

# ORCHESTRATING TIMBRE

Unfolding Processes of Timbre and Memory  
in Improvisational Piano Performance

Magda Mayas



UNIVERSITY OF GOTHENBURG



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Thesis for the degree of Doctor of Philosophy in Fine Arts in Musical Performance and Interpretation at the Academy of Music and Drama, Faculty of Fine, Applied, and Performing Arts, University of Gothenburg.

Published by Göteborgs universitet (Avhandlingar).

This doctoral dissertation is No 76 in the series ArtMonitor Doctoral Dissertations and Licentiate Theses, at the Faculty of Fine, Applied and Performing Arts, University of Gothenburg.

[www.konst.gu.se/artmonitor](http://www.konst.gu.se/artmonitor)

The dissertation *Orchestrating Timbre—Unfolding Processes of Timbre and Memory in Improvisational Piano Performance* contains a book and a Research Catalogue Exposition available at URL:

<http://hdl.handle.net/2077/62283>

The Research Catalogue exposition is also available at URL:

<https://www.researchcatalogue.net/view/382024/382025>

Graphic design and layout: Fredrik Arsæus Nauckhoff

Cover photo: Magda Mayas

English proofreading: Helen Runting

Printed by: BrandFactory, Kållered, 2019

ISBN: 978-91-7833-722-4 (printed version)

978-91-7833-723-1 (digital edition)

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# Abstract

Title: Orchestrating Timbre – Unfolding Processes of Timbre and Memory in Improvisational Piano Performance

Author: Magda Mayas

Language: English with a Swedish summary

Keywords: extended timbre, improvisation, composition, inside piano, prepared piano, listening, timbral memory, spatialization, gesture, choreography, musical perception, embodied musical performance, artistic research.

ISBN: 978-91-7833-722-4 (printed version)

ISBN: 978-91-7833-723-1 (digital edition)

URL: <http://hdl.handle.net/2077/62283>

This doctoral thesis presents how the orchestration of timbre is investigated from a performer's perspective as means to "unfold" improvisational processes. It is grounded in my practice as a pianist in the realm of improvised music, in which I often use preparations and objects as extensions of the instrument.

As practice-based research, I explore multiple, combined, artistic, and analytical approaches to timbre, anchored in four of my own works. The process has also involved dialogues and experimental collaborations with other performers, engineers, an instrument builder and a choreographer. It opposes the notion of generalizable, reproducible, and transferrable techniques and instead offers detailed approaches to technique and material, describing object timbre, action timbre, and gesture timbre as active agents in sound-making processes.

Whilst timbre is often understood as a purely sonic perceptual phenomenon, this view does not accord with contemporary site-specific improvisational practice; hence, the need to explore and renew the potentiality of timbre. I introduce and argue for an extended under-

standing of timbre in relation to material, space, and body that embraces timbre's complexity and potential to contribute to an ethical engagement with the situated context. I understand material, spatial, and embodied relations to be non-hierarchical, inseparable, and in constant flux, requiring continuous re-configuration without being reduced or simplified. From a performer's perspective, I define "orchestrating" timbre as the attentive re-organization of these active agents and the creation of musical structures on micro and macro levels through the sculpting and transitioning of timbre—spatially, temporally, physically, and mentally—within a variety of compositional frameworks.

This requires recognizing the multiple and complex roles that memory plays in contemporary improvisational practice. I therefore introduce the term timbral memory as a strategic structural, reflective, and performative tool in the creation of performing and listening modes, as integrated parts of timbre orchestration.

Reaching beyond the sonic, my research contributes to the field of critical improvisation studies. It addresses practitioners and audiences in music and sound art, attempting to also constitute a bridge from artistic research in music—often viewed as a self-contained discipline—into multiple artistic fields, to inspire discussions, creation and education.

# Acknowledgements

## Thank you

Tony Buck

My family

Palle Dahlstedt and Catharina Dyrssen

Toby Kassell and Ingeborg Zackariassen

Marina Cyrino

Linus and Spooky

Douglas Henderson

Sukandar Kartadinata

Artists and Musicians who contributed to this thesis:

Burkhard Beins, Johannes Bergmark, Dave Brown, Tony Buck, Benoit

Delbecq, Jim Denley, Rosalind Hall, Steve Heather, Mazen Kerbaj, An-

drea Neumann, Andrea Parkins, Gino Robair, Ignaz Schick, Clayton

Thomas, Ute Wassermann, James Welburn, Marta Zapparoli

Helen Runting and Fredrik Arsæus Nauckhoff

Anders Carlsson

Kristina Hagström-Ståhl

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# Chapter 1: Opening

## 1.1 Myriad Timbres

In 2012, sound artist and radio producer Sherre DeLys, at the time working at the Australian Broadcasting Corporation (ABC), asked me if I was interested in making a radio piece around John Cage, in light of his 100<sup>th</sup> anniversary. I had never worked with radio prior to this, but was excited and said yes. However, my ambitious project, which built on the *prepared piano*<sup>1</sup> that Cage is so known for, took too long to finish, and so a year later, in 2013, Sherre and I decided to instead make an extended program that explored multiple *inside* and prepared piano approaches (Mayas 2013).<sup>2</sup>

Over a period of three months, while traveling and touring in different parts of Europe and Australia as a pianist performing with various groups, I interviewed many practitioners with different backgrounds—improvisers, composers, interpreters—and belonging to different generations. I also visited the Brussels Instrument Museum to learn about early piano models, extending and modifying the sound of the instrument and trying to get a grip on the inside and prepared piano repertoire.

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- 1) The term “prepared piano” is mostly associated with John Cage, referring to objects such as screws, coins, or bits of rubber stuck in between the strings of the instrument, which is then played on the keyboard. Cage first explored this in 1938 in his composition *Bachannale*. There are however earlier examples of composers calling for preparations of the instrument, as well as early piano models with preparations and mechanisms to alter the sound (see Vaes 2009). “Inside piano” is a commonly used term—e.g., by pianist Reinhold Friedl—that refers to playing inside of the piano, on the strings, metal frame, and soundboard with the hands and various objects. I will mainly use the term “inside piano” in this thesis and describe this choice in further detail in chapter 2.
  - 2) The text from this paragraph is partly adapted from the script of the radio program.

I was interested in the pioneