cantus in violin I introducing the first pitch, A, in measure 6, interrupted then by the B flat harmonic from the previous speech-rhythm. It is then reiterated in measure 8 moving up to the highest pole pitch of the phrase, interrupted again by the B flat harmonic, and then finally completing the three-note fragment passage in measures 10-13 with the third pitch jumping up the octave to emphasize the peak of the climb. Figure 25 shows the original Cantus passage, at rehearsal number two, from which the fragment derives. As the work continues, the fragmented material shifts focus between voices with the more active voices and the Cantus often more present, and the more static voices coming in and out of focus using various bowing techniques and placements to blur and quiet the sound. In addition to taking inspiration from the acoustics of the Sistine Chapel, I applied extreme isolated equalization and time stretching using Logic Pro to certain pitches, phrases, and whole sections. This augmented analysis approach is intended to isolate and exaggerate elements of the acoustics in the Chapel as well as stretching and isolating moments of reverberation to create fantastical instrumental interpretations of the space.

Figure 24. – *Tenebræ :* integration of Cantus seeds, m. 6-13, violin 1

Figure 25. – *Miserere mei, Deus* : Cantus [38]
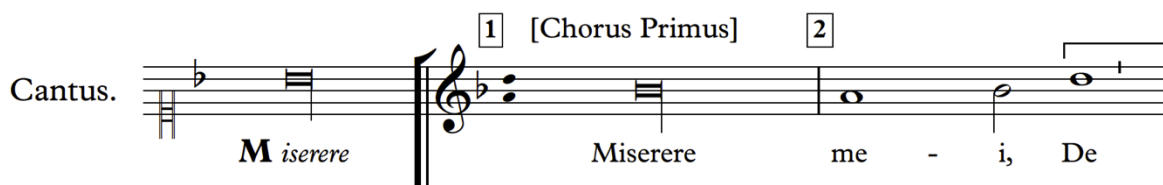
The antiphonal choral approach performed notably in the Sistine Chapel Choir recording demonstrates the lopsided nature of the two choirs, with the second choir faint and distant allowing the already rich reverberation time to blur the articulations and filter the pitches even more in the

response phrase. Inspired by these distant passages, I wanted to emphasize the lightness and thinness of these sounds with the reverberation time blurring the articulation, speech, and presence of the polyphonic tendencies.

This work is the beginning of a much larger scale work for an antiphonal string nonet, separated into a quartet and quintet. These two formations will represent respectively the two choirs and will perform antiphonally, as the choirs in *Miserere:* one in proximity and the other at a distance. However, instead of remaining silent while the other ensemble performs, each ensemble will represent the background acoustics of the space in reaction to the foreground ensemble representing elements of the sung choral itself. As we will see later in the work *Echoic Memories*, *Tenebræ* has already been reworked once with this future nonet work in mind, but with the modified quartet as pre-recorded and manipulated radio transmission in dialogue with a live quintet.

Dust

2019

String Quartet

Duration: 11 minutes

General introduction and concept

Dust was composed during my third year of studies with Salvatore Sciarrino at the Chigiana Academy in Siena, Italy. The work was premiered on July 27th, 2019 at the Palazzo Chigi-Saracini by *Quartetto Prometeo*. *Dust* imagines sound as a lingering memory or momentary mirage we might hold in our ears. I imagine the fragility and lightness of it as a dust-like substance, floating in the air and accumulating in areas as fine particles of a past matter, a past musical moment. In Proust's *À la recherche du temps perdu,* the fictitious composer Vinteuil's pieces are described in intimate detail and many historians and literary critics have mused upon possible real life composers that the pieces are drawn from. Many believe Vinteuil is based on Camille Saint-Saëns, others have argued the musical descriptions match the work of César Franck, Claude Debussy, or Gabriel Fauré. I was not particularly interested in solving this riddle. The beauty to me in this point of inspiration is in the distortion of Proust's auditory memory in his recreation through description. Proust was known to be a fan of Beethoven's late works, and as I share his admiration for the sound of late Beethoven I decided to draw my personal inspiration for this piece, and concept of imagined sound, from Beethoven's String Quartet No. 15. Of particular interest was the blurred boundary between Proust's actual auditory memory of certain composers he'd heard versus his creative authorship in describing the fictitious music in the novel. Just as composers often use our auditive imagination and conceive ideas using our accumulated and echoic memories, when a writer describes a sound or a musical motif, a gesture or timbral colour, they are recalling an abstracted echoic memory and reconstructing it into their own creative expression.

Analysis and implementation: Score

In addition to taking inspiration from Beethoven's quartet, I wanted to literally materialize the sound, behaviour, and character of its imagined degradation, distortion, and distant, phantom-like quality. Whereas in later works I utilize radios as an instrument, similar to Stockhausen's *Kurzwellen*, 1968 and Cage's *Imaginary Landscape no 4,* 1951, in this work I turned to radio as a compositional device to aid in the concrete manipulation and re-imagining of the sound. Prior to

beginning the actual abstraction process of the score and audio I listened to and analyzed various recordings of old tube amp radios. I used field recordings from public audio source websites and made recordings of my own using two different radio receivers. I collected various examples of radio static, interference, radio hum, and intermittent or weak signal. I then used these materials as independent musical motifs, and to affect the timbre and texture of the chosen abstracted material from the Beethoven quartet. Figure 26 below shows the chosen melodic pole notes in the *Molto adagio* section as well as one melodic-rhythmic motif from the *Andante* section. The melodic seeds in the *Molto adagio*, shown in red in the figure, are distilled as either small melodic seeds from one to four pitches in length, or as horizontal layers between two voices shown in orange. The melodic-rhythmic figure in the *Andante* section, shown in green, undergoes full or partial intervallic deformations, full transposition, and is often looped or abbreviated.

Figure 26. – Beethoven *String quartet No. 15,* Third Movement : m. 1-34, melodic seeds

Source: *Ludwig van Beethovens Werke, Serie 6: Quartette für 2 Violinen, Bratsche und Violoncell,* Band 2, Nr. 51, Leipzig, Breitkopf und Härtel, 1863. Public domain.

Figure 27. – *Dust :* correspondence of source material to the organization of sections

Section		1		2		3		4		5	
measures		ms. 1-30		ms. 31-59		ms. 60-86		ms. 87-112		ms. 113-136	
	subsect.	1a: ms. 1-15	1b: ms. 16-30	2a: ms. 31-42	2b: ms. 43-59	3a: ms. 60-71	3b: ms. 72-86	4a: ms. 87-101	4b: ms. 102-112	5a: ms. 113-125	5b: ms. 126-136
material / rhythmic melodic		seeds 1, 2, 3	line 1,2 vn (sop) vlc (bass)	seeds 4 (1), 5 (2), 6 (3), 7 (4)	line 3,4 vn2 (sop) vla (bass)	seeds 8 (1), 9 (2), 10 (3)	line 5, 6 vn1, vlc	seeds 11 (1), 12 (2), 13 (3), 14 (4), 15 (5)	line 7, 8 vn2, vlc	seeds 16 (1), 17 (2), 18 (3)	line 9 ,10 vlc, cb
			rhythmic interruptions		rhythmic interruptions		rhythmic interruptions		continuous interference		white noise interference
signal		weak reception		medium reception		strong reception ⟶ med ⟶ weak					

Whereas the melodic seeds derived from the *Molto adagio* section are used as thematic melodic identifiers at the beginning of each section of the piece, the melodic-rhythmic figures represent momentary signals or connections to a station frequency. The former are highly transformed via fragmentation, dilation, repetition, and textural transformation. The quasi-repetition allows for the unveiling of previously hidden pitches expressing a variation each time. The *Molto adagio* seeds are vaguely familiar and serve as formal guideposts to introduce each section of the piece. The melodic-rhythmic figures remain more intact to affirm a momentary stylization and recognizability. They act as a transitory mirage or periodic signal interrupting the more continuous flow of the former, creating a stark contrast in temporal planes. Whereas the *Molto Adagio* seeds act to set the base and overall form of the piece, the melodic-rhythmic fragments act to interrupt and lend each section an identity of strong or weak signal. A strong signal implies a single coherent musical thought; whereas weak signals suggest more interference, radio static (white noise gestures), and brief melodic-rhythmic interruptions representing a sudden connectivity to a different signal. Figure 27 above illustrate how the melodic phrases and smaller seeds in the *Molto Adagio* section correspond to the organization of sections in *Dust*. In each numerated section the 'a' seeds, as shown in Figure 26, introduce and slowly unveils the melodic seeds alone, while the 'b' seeds are used as steady harmonic anchors, introducing the melodic-rhythmic figures. The amount of melodic-rhythmic material presented in each B section corresponds directly to its identity as a strong or weak signal.

The following two figures, 28 and 29, demonstrate the contrasting melodic and melodic-rhythmic role implementations within the piece. They also demonstrate the contrast and dialogue between the A and B sections throughout the piece. Figure 28 shows the development and movement of melodic seed one throughout the ensemble, as well as the representation and integration of white noise gestures representative of weak or no signal.

Figure 28. – *Dust:* development and movement of seed 1, m. 1-6

Figure 29 below is of the following section, 1b. We see the first pitches of line 1 and 2, from Figure 26, represented in the first violin and cello. The first melodic-rhythmic motif, as labeled 'figure 1' in Figure 26, appears in the second violin faintly represented in harmonics, fragmented, and looping. These rhythmic motifs appear to interrupt the harmony and coherence of the other voices.

Figure 29. – *Dust:* seeds with 3 signal interruptions, m. 16-18

Analysis, Abstraction and Implementation: Audio

All the analyzed and abstracted material from the score is used directly as thematic and formal structural devices in the work itself, as seen in the above figures. As for the recordings I collected of tube amp radio sounds, these served to create a sonic library used to inspire and model various instrumental gestures. However, the actual radios, their sound and behaviour, played an important and concrete role in the process of distortion and manipulation of both the original and composed excerpts. Parallel to the score analysis and abstraction described above, I embarked on a very particular process of audio analysis, manipulation, and radio-assisted processing. Using Paulstretch, AudioSculpt, and Logic Pro, I created a range of deformations of the original recording through time stretching, extreme equalization, editing, looping, and other audio processing techniques. Using a low power FM transmitter, I then broadcast these processed signals to a vintage tube amp radio. In addition to using multiple variations of the audio deformations I also transmitted the signal over two different FM frequencies. The first frequency was unoccupied while the second was a local Montréal classical music station. The first transmission acted fundamentally as a filter adding the colour, warmth, hum, noise, and sometimes uncontrolled, fluctuation in clarity associated with radio signals. The second transmission over an already occupied frequency resulted in convergence, interference and tension between the competing signals. This was one of the main motivators for using an analog tube amplifier, as it allowed for

competing signals to superpose instead of simply switching between the two. I then set up a microphone at the speaker of the radio receiver and recorded these transmissions. To encourage more dynamic interference and loss of signal I would physically manipulate the transmitter during the recording to capture more extreme and abrupt signal drops, static bursts, and other fluctuations. The blurriness and oscillation between the signals became the principal gestural inspiration for the overall musical character of the piece. The audio recordings were impressionistically transcribed into musical gestures and general guideposts for the aesthetic of the written composition. The waves of harmonic and melodic coherence that swell in and then disappear represent flashes of musical memories or imaginations. The gesture demonstrates the momentary mirages of sound that arise in our current sonic plane. These musical thoughts, or interruptions in signal, rise up and then fall back into their particle matter, or radio static.

In complement to the abstractions and implementations of the melodic seeds and figures from the score, as well as the audio manipulation and radio-based manipulation process, it is worth noting the how white noise is interpreted and rendered throughout the piece. The three main audio figures represented as recurring musical figures throughout the piece are (1) radio static at various levels, (2) satellite interference, and (3) tuning and/or searching for signal. The radio static is expressed primarily as rapid tremolo near and on the bridge as well as increased bow pressure on various dynamic gestures as harmonic trills. The satellite interference is represented as vibrato glissandi between harmonic pitches. Lastly the radio tuning gesture is also alluded to via glissando and in general the gradual cross fades between white noise and pitch, and the more abrupt shifts between the different materials.

Goals and influences on methodology

Dust aims to explore and depict the blurriness between recreating a memory and imagining a sound. With the multiple layers within the process of analysis, manipulation, transmission, and then impressionistic transcription, the fluctuation between listening and composing become increasingly blurred. This is how I imagine recollection works. With strong episodic memories that we replay and recreate in our minds over and over, we are deforming and distorting them. We hold onto certain aspects strongly, and other areas become blurred. Some elements of creation remain accurate, closer to transcription, others become diluted and faded in the background, like a stretched and blurry suspended pitch. *Dust* explores the materialization of the degradation, distortion, and faintness of a memory. Integrating actual sonic analysis of radio static and noise,

as well as semi-controlled interference manipulation, allowed me to produce examples of the sounds that I was imagining. This encouraged the materialization of the work concretely as a dynamic object to be listened to and interacted with while composing.

Dust has had a significant influence in developing and broadening my methodology of abstraction. In the first series of works I'd used software tools to analyze and study recordings of planes, Doppler effect, hydroacoustics and to perform spectral analyses. In this second series, the integration and involvement of computer-assisted tools have become much more integral in manipulating and interacting directly with the musical source itself, taking it off of the score and analyzing and manipulating it physically. This more active and wider range of manipulations of the material itself began with *Tenebræ* and developed even further with *Dust,* creating a much wider palette of gestures to either transcribe or use in the audio playback of the piece, as we will see in *Echoic Memories*.

Echoic Memories

2019

[fl, 2vn, va, 2vc, db, perc, radio + 2 radio transmitters + 3 radio receivers]

Duration: approx. 1 hour

General introduction and concept

Echoic memories is conceived as a singular long-form mobile work, of approximately 60 minutes, structured around the physical layout and performance spaces of Villa Romana in Florence, Italy. This work was commissioned by the *Music@VillaRomana* festival run by co-creators Francesco Dillon and Emanuele Torquati in celebration of their festival's 10th anniversary. It was premiered on September 14th, 2019 by a mixed ensemble of the festival's veteran musicians. The Villa itself hosts a residency for visual and sound artists from all around the world and provides a uniquely inspiring space for musical performance. As artists live and work there throughout the year, the space is transformed by art installations both temporary and permanent within the building and throughout the gardens, olive grove, and various pavilions of the property. In celebration of the festival's 10th year, *Echoic Memories* aimed to guide the audience members through the landscape and architecture of the Villa exploring the space through musical performance. I was given complete carte blanche to create a large-scale work in whatever manner I wished, and chose to continue my developing study of the materiality and memory of sound by focusing the opera on this same subject.

How do we remember sound? How do different spaces transform our sonic experiences? I came across a podcast[39] that spoke about Gugliemo Marconi (1874-1937), an Italian inventor who was attributed as one of the principal pioneers of long distance radio transmission. It is recounted that in the late years of his life, Marconi believed that possibly sound waves never die and that one day we would build a machine to pick up these past transmissions. This imagined atmosphere full of everlasting sound waves was so poetic and evocative to me as an idea that it became the principal inspiration point for the work *Echoic Memories*, as well as the opera I am currently working on, *L'écoute du perdu*.

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[39] Nate DiMeo, "These Words, Forever," *The Memory Palace* podcast, episode 12, June 2009, https://thememorypalace.us/2009/06/episode-12-these-words-forever/, retrieved July 17, 2021.

This theme is what introduced the use of the radio in my work not only a fixed electronic element in the piece, but as an instrument. Similarly to *Dust*, *Echoic Memories* uses the idea of connectivity and signal to represent the audiation of uncovering old layers of sound. The radio transmitters and receivers were also devices used to create the transitions between the movements and create a more complete illusion of sound decaying and living forever. To imagine sound never dying is to begin to imagine the existence of sound outside of oneself, outside of human experience, outside of an audience. I was no longer composing from a human temporal plane of experience but through the fantastical quality of sound as autonomous subject, allowing it to breathe and take on a life of its own. The theme of sound never dying was expressed through the continuous signal of the radio transmissions. The transmission's relationship to the physical space of the Villa and the mobility of the work defined the formal conception of the movements, transitions, and the performed and pre-recorded inclusion of pre-recorded radio sounds.

Formal structure, mobility and transitions

The opera's four movements are each represented by a different location. The Villa's grounds consist of a large principal building with 40 rooms and a surrounding garden and olive grove with a glass pavilion building in the center. Figure 30 below shows a plan of the locations of each movement and trajectories between them.

MVT I

[flute, vln1, vln2, vibraphone, radio operator, one fixed FM radio receiver + 2 mobile FM radio receivers + 1 radio transmitter]

The opera opens in the entranceway (corridoio) which parts into rising staircases and is overlooked by multiple balconies. The musicians are positioned on the ground level and the balconies surrounding the audience who are in the center of the entranceway. The three radio receivers are each elevated on their own pedestals, one on the ground level and the other two on balconies. The radio transmitter and operator are on the central balcony. The transition at the end of this movement guiding the audience to the glass pavilion (padiglione di vetro) for the second movement is guided by live mobile musicians and one of the FM radios transported by the radio operator. The two remaining radios continue playing a long composed tail of the piece that keeps playing until they are out of earshot.

Figure 30. – *Echoic Memories:* floor plan of performance sites, trajectories of musicians & public

MVT II

[string quintet and FM radio transmission of pre-produced multiple cues]

The second movement begins with an FM radio playing a transmission of a manipulated electronic track of the original *Misere Mei Deus* of Gregorio Allegri. Once the musicians and audience arrive and settle in, the quintet begins the instrumental introduction, the newly arranged and mixed manipulated version of *Tenebræ*. The audience is situated between the quintet and the radio receiver. This is intended to evoke a mixed and contemporary version of an antiphonal choral setting. At the end of the piece two radio operators with two portable receivers, situated outside of the pavilion, tune their radios to the principal fixed radio station of movement II. They then physically enter the space and walk toward the stage surrounding the audience and blending their sound gradually with the main radio. The musicians and the two operators then leave the space ushering the audience with them. The fixed radio continues playing for 45 minutes after they have

all exited the pavilion. They are then guided on a circuitous route through the olive grove (oliveto) toward an intimate outdoor performance space within the olive grove on an artist's floor mosaic (mosaico). The winding circuitous route between the two locations explores the sounds and interferences produced from the two radios as their distance to the transmitter fluctuates. The audience arrives to the musicians of the next movement already installed and beginning to make small micro musical gestures. The radio operator's signal by this point is almost completely radio static.

MVT III
[musical saw, cello, tabletop object percussion, wine glasses]

Once the audience is installed, the radio operators slowly fade out and turn off their radios. In contrast to the first two movements, this third movement, aside from the transitions into and out of it, is completely acoustic. Approximately 30 seconds before the end of the written instrumental portion the radio operator is cued and fades the radio back in. However the signal, now lost, consists only of radio static. During this transition they guide the audience back through the grove toward Movement IV in the principal building (Sala Giardino). As they retrace their steps back through the gardens, the radio transmitter from the second movement, still transmitting signal, is intermittingly picked up in uncontrollable waves. The audience is led directly past the glass pavilion where the fixed radio receiver, which has been emitting the same signal this entire time, fades into and back out of earshot as they pass by. During this transition the pre-recorded track for the introduction of Movement IV is triggered to use as a guided audio cue as the audience nears. This audio cue is now coming out of two portable sound cube speakers placed face down onto two snare drums at either edge of the stage.

MVT IV
[nonet: flute, vln1, vln2, vla, vlc1, vlc2, db, perc1 + AM radio, perc2, AM radio]

The pre-recorded transition plays as the musicians and audience get installed. The musicians are positioned in a large circle with the audience seated in the center and on the far outer circumference of the circle. This last movement doesn't include a radio transmitter. However the two radio receivers are used in this piece as instruments themselves. The two radios are set to AM to avoid picking up any signal (the AM band is unoccupied in Italy) and using the volume knob, and occasional adjusting the tuning, the percussionist and radio operator perform the dynamics

of white noise static. Figure 31 below shows the organization and cueing of the various mobile and fixed radios throughout the movements and transitions of the opera.

Figure 31. – *Echoic Memories :* overall form showing radio and transmission cues
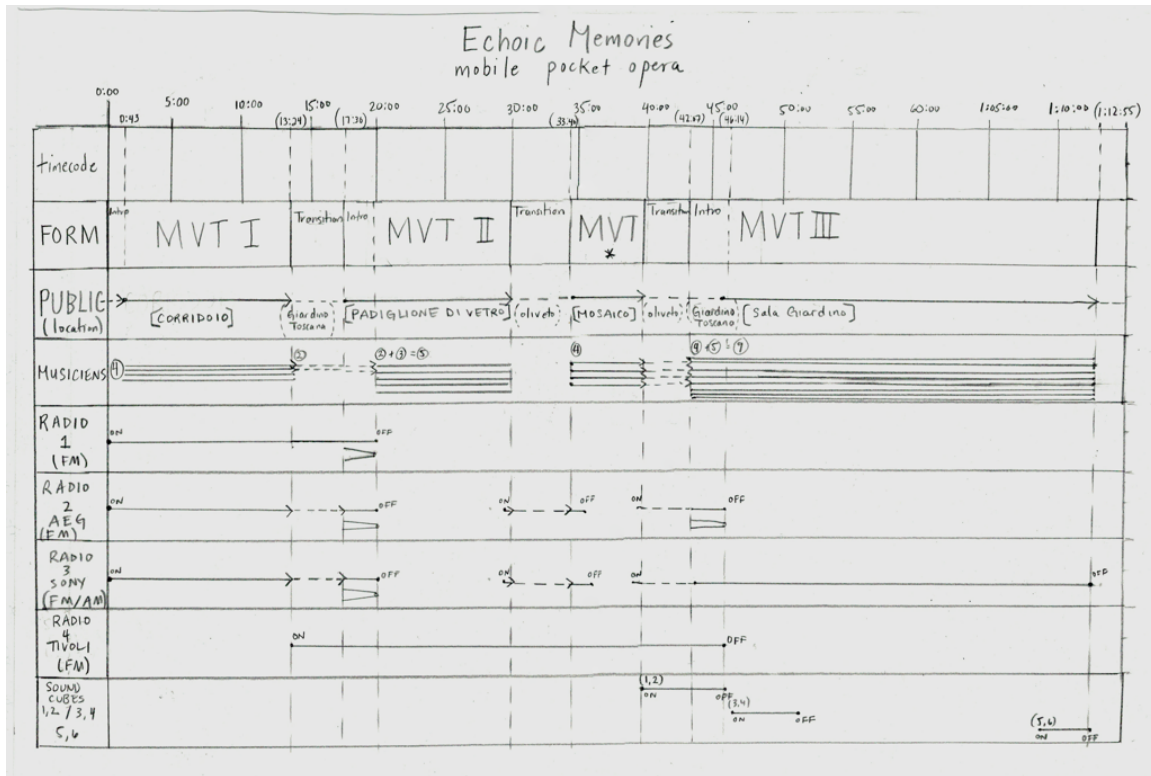
Choice of material & analysis

The choice and analysis of intra-musical content can be divided into two clear categories and methodologies: score material and audio material. The abstracted score material content is used exclusively within the instrumental composition. The audio material is processed and manipulated directly for radio transmission as well as audio playback. As mentioned earlier, this pocket opera synthesizes and expands on *Tenebræ* and *Dust.* Therefore, the score content choices for these two works have not changed, but the processing and manipulation has developed further. The content and sources are broken down in Figure 32 below.

Figure 32. – *Echoic Memories :* pre-existing material used in score and as audio

Section	pre-existing material used in score	pre-existing material used as audio (radio transmissions, sound cubes)
Mvt I + Transition	(1) *Miserei Mei Deus* (2) Beethoven's *String Quartet no. 15*	pre-produced and manipulated recordings of fragments of: (1) radio transmission, static, interference recordings (2) *Miserei Mei Deus* (3) Beethoven's String *Quartet no. 15* (4) *Tenebrae*
Mvt II + Transition	(1) *Miserei Mei Deus* (2) *Tenebrae*	pre-produced recordings of fragments of: (1) *Tenebrae* (quartet version) (2) *Miserei Mei Deus* (3) *Aeroplane over the Sea*
Mvt III + Transition	*Aeroplane over the Sea*	*Aeroplane over the Sea*
Mvt IV	Beethoven's *String Quartet no. 15*	(1) pre-produced recordings of radio static (2) AM radio signal capturing live static, interference and signal aleatorically

Score and audio abstraction and implementation

MVT I

My intention was for the opening movement of the opera to act as a synthesis of audio materials from MVT II (*Tenebrae* version II) and MVT IV (*Dust* version II) but in even more skeletal and abstracted form. This movement focuses on a limited higher frequency range of pitches very minimally and patiently unveiling slow and meandering melodies. It is intended to create the sonic impression of faded sound that has lived in the air for a long period of time. Using excerpts from both *Miserere Mei Deus, Tenebræ,* and Beethoven's String quartet No. 15, I dilated, heavily equalized, and made audible the inaudible spectral analysis of these pitches as representations of these past radio emissions. These processed sounds are used for two purposes: as playback transmitted through the three radios alongside the musicians, and for melodic analysis and transcription to be integrated into the musical notation and instrumentation. Figure 33 below is the radio transmission for MVT I, in Logic Pro, designed from interweaving different recorded and treated radio transmissions.

Figure 33. – *Echoic Memories :* Logic Pro screenshot, MVT I radio transmission cue
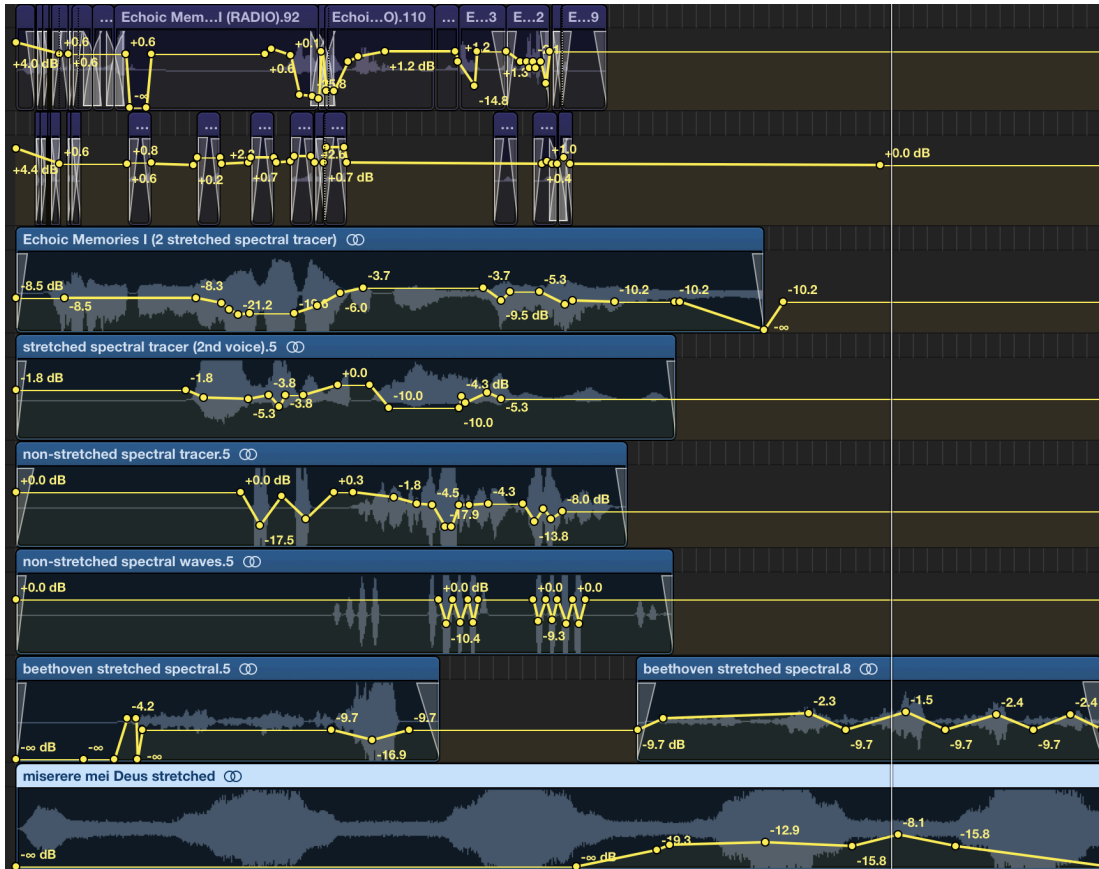
MVT II

Movement II is the re-composed version of *Tenebræ.* My ultimate intention, ever since initially writing *Tenebræ,* is to make an antiphonal nonet version. I therefore decided, in the context of this opera, to create a mixed version of this work representing this antiphonal placement. I re-wrote and expanded the original quartet work for quintet. I also fragmented and processed the recording of the quartet version for mixed playback organized into several audio cues transmitted to a radio receiver on the opposite side of the audience facing the quintet. In this way, the string quintet represents the close choir, while the radio takes the role of the more processed, reverberant, and high frequency diffuse choir further away. Figure 34 below is a screenshot of the Ableton Live session of multiple cues representing the distant four-voice choir. These are triggered live and transmitted to the radio receiver behind the audience.

Figure 34. – *Echoic Memories :* Ableton Live screenshot of different interventions

MVT III

Echoic Memories did not initially contain this movement. During rehearsals for the work the percussionist started demonstrating some sounds on his musical saw, and I decided the day before the premiere to write a short movement to feature this instrument alongside cello, wine glasses, and object percussion on the mosaic tiles at the far end of the garden. It was referred to as the 'hidden track' of the opera, similar to the undocumented track sometimes included at the end of an LP or CD. The performance site was intentionally hidden in an unusual location on the garden grounds. Inspired by Neutral Milk Hotel's "Aeroplane over the Sea," it is a standalone notated but semi-improvisational performance. The intention going forward is that future performances of this opera will include a different hidden track each time, depending on the ensemble and location.

Figure 35. – *Echoic Memories :* Photo of olive grove 'hidden track' performance of MVT III

MVT IV

The last movement of the work culminates in all the musicians performing together. Just as Movement II is a mixed re-arrangement of *Tenebræ*, Movement IV is an expansion and re-orchestration of *Dust*. In addition to the re-distribution and orchestration of parts from quartet to nonet, it also adds two full sections at the beginning and end, introducing sonic environments expressing dynamic radio sound and interference where the ensemble is searching for signal and as the signal is lost. The addition of flute, cello II, double bass, percussion, and radio operator introduces important expanded elements expressed through doubling, expanded dynamic range, and more extreme contrast in noise versus signal. Most importantly in the transformation of this work into Movement IV is the integration of performed mixed elements: four portable sound playback cubes and two AM radios. The sound cubes, transmitting pre-produced fragmentary sounds from Beethoven's *Quartet no. 15* as well as pre-produced radio recordings, are placed speaker facing down onto upside down snares on opposite sides of the stage. They are first used in the transition into Movement IV as the audience enters the space, and again at the end of the

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section as a slow composed fade-in of white noise to fully drown out all the remnants of acoustic pitch. Secondly, the radio operator, acting equally as percussionist, manipulates the speaker cubes on the second snare and performs the AM radio throughout the entirety of the piece. The AM band was chosen simply because the FM radio waves are highly crowded in Florence and we wanted to avoid accidentally landing on a strong commercial radio station. Figure 36 below shows the manipulation of the snare, which is resonating with the sound from the speaker cube placed downward on it. The mute and open circle symbols placed above the speaker-snare line indicates a muting action of the palm on the skin of the snare bending the pitch of the sound. The arrows between them indicate the gradual application and release of the pressure. Later in the work the same operator manipulates the radio primarily by manipulating the volume and channel knob. They are also given several AM channels, pre-chosen, to oscillate between freely as they wish, changing the timbre and quality of the white noise. As indicated in Figure 36, the percussionist, in tandem with the radio and speaker-snare operator, places their speaker-cube facing downward on their snare, while adding quiet cross-stick attacks that act as the percussive breaks and changes between the ensemble's white noise. The rest of the ensemble is divided in two main layers: the dynamic swelling and cutting of different white noise swells in the lower strings and flute, and the atmospheric and ethereal interferences heard when scanning through channels in the two violins.

Figure 36. – *Echoic Memories :* representaton of white noise, MVT IV m. 1-3

Goals and influences on methodology

Each space – indoor or outdoor – acts not only as a movement, but a variation of musical gestures that recur and transform throughout the piece interacting with the changes in locations and instrumentation. The mobility and focus on transitions within the opera allow the composition to explore the identity of location and placement of the musicians in each movement and the position

of the audience as they move toward and away from the sound. This dominant spatial parameter manifests naturally through a hybrid notation approach, combining traditional notation with more open-score influenced approaches such as text instruction and graphic score notation. In addition to the principal concept, this piece is focused on audience experience and how time and spatial context inform our perception, amplifying and unveiling different elements and layers of recurring material. The movements act not as linear developments of musical material, but as distorted 'variations' and spatial transformations of the same experience.

Excavated sound / imagined sound: Conclusion

In the first series of works the musical material was representative of a character, memory, or sonic environment in dialogue with another contrasting musical material. In this second series, the interest in and influence of auditory memory takes a clear direction. In essence, the pre-existing work itself becomes the object of our memory. Each of these three works approaches the experience and expression of auditory memory from different conceptual angles: someone else's memory of a work (*Tenebræ*); the imagined memory of a fictitious work (*Dust*); and the idea of sound never dying (*Echoic Memories*). Each of these works brought important new elements to my conceptual approach and thus my methodology. *Tenebræ* introduced the importance of spatial imprint on auditory memory. It encouraged the consideration of the complete auditory memory experience encompassing the acoustics and localisation of sound. *Dust* introduced the element of connectivity and signal as a way to imagine an auditory memory. With this work I began integrating the use of radio transmission and interference to simulate weak and brief signals as metaphors of recollecting fragments of auditory memory. *Echoic Memories* introduced the concept of the materiality of sound and allowed me to push the audiated representation of sound to a more fantastical sensory experience. It was also the first time I had conceived a work of this duration. Centering the form around the physical layout of the Villa aided tremendously in helping me walk through the experience of the work and imagine how the events would unfold. In part due to the long duration of this work, and in part due to the theme of sound never dying, I found my compositional approach to be a lot more patient, focused and exploratory with extremes. There are certain musical formal and gestural habits we develop as composers when working within shorter durational forms. With this piece, I found myself much more comfortable pushing explorations of gestures further than usual and allowing sounds and silences to luxuriate and take up more space.

Echoic memory: as identity, culture, ancestors

Arras, Hōrai

These two last pieces, *Arras* and *Hōrai*, fall distinctly into their own separate category: although they share overlapping elements with the first two series in inspiration and methodology, they have a particular focus on familial identity. This is the most recent category I have undertaken, and its scope will eventually broaden. Familial sonic history serves as a starting point, but the wider interest is in the sonic histories of a geographical, cultural, and temporal groups of individuals. The prompt for this particular focus came about through the commission of *Arras*, which was to propose a 'Canadian' work. I will go into more detail below about how this work approaches the topic, but briefly, my response to considering what makes a work 'Canadian' was not to attempt to encapsulate any broader sonic definition that inevitably would exclude others, but rather to take a more personal approach. As my interest was already in echoic memory of myself, others, and the imagination of sound, I chose to create a sonic tapestry of the various sonic elements – personal, cultural, geographical, etc. – that frame my personal sonic history. Given my current interests, it seemed appropriate for me to define Canadian identity not through just history, but through the lens of one person's (my own) sonic memory. The second work in this series, *Hōrai*, was commissioned by Mark McGregor, a flutist who shares my Japanese-Canadian identity. I therefore decided to again adopt an approach that takes our common cultural heritage into consideration. Whereas *Arras* weaves together my French and Japanese-Canadian background through many intra and extra musical layers, *Hōrai* focuses on the theme of ancestry and ghosts with a focus on the Japanese-Canadian side of my family.

The conceptual approaches for these two works is quite contrasting, as is the material chosen for each. Whereas *Arras* weaves together elements of both extra and intra musical parameters and fragments into a dense polyphony, *Hōrai* focuses almost exclusively on intra-musical influences in a segmented and chronological manner. In *Arras,* materials range from popular and sacred musical works to mechanical and natural sounds and rhythmic/behavioural patterns. These sources are chosen based on sounds that I, and generations before me on both sides of my family, were surrounded by. They are designed to be overlapped, transitioned between, and interwoven creating a polyphony of multiple and cross-generational memories. My interest is in the evocation of the material itself and how it translates musically in juxtaposition with the other chosen elements. The contrast and distinct tensions between layers is desired and actively sought. These

contrasts illustrate the blending of families, cultures, and generations. The musical interest in these abstractions is both genre and historical blurring. This layered synthesis and tension in *Arras* contrasts the more dialogue-focused approach to *Hōrai*. As *Hōrai* aims to dialogue and 'visit' various individual ancestors within the form, the music in this work is introduced not only in segments, but as representational devices of individuals, rather than focusing on the sound, timbre, or patterns per se. This approach, more similar to the first series, acts as a neat synthesis of how these different approaches and focuses in the methodology converge and synthesize in the third series.

These two works introduced important new elements into my scope of interest as well as my compositional process. Working with a larger polyphony of material in both pieces, but especially in *Arras,* encouraged me to distil the parameters of the source material even more. Thus the individual aspects in *Arras* are more heavily abstracted. This clearer distillation allowed for a more consciously developed step in my methodology process for this particular work, which I refer to as 'parameter pairing and fusion.' This consists of combining contrasting source rhythmic/textural and pitch material creating a deeper synthesis and fusion of the material's parameters. I will go into this process further in the analysis of the piece below. A second, somewhat less concrete but nevertheless important development arises from the denser superposition of these multiple materials, leading to a more conscious embrace of happenstance vertical alignments and coherence of materials based on greater cognitive dissonance. This implies a more conscious challenge to the listener to engage with material that is less interlocked, less cohesive. Further, building on the previous theme of memory of others, this exploration of collective or community aural memory inspires sonic environments that are complex and layered, as opposed to previous works which had a more focused expressive emotional arc built into the form. From the starting point of subjective and personal memories, then moving toward imagined memory and sound, this third group now delves into collective memory.

Arras

2020

[fl(picc.), ob, 2cl(1bcl), bn, hn, tpt, tbn, perc, pno, 2vn, va, vc, cb]

Duration: 24 minutes

General introduction and concept

Arras was the prize commission piece for the inaugural Azrieli Foundation Commission for Canadian Music. It was premiered by *Le Nouvel Ensemble Moderne*, conducted by Lorraine Vaillancourt, on October 22, 2020 at Salle Bourgie, Montréal. The title *Arras* refers to a rich tapestry, of Flemish origin, hung on the wall, as well as the name of a city in Northern France famous for wool and tapestry production thus giving the English word *Arras* its signification, from the French 'draps d'Arras.' This work was the prize commission piece for the inaugural Azrieli Commission for Canadian Music. *Arras*, similar to *Ebb*, served as a pivot piece toward considering an outside compositional prompt of geographic and cultural identity. As I would never feel comfortable proposing a work that aimed to encapsulate the identity of an entire country or culture, I decided to respond to this prompt by speaking about my own personal sonic history, and through extension, my family's sonic cultural history and environment. This perspective is filtered through my distorted personal memory and experience via fragments of sonic moments and episodic sensorial experiences that I have carried with me as an adult. The resulting work aims to be a synthesis, or a kaleidoscope of influences over the generations, cultures, and musical genres of both my maternal and paternal family's sonic histories. Can one inherit the imprint of sonic memories? Can ancestral song and sonic patterns be passed on? Where are the boundaries and limits of our collective auditory memories?

Choice of source materials

When choosing materials to abstract and integrate within this work I began by recalling specific memories strongly associated with the geography, craft, and traditional practices of both my Japanese-Canadian and French families. I created parallel examples on both sides of the family to explore and pivot between. In addition to weaving and synthesizing these elements together, I would also present them as contrasting environmental characters within the form. This holistic approach using extra-musical and intra-musical material from both sides of the family makes this my most densest piece so far, in terms of content analyzed and used. The work integrates

traditional and popular music, rhythmic behaviour of environmental elements as well as physical and mechanical objects. The table below, Figure 37, breaks down all the musical elements analyzed, abstracted, and integrated into the work.

Figure 37. – Classification of elements abstracted and integrated into *Arras*

	Physical Objects	Environmental Sounds	Sacred works	Popular song
Japanese Canadian	Daikin (Japanese prayer bowl)	Fireflies Cicadas	Sanbujo (Japanese Sutra in the Jodo Shinshu Buddhist tradition, verses written between 618-681 C.E.)	"Yuhi ni Akai Ho" performed by Club Nisei Orchestra and singers *(Japanese American songs of 1950s)* - cover of "Red Sails in the Sunset" composed by Hugh Williams, 1935
French	Jacquard loom	Cicadas European swifts	Deum Verum (Gregorian chant, attributed to Étienne de Liège 7th Century)	"Emmenez-moi" composed by Charles Aznavour & Georges Garvarentz, 1967 & "Pigalle" composed by Georges Ulmer and Guy Luypaërts, 1944

Formal organization of materials

Before developing a specific abstraction methodology for the chosen materials, I first mapped out the over-arching purpose and dialogue of each material on a formal level. This mapping is most important as it defines the overall narrative and development of the material. The form is broken down into four principal sections: (1) Exposition, (2) Memory A, (3) Memory B, and (4) Synthesis. Each of these sections further breaks down into three or four subsections. Figures 38 and 39 below display the material organization of the piece with active material highlighted, and boxes around what I am calling parameter paired and matched material.

Figure 38. – *Arras :* mapping of source material

	(1) Exposition measures 1-83				(2) Memory A measures 84-164		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3
Loom	winds, perc, pno	perc, pno	winds				
Daikin	winds, perc, pno			perc	strings		
Firefly					brass →→→		
Cicada	strings				strings, pno →→	+vib	
Swifts							
Deum verum		low strings	strings, winds	low strings, brass, flute			
Sanbujo	strings	brass	brass	winds	winds, brass, marimba		
Yuhi Ni Akai No		high strings	high strings	strings, perc, pno	strings →→→	+fl	+winds, perc, pno
Emmenez-moi							
Pigalle							

Figure 39. – *Arras :* mapping of source material, continued

	(3) Memory B measures 165-299					(4) Synthesis (disintegration) measures 300-376		
	3-1	3-2	3-3	3-4	3-5	4-1	4-2	4-3
Loom	brass, perc	pno, perc →→		+cb			winds	perc
Daikin					pno, perc →→	+winds	pno, vib	
Firefly						winds		bsn
Cicada						strings		
Swifts		strings	strings		vn1, vn2			
Deum verum		brass	fl, vln	fl, cl	brass	brass, strings	pno, winds, brass, perc	
Sanbujo						brass, strings		high woodwinds
Yuhi Ni Akai No							strings →→	low woodwinds
Emmenez-moi	strings	strings →→→	+ob, bsn	cb	vn1, vn2			strings, perc, pno, brass
Pigalle	brass	winds	cl, vlc	brass				

Arras is a synthesis between a formal dialogue of materials representing characters or themes and of smaller melodic, rhythmic, and textural motifs interwoven and superposed on a micro level to create a more aural synthesis of the sounds themselves. In addition, various abstracted

parameters are paired, particularly in the fourth movement, to create more developed and fused identities as the piece evolves. I will give two specific examples of this shortly.

The (1) **Exposition** section of the work presents the most heavily abstracted material and thus diffuse overlap between the two contrasting sonic environments. The very diluted nature of the material in this first macro section allows for a more blended identity between the two. It is the most focused of all the movements presenting more exposed timbral and textural layers of the work. This allows the identification of the singular elements when they are more densely developed and layered later in the piece. Whereas traditional musical expositions present more melodic and harmonic thematic material, the presentation of the material in *Arras* is abstracted and focused on sonic layers. As the piece develops and the material returns, they become more prominent and concretely identifiable in melodic and harmonic character. This gradual gradation into their more concrete sonic identity aims to create a sense of past, once inaudible, emerging slowly into existence. The next two macro sections, (2) **Memory A**, and (3) **Memory B** represent the presentation and development of the two different sonic memories of my Japanese-Canadian and French backgrounds. Here the frozen, more abstracted, timbral moments, as presented in the Exposition, melt and unfurl into their fully formed layers. The last macro section, (4) **Synthesis**, as the title suggests, fuses the two worlds. This is achieved in general by the superposing of the contrasting material presented separately in the second and third section, but as well as with the more focused pairing of parameters into a single voice among the layers. This section allows the complete development and integration of both sound environments as well as their disintegration back to their most abstracted simplest forms, like the unravelling of interwoven parts.

Analysis of score and audio; choice of parameters

My intent in choosing source materials was to have equal and parallel characters from the different categories of melody, harmony, and environmental textures. The resulting musical character of each of these sonic environments slowly started to form the overall dynamic and expressive arc of the piece as I analyzed and began abstracting the different materials. The analysis of the material was done both via manuscript written analysis and audio recording analysis.

My Japanese-Canadian family are active practitioners of Jodo Shinshu Buddhism. In this tradition, the Buddhist priest strikes a very particular sounding Japanese prayer bowl, a *Daikin*, during the Buddhist sutra chant. My great-grandparents on the French side of my family owned and operated a *Jacquard loom*. The history of craft textile work in my French family not only provided the

inspiration for the title *Arras* itself, but also serves as a recurring textural theme throughout the piece. Also, the very methodology of distilling parameters, layering and interlocking them has a fortuitous parallel with weaving at the loom. For the two *material objects*, the Jacquard loom and the Daikin, I analyzed audio recordings using AudioSculpt and extracted multiple rhythmic and harmonic seeds. With the Daikin bowl this was a traditional spectral analysis, using multiple pole markers as the sound fades to consider both the identity of the attack and the character and nature of the resonance. Figure 40 shows my transcription of this analysis. For the Jacquard loom, as it is such a complex sound and rhythmic pattern, I manipulated the EQ and tempo of the recording to better distinguish the most prominent interlocking rhythms, which I then transcribed by ear.

Figure 40. – Daikin (large temple bell) transcription
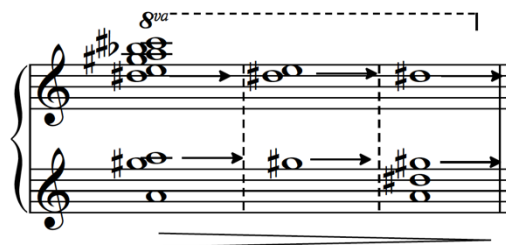
The integration of *environmental patterns* and sounds of swifts, cicadas, and fireflies was done from a more impressionistic standpoint. In my earlier work *Salt* I had developed a musical gesture of increasing bow pressure on a harmonic trill in the strings to represent the call and trill of the swift, which I re-integrated into this piece. The shrill call of the swift is an environmental sound I associate with visiting my family in France. *Cicadas* assume a more neutral function as they are a generally nostalgic sound that I associate with both sides of my family. Their representation appears in the strings as layered and offset interlocking percussive harmonics with echoed attacks in the percussion and piano. Lastly the *firefly* is a very symbolic insect that recalls my time spent in Japan as well as in Canada. Whereas the swifts and cicadas were approached more mimetically for their rhythmic/sonic behaviour, with the fireflies I focused on the behaviour of their light patterns. The slow swelling of light or quick flash, depending on the species, is illustrated almost exclusively in the brass section by ostinato swells with flutter tongue on the peak. I was principally inspired by their organic and complex rhythmic qualities, which in certain species cluster together until they fully synchronize and flash together ending with a period of silence before restarting.

Lastly, the *intra-musical material* both sacred and popular was chosen based on personal memories I associate with these two backgrounds via individuals on either side of the family. **Sanbujo,** ("Three Respectful Callings" – verses written by Zendō 618-681 AD), is a short introductory Japanese Buddhist sutra chanted at the beginning of many Jodo Shin services.[40] Figure 41 below shows a transcription and analysis of the chant with my general phrasing analysis divided into separate seeds for abstraction. My echoic memory of this includes not just the sutra itself, but the entire ritual of ringing the Daikin bowl, the silences between attacks and the priest's spoken repetition of 'Amida' (for Amida Buddha). In addition to the melodic seeds shown below, I transcribed the entire rhythmic and pitch parameters of this ritual as a starting point to be potentially fragmented and abstracted later into layers of the piece.

Figure 41. –   Seeds from *Sanbujo* verses

As a parallel sacred musical reference on the French side of my family I chose fragments of Gregorian chant. This approach was not anchored in a singular piece, but rather a stylistic approach to certain melodic and harmonic behaviours of this repertoire. There are however a few moments in *Arras* that make pointed reference to the medieval Gregorian chant **Invitatorium: Deum Verum** , attributed to Étienne de Liège. It was a chant sung at the Matins of the feast of the Holy Trinity. Of all the pre-existing musical material I have used, this is the one most literally linked

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[40] Buddhist Churches of Canada Ministerial Association, *Jodo Shinshu Seiten,* Kyoto, Dohosha, 1991.

to an episodic memory I have. When I was a child, I visited my family in France and took a trip to the countryside near the Abbaye Saint-Pierre de Solesmes. We were walking through the countryside past an old dilapidated building and I wandered off to follow the sound of a male choir performing this work. It was one of the most musically moving moments of my life, as I was the only audience and it was the first time I had listened to Gregorian chant, particularly live. Figure 42 below is a fragment of the transcription I made of this chant. The headless notes indicate my added imagined harmonic overtones of certain weighted melodic notes.

Figure 42. – *Deum Verum*, excerpt of transcription: seed 1, seed 2

It was important for me to contrast these traditional elements from fragments of Buddhist and Gregorian chant with more contemporary popular music genres. The weaving together of sacred and popular aimed to represent not just my memories, but the families and cultures in which I was raised. The three *popular music works* I analyzed and abstracted for this piece were *Yuhi ni Akai Ho*, *Emmenez-Moi*, and *Pigalle*. These songs were chosen based on certain personal memories and by association with particular members of my family who frequently sung and whistled in their daily routines. "Yuhi ni Akai Ho," (as performed by the Club Nisei Orchestra and singers), is a Japanese American cover of the American song book classic "Red sails in the Sunset" (1935, Hugh Williams). It was a common practice in Japanese-American communities to create Japanese covers, translations, and re-orchestrations of classic American songs. My Japanese grandfather had a penchant for singing, and often crooned in the late afternoon after coming home from work in the fields. "Yuhi ni Akai Ho" was one of his favourites. "Pigalle" (1946), co-written by Georges Ulmer and Guy Luypaerts, is a classic popular song paying homage to the famous neighbourhood in Paris. My uncle Maurice, the patriarch of my French family, sang this song around the dinner table whenever we would visit. Lastly, "Emmenez-moi" (1967), by Charles Aznavour and Georges Garvarentz, I discovered on one of my father's vinyl records that I listened to when I was young. It became a song I strongly associate with my French family, as it is about nostalgia, and the North, where they are from. I analyzed all three of these popular songs using both score

transcription and audio analysis. The act of transcription, analysis, and then distillation of rhythmic, harmonic, melodic, timbral and other parameters helps clarify and distinguish between the forgettable and the unforgettable of each work. This process of analysis and abstraction was at its inception a personal investigation seeking to isolate and focus on what makes a certain work so memorable.

Source material manipulation and integration

Extra-musical: Physical Objects: Daikin Bowl, Loom

As seen in the earlier tables, Figures 38 and 39, the figuration and implementation of these two sound objects feature prominently in the Exposition and Synthesis, with the Loom also integrated prominently in the third section. Figure 43 below illustrates both the musical figures of the loom and the spectral analysis of the bowl within the first section of *Arras*. The winds, brass, percussion, and piano fade out on the rhythmic loom figure and, in measure 14, an actual Daikin is struck and the piano attacks a simplified spectral analysis of the bowl. This attack then triggers a pulsating and sustained partial harmonic figure of the bowl's harmony in the brass.

Figure 43. – *Arras :* incorporation of Loom and Daikin material, m. 10-14

Sacred works: Sanbujo, Deum Verum

Despite chant being a melodic form, the unique identity of each work is defined not by the pitches themselves but their rhythmic values and phrasing. I find this to be true in both Gregorian and Buddhist chant. For *Sanbujo,* I transcribed a recording sung by a Buddhist priest, carefully notating his slurred connections between notes, the weight of certain words or syllables, and whether the pauses between melodic fragments varied. Because of the melodically static nature of this chant where rhythmic phrasing pulse takes precedence, I often placed the abstracted fragments in the inner voices, acting as shifting inner tectonic plates within the tapestry of the work. These seeds first appear in section 1-2 in the brass. Figure 44 below shows the trombone leading the melody of seed 1, the trumpet and horn following both slightly offset and with the horn often moving a 5th above.

Figure 44. – *Arras*: incorporation of *Sanbujo* material, m. 37-42, brass section

Similarly in *Deum Verum* the rhythmic nature of the work was the parameter that remained the most intact as it was abstracted and woven into *Arras*. It appears in the first, third, and fourth sections of the work. Notably, and most recognizable of all its abstractions, is its appearance in section 4-2 of the Synthesis, (m. 324-326, Figure 45 below). The wind section plays fragmentary 'glitches' or loops and variations of seed 1 (as illustrated in Figure 44 above). They are transposed, rhythmically shifted, and harmonized to create audible spectral phantoms above the original melody.

Figure 45. – *Arras :* incorporation of *Deum Verum* material, m. 324-327, wind section

Popular Song: Emmenez-moi, Pigalle, Yuhi no Akai Ho

In contrast to the rhythmic focused figures abstracted from the two sacred works, the three popular works served the opposite purpose. Although rhythm is again integral to distinguish the songs' identities, it was the melody and harmony that remained most strongly as I abstracted these works down to their skeletal forms. "Yuhi ni Akai Ho" appears most prominently in the 'Memory A' section, as seen in Figure 38 above, although more abstracted and momentary fragments of its melody also appear in the Exposition. Figure 46 below is an excerpt of my distillation of the original piece, transcribed from a recording, showing chosen melodic and harmonic seeds. The following two figures, 47 and 48, show the melodic motifs' integration into *Arras*. The first integration is a brief melodic, looped, and distorted version of seed 1 appearing in the high register and *sul ponticello* of both violins. This melodic-rhythmic figure is used intactly but briefly. It derives not from the actual sung theme of "Yuhi ni Akai Ho," but from the melodic-rhythmic figures of the song's instrumental introduction. Figure 48 gives an example of the main melodic line, shown as seed 5 in the reduction. This time the abstraction, though more distorted on a temporal level, appears both in the melody and harmony of the full string section. I purposely oscillated between stylistically intact but briefer horizontal interventions in singular voices and more homogenous sectional vertical interventions of a melodic and harmonic abstraction, often time-dilated. I was curious to explore how these different variations of abstractions, and thus distortions, interrupted our aural understanding and organization of these figures.

Figure 46. – "Yuhi no Akai Ho," melodic seed reduction

Figure 47. – *Arras* : integration of seed 1, m. 66-68, vln1, vln2

Figure 48. – *Arras :* integration of seed 5, m. 148-150, string section

"Emmenez-moi," by Charles Aznavour, appears in melodic and harmonic abstraction primarily in the third section of *Arras* in the strings, and then returns in the very last section of the work. All the material used and abstracted comes from the first five measures of the song (Figure 49 below). This melody, bass line, and inner melody moving in diads, though not the main theme of the song, form a recurring motif heard throughout the work between verses and in the introduction and conclusion of the song.

Figure 49. – « Emmenez-moi », reduction, m. 1-4

Figure 50. – *Arras :* integration of voices, m. 165-171, strings

Figure 50 above shows this passage's first introduction in the string section, with the violin and double bass outlining the outer melodic voicing, and the viola and cello moving via glissandi between the pole arcs of the inner melodic motif.

"Pigalle*,*" by Georges Ulmer, also appears in the third section, 'Memory B,' as well as the Exposition. The first musical motif abstracted from "Pigalle" is the rising arpeggio heard both in the song's intro and the verse. These dilated, and stratified melodies introduce this theme as a

diluted skeleton of itself soaring above the other voices. Later in section 3 the second figure appears in the wind section as a background rhythmic pulse in the background – a repeated 'E' pulsation that shifts its strong and weak beats between groups of four to six notes.

Parameter pairing and fusion

In *Arras* there was a strong focus on developing multiple layered sonic environments. As this piece explores shared sonic memories, generational and cultural, the clash and co-existence of these layers was an important quality to maintain when integrating material. However, in the final section of *Arras* the sounds start to synthesize, influence each other, and deform even more. In section 4-1, (measures 300-316), we hear two coinciding sonic environments begin to synchronize and 'adapt' to each more than before. The Daikin re-introduced in the piano and percussion is then resonated in the winds. However, this time the winds pulse in dynamics, matching the rhythmic figure of the fireflies' pulsating earlier in the brass, paired now with the pitches of the Daikin (Figure 51 below). This is what I am referring to as parameter pairing and fusion. As *Arras* demanded more density and complexity in autonomous layers, it was important to distinguish this synthesis by pre-mapping out certain melodic, harmonic, rhythmic and textural parameters together to form new melodic-rhythmic identities, particularly in the last movement. I didn't want the last section to be a re-exposition, but a synthesis and creation of new material. In this same section there is another layer of parameter pairing and fusion. The pole melody of *Sanbujo* is voiced in the brass section as well as the lower strings with both sections re-introducing previous textures representing cicadas, (cello and viola), while the brass echo the earlier distorted swift musical figure in the strings (Figure 52 below). In addition to this pole base layer of *Sanbujo* in its reinvented textural identities, the two violins and trumpet find a common pitch point, A, and introduce mutations and broken figures from *Deum Verum*. This vertical pitch point of layering and shifting between two different melodies is something I began exploring in *À perte de vue,* using common pitch points and brief fragments in melodies as leitmotifs and trigger points to depart abruptly into a second intra-musical voice starting from the common pitch.

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Figure 51. – *Arras :* Daikin pitches with firefly rhythmic pattern, m. 303-304, wind section

Figure 52. – *Arras :* Sanbujo with cicada texture, m. 301-304, vlc, vla and brass

Goals and influences on methodology

As mentioned at the outset, the intention of *Arras* was to explore a collective sonic memory. Developing independent sonic layers that can either co-exist, slightly influence each other, or completely fuse to create new gestures was the main musical interest in this work. The challenge was to create a coherent sound, despite the disparate aesthetics and voices. The heightened complexity and polyphony of this piece encouraged me to distill even further the musical

parameters to better enable this fusion. The materials are formed and introduced to establish distinct, contrasting environments to allow for a clear dialogue and synthesis between them. The denser nature of the piece and the independence of its layers encouraged and allowed more risk in the verticality and juxtaposition of certain material. Embracing these multiple sonic environments allowed them to interact in a less composed and controlled manner. Although this is true in most of my compositions, I found it particularly present in *Arras,* and an important and interesting compositional decision to make in the methodology. In addition, the unprecedently broad reach of sonic memory and identity that informs this work introduced a greater patience in its formal development and exploration. This patience allowed the music to interact and exist without formally structuring it through a dramatic, emotional and dynamic formal arc, as I would have done in earlier pieces. Approaching the sections with the aim to introduce a polyphony of sonic environments, I felt less propelled to push a tension and release relationship in the material. This tension and release existed instead on a macroscopic level between the different sections, allowing more subtle, nuanced, and patient characteristics of musical expression to speak and develop.

Hōrai

2021

Instrumentation: Solo flute with electronics, video, and smoke machine

Duration: 21 minutes

General introduction and concept

Hōrai was a commission by Mark Takeshi McGregor for solo flute, electronics, and video. It was premiered on November 8, 2021 at the Roundhouse in Vancouver. It was programmed by David Pay for Music on Main's *Modulus* festival. McGregor and I share a common Japanese-Canadian heritage, and in discussing inspirations for a piece together we decided to explore our common heritage to see what extra and intra-musical commonalities we were both interested in exploring in a solo work. This piece has two important inspiration points: (1) the story of *Hōrai* from the book *Kwaidan: Stories and Studies of Strange Things*, and (2) relationships and traditions regarding past ancestors in Japanese culture, and in particular in our two families. We both were raised with a Butsudan, or Buddhist shrine, in our family homes. These small shrines are adorned with photos of family members who have passed, a small prayer bowl (*rin*), prayer beads (*zuzu*), and offerings to the ancestors, often consisting of fruit and a small serving of Japanese rice. We shared our common childhood experiences praying, ringing the bell, paying our respects to those who have passed, and generally the frequent and normalized interaction and sometimes speaking with ancestors. In parallel to discussing these shared experiences with McGregor, I began reading various Japanese ghost stories, studying the history and literature about Japanese culture's relationship to death and the spirit world. The story *Hōrai*, as it appears in *Kwaidan*, an anthology of Japanese ghost stories collected by Lafcadio Hearn, presents the mystical mountain and land of Hōrai as a fantastical, surreal atmosphere. It is not of a human period; it is "enormously old" and holds "the substance of quintillions of quintillions of generations of souls."[41] Hōrai is also referred to as 'Shinkiro', which means Mirage.

These two parallel inspirations spurred me to write a piece that blurs the line between our interactions with deceased ancestors and with ghosts or atmospheric lands. It weaves between more subjective literal memory and a more fantastical imagined theme a surreal atmosphere containing lost people and atmospheres. Imaging this relationship between present and past, real

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[41] Lafcadio Hearn, *Kwaidan: Stories and Studies of Strange Things*, New York, Houghton Mifflin, 1904, p.176.

and imagined, I decided to distinguish between the real and imagined and the present and past through the instrumental and pre-recorded/mixed elements of the piece. As the story describes, "whatever mortal man inhales that atmosphere, he takes into his blood the thrilling of these spirits so they change the sense within him – reshaping his notions of Space and Time."[42] This imagined effect on the 'mortal man' is what inspired the relationship between the flute's instrumental sound and the pre-recorded atmospheric character of the EA tape. McGregor represents the mortal man, and we, the listeners, are given aural glimpses into this mythical atmosphere. The tape, diffused and surrounding Mark, represents the atmosphere as it arrives and departs in different interventions. Thus, there is the sound we hear and can coherently and visually link to the flute, as well as the sounds that are ephemeral that we cannot see, nor fully understand.

Form

The form of *Hōrai* is structured in five principal sections (A to E) interspersed with four main phantom (or mirage) interventions of pre-recorded sound in the surrounding speakers. The principal guiding theme of this piece is all about breath and inspired by the imagery of atmosphere, density of air, mirages of images and ghosts evoked in the story. The driving narrative for how the flute part and electronics interact is, as the above citation evokes, that the air inhaled by a mortal man reshapes his notions of space and time. Thus, the flute part begins almost with no identity at all: just breath, the bare existence of a person. As the electronics progressively introduce melodic, harmonic, and textural characteristics, the flutist engages with these melodic seeds, inhaling, echoing, and carrying them forward as musical contagions he has now acquired. To achieve this interaction, I chose the electronic material and set certain fixed pitch parameters and goals governing their level of distortion. In this way, I was able to compose the instrumental part in parallel to interact with the chosen pitches. The source materials chosen, inspired by one of the initial cultural references, the Butsudan, were four musical works that represent four passed family members of mine: my father, my maternal grandfather, my step-father, and my maternal grandmother. In contrast with more recent works, and in particular with *Arras* where the interaction with the musical material was about exploring the various parameters of the material itself, the relationship in *Hōrai* is much closer to that of *À perte de vue*. Here the material serves as representational-thematic devices to create a structural and narrative arc of evolving dialogue throughout the piece. I chose melody-driven works that I associate strongly with each of the four

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[42] *Ibid.*

individuals. The works abstracted, in order, are "Let it be" by The Beatles, "Goodnight Irene" by Leadbelly, "Always on my mind" by Willie Nelson and "Kanashii Sake" written by Masao Koga and famously interpreted by Misora Hibari. Figure 53 below shows the formal structure of *Hōrai*, and the material and instrumental techniques organized around it.

Figure 53. – *Hōrai :* formal structure showing materials and techniques

section	measures	material	technique
A	1-30	room impulse reverberation	air, vowel changes, tongue click
phantom 1	30-47	*Let it Be*	harmonic trills
B	48-66	*Let it Be* + room impulse reverberation	synthesis of 2 previous techniques
phantom 2	67-84	*Goodnight Irene*	bisbigliando
C	85-102	*Goodnight Irene* + room impulse reverberation	synthesis: bis. + air
phantom 3	103-127	*Always on my mind*	multiphonics
D	128-143	*Always on my mind* + room impulse reverberation	synthesis: multiph. + air
phantom 4	144-184	*Tanashii Sake*	synthesis of 3 previous techniques
E	185-223	room impulse reverberation	air, vowel changes, tongue click

In contrast to *Arras* where multiple environments coexist and slowly develop and interact with each other, *Hōrai* presents them one at a time in dialogue with the more neutral breath-focused flute foundation. The flute interacts with each one of them in a slightly different manner. The musical figures integrate the pitches in the electronics using one or two focused textural techniques for each section. I wanted to emphasize the shifting of atmospheres and the influences and evolutions between them; thus it was important for me to maintain a certain homogenous nature of character in each section.

Analysis & Abstraction: flute

I began with a quick melodic and harmonic transcription of the four chosen works, then transposed them all to exist in closer shared tonalities so that the shift between sections would be subtler and focused on textural changes rather than tonality. The figures below (Fig. 54-61) show the principal extracted melody and harmony from each transposed work followed by a short example of how it is represented and further abstracted via technical explorations of the flute. These extractions and transpositions were isolated, chosen, and blended first in Logic Pro before transcribing them by hand. I have found that especially when distorting musical material almost completely beyond recognition, it is important to use material that retains a certain measure of identity even after EQ, temporal distortion, and pitch manipulation.

Figure 54. – *Hōrai* : Phantom 1, melodic seeds
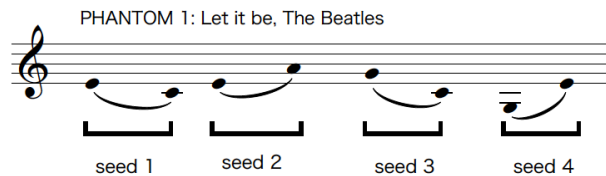
Figure 55. – *Hōrai* : flute, m. 33-35

Figure 56. – *Hōrai* :Phantom 2, melodic seeds

Figure 57. – *Hōrai*, flute, m. 78-80

Figure 58. – *Hōrai* :Phantom 3, Melodic seeds

Figure 59. – *Hōrai*, flute, m. 104-108

Figure 60. – *Hōrai* : Phantom 4, Melodic seeds

Figure 61. – *Hōrai,* flute, m. 144-147

Analysis & Abstraction: Electroacoustic/Phantom

The electronic manipulation was aiming to achieve a transparent and phantom-like quality to these melodies. Pursuing the audio manipulations I had begun exploring with *Echoic Memories*, I continued to ask the question of what sound might look or sound like if we excavated it out of the ground, if it never died? How can we materialize the aging, fading, or deterioration of a sound wave? Transposing, layering, looping, and using extreme equalization in Logic Pro was the first step in creating the base voice and character. Then using Paulstretch I heavily time-dilated certain fragments of the material, then further manipulated the equalization, added octaves, and altered the noise-tone balance of the sound. These manipulations varied in degree depending on the character and instrumentation of the original sound source. The aim was to create sonic representation of the suspended ghostly atmospheres of mythical Hōrai.

In addition to these four interventions of EA phantoms, there is also the more neutral base state of the flute itself. As mentioned earlier, the theme of breath is the common thread throughout the entire work, exploiting the flute's rich virtuosic ability to gradually shift between many different non-pitched colorations from air, to partial air and pitch, to strong wind attacks. The principal sonic imagery behind the introduction and conclusion was that of *impulse response recordings* of various imagined acoustic spaces. Using various vowel coloured air tones breathed into the flute, covered mouthpiece, pitched low notes, inhaling, exhaling, and various combinations of the above techniques allowed me to create a large palette of imaginary spaces. The tongue click, used as a quick pivot between these various room sounds is also meant to allude to the finger snap or clap that we make when listening to the response of a room.

Figure 62. – *Hōrai* : Figuration of room impulse, m. 12-16

Integration of video

Although not initially planned with this work, I ended up composing a video component for the piece. The concept was fairly minimal in scope. I wanted to capture images of mirage-like imagery that were organic and not heavily treated but at the same time remained quite ambiguous in character. I did tests with reflections of water, burning incense, an air humidifier, and a smoke machine. I was essentially seeking to capture what I imagined the mythical atmosphere of Hōrai to look like and wanted an organic character to the movement, as well as a dynamic range of opacity and size of figure. Using contrasting excerpts from the footage I shot, I was able to create a slow gradation and arc between these two worlds to represent both the presence of a phantom – the electronics – as well as the mortal being – the flutist – more isolated and alone. Aside from physical manipulation of flashlights, fans and homemade lighting reflectors during shooting, the principal treatment done on the video consisted of color correction and a slow-motion rendering fluctuating between 10-30% of normal speed.

Figure 63. – *Hōrai* : Staging of performer with video projection

Goals and influence on methodology

The interesting challenge with *Hōrai* was that because I had already clearly distinguished the characters in dialogue using acoustic and electronic roles, I was now more focused on blending

and finding common sonic ground between the two. Due to the more intimate and singular nature of the flute's interaction with each musical material one at a time, the level of abstraction both written for the flute and in the electronics needed to find a common point to create an overall coherent aesthetic. However, it was equally important to maintain enough distinguishing figures, both in the technical character of the flute, and in the melodic arc or harmonic swells of the electronics. The sections within the form of the piece needed to feel unique whilst maintaining an overall coherence of the work as a whole. This challenge presented quite a contrast to previous works for larger ensembles: Could I make musical phantom portraits within a solo work that would still maintain an overall coherence? How to create a sense of intimacy in the experience of the flute player simultaneous to the vastness of the atmosphere he is exploring? This integration of electronics as such a strong musical character in a solo piece opens many new possibilities for how to approach the act of musical differentiation within a work. I found focusing the pre-existing works in the electronics to create distance and space between the composer and other composed sounds was new territory. This clear demarcation can be used to further underline the gradation and dynamic scope of this methodological relationship. Lastly, in regards to conceptual points of inspiration, *Hōrai* continues my interest in blending realist and fantastical representation of sound: from *Echoic Memories'* imaging the materialization of sound as a decayed object we can excavate, to *Hōrai's* representation of ghostly figures and atmospheres. It continues my transition from creating a sonic representation of a past sound to a representation of a fantastical sound.

As identity, culture, ancestors: Conclusion

These works introduced a few interesting challenges and influences to my compositional palette. As these two works were much more contrasting to each other than the other series of works, they each introduced a distinct new angle to my methodology. *Arras*, with its aim to encompass a collection of auditory memories beyond a singular work or even a dialogue, introduced a heightened complexity of working with multiple sound sources simultaneously. The works in response became more of a complex sonic environment, moving at a slower pace and allowing the audience to actively navigate between the different layers. The challenge of navigating more layers forced me to focus and distill the parameters even more. This introduced the option of a more concrete step between parameter abstraction and role integration. Combining parameters in their raw state before their integration and manipulation allowed for more complex layers in their gradient of abstraction. As mentioned earlier, *Hōrai* shared similarities with the first series in its

aim to use music to represent characters. However, the strong separation and influence of pre-existing work in the tape on the neutral state of the flutist allowed me to take advantage the distinct mixed instrumentation of this duo, which distinguishes the pre-existing material from the newly created material in a very clear way. This distinction allowed me to explore, in a more focused and isolated manner, the interaction and influence of pre-existing melodies and harmonies and how their gradual influence could be audibly perceived.

Conclusion

The separation of these selected works into the above subcategories of *(1) In Dialogue/ Narrative, (2) Excavated sound,* and *(3) As Identity, culture, ancestors* served more as a post-analytical organization of thematic commonalities that separated and unified them. Although these eight works were all composed with the common frame of auditory memory and the developing methodology of abstraction, reflecting on the nuances that unify or distinguish them provides insight into limitations and findings along the way.

The first series of works, *In dialogue, narrative,* explored auditory memory as a representational compositional device. These works were exploring extra-musical conceptual forms that were autobiographical and linear in narrative. The actual auditory memories engaged in these works, although part of the memory, served as thematic material representing a character, environment, or event. Although these works were the main basis for the foundation of abstraction as my methodology, their relationship with pre-existing music as thematic devices had productive limitations. However, engaging pre-existing music in a focused dialogue introduced and set the stage for playing on contrast, genre-blurring and defamiliarization as principal tools. The second series of works, *Excavated Sound*, is a direct reaction to this limitation of music as a representational device. In these works, the pre-existing music becomes the main subject of the auditory memory and thus the work itself. To recall or imagine a musical work as the subject of an auditory memory is to place it in a specific context – autobiographical, historical, or fictitious. Thus, the manner in which I considered, analyzed and abstracted the pre-existing material became more holistic and highly influenced by the context in which I was placing it. Whether it is the influence of the spatial imprint of the acoustic space, the descriptive text in a fictitious novel, or the imagined aging and decaying of sound waves, expressed through signal and connectivity. This second series further defined the aspects of auditory memory that interest me most, not in the vivid recreation of a musical event nor necessarily its content. It is in the affective and sensorial qualities of the overall auditory experience, and the very acts of remembering, distorting, audiating, and forgetting. The first series of works focused on linear, autobiographical memories, and the second on someone else's memory, or imagined memory. The third series of works, *As identity, culture, ancestors*, was born from two specific commissions asking for reflections on identity. This series aimed to respond to identity through collective auditory memory (familial, cultural, etc). Inherent in

the natural polyphonic density of the collective auditory memories is a higher level of complexity in my compositional aesthetic. These works no longer explore a dialogue between voices, but rather between layered sonic environments. The evolutions between the series and each of the works were often reacting to the elements that were effective or limiting in a previous work. Parallel to this is the parameter of the new work's context and instrumentation that themselves provide limitations and influences that engage with the continued theoretical and methodological development.

The over-arching theoretical interest in auditory memory was always implicitly present, stemming from my interest as 'the composer as listener' approach as well as my earlier methodology of translations of extra-musical experiences. Influenced by the extra-musical concepts and forms of the works themselves, particularly in the first series, my interest in auditory memory and pre-existing music evolved from purely a representational device to the principal subject within the exploration of the actual faculty of memory. Beginning with more autobiographical and linear episodic memories led to the consideration of emotional affect and temporal distortions within the expression of memory. Then, continually, the chosen extra-musical subjects – Mozart's transcription, Proust's fictitious composer, and Marconi's imagined device – further pushed the theoretical research towards someone else's memory, fictitious memory, and imagined memory. This led to the further theoretical interest in audiation, spatial imprint, excavation of sound, and the materialization of sound.

Upon broader reflection, the initial interest in examining experience and thus auditory memory as a compositional device and subject grew from the desire to create an emotional expressive language in the music that was not solely focused on learned musical codes. Clearly, analyzing and abstracting pre-existing music is partially to access their very musical codes, but it also accesses periods and genres of music and most importantly their potentially felt synthesis and dialogue, beyond cognitive citation. My continual interest in genre-blurring and high contrast, both in programming and within a piece itself also feeds into these juxtapositions and desire to explore and consciously harness them. Moving forward I am keen to further explore the more material and fantastical aspects of sound surrounding excavated sound and imagined sound. I am planning on exploring the synthesis of performance and sound installation within my works as well as long durational performances and works not fixed in their linear interpretation. These elements will allow the works to push their expressive boundaries further as well as consider memory devices, not learned, but within the work itself.

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Annexes

Annex 1 – List of works composed

Figure 64. –   Works composed during the doctorate

title	year	duration	instrumentation	premiered by
Ombra	2018	12 minutes	concerto for baroque 5-string cello and string orchestra	Elinor Frey & Ensemble Arkea
Kintsukuroi	2018	12 minutes	piano, alto saxophone, and percussion	Kimihiro Yasaka & Duo Airs
Ebb	2018	13 minutes	15 musicians	Le Nouvel Ensemble Moderne
Salt	2018	9 minutes	string quartet	Quartetto Prometeo
Tenebræ	2018	7 minutes	string quartet	Ensemble Asssoluta
À perte de vue…	2018	10 minutes	symphony orchestra	Orchestre de l'Université de Montréal
Dust	2019	11 minutes	string quartet	Quartetto Prometeo
Efflorescence	2019	15 minutes	violin, cello, piano	Trio Fibonacci
Echoic memories	2019	60 minutes	9 musicians	commissioned by music@villaromana festival
La cartographie des sons	2019	12 minutes	kanoun and string orchestra	Nizar Tabcharani and string orchestra
La vingt-cinquième heure	2020	13 minutes	mixed choir (50), organ, and wind ensemble (10)	Orchestre Symphonique de Montréal
Arras	2020	22 minutes	14 musicians	Le Nouvel Ensemble Moderne
Hōrai	2021	18 minutes	flute solo, tape playback, and video	Mark McGregor
Bioluminescence	2021		brass septet	Musicians of the National Arts Centre Orchestra
Aer	2021	12 minutes	8 musicians and soprano	Sturm und Klang

Annex 2 – Links to recordings of works

Echoic Memory: in dialogue and narrative

Ebb: https://soundcloud.com/k-ko/ebb

Salt: https://soundcloud.com/k-ko/salt-2018

À perte de vue…: https://soundcloud.com/k-ko/a-perte-de-vue/s-axwQ4

Echoic Memory: excavated sound / imagined sound

Tenebræ: https://soundcloud.com/k-ko/tenebrae

Dust: https://soundcloud.com/k-ko/dust

Echoic Memories: https://soundcloud.com/k-ko/echoic-memories

Echoic Memory: as identity, culture, ancestors

Arras: https://soundcloud.com/k-ko/arras-amp-recording/s-ZLT4XxvWRXy

Hōrai: https://soundcloud.com/k-ko/horai/s-8iZG5S5sX7p

Annex 3 – List of scores submitted with the thesis

Echoic Memory: in dialogue and narrative

Ebb (2018) 30 pages

Salt (2018) 6 pages

À perte de vue… (2018) 24 pages

Echoic Memory: excavated sound / imagined sound

Tenebræ (2018) 6 pages

Dust (2019) 8 pages

Echoic Memories (2019) Mvt I 8 pages, Mvt II 9 pages, Mvt III 30 pages

Echoic Memory: as identity, culture, ancestors

Arras (2020) 76 pages

Hōrai (2021) 8 pages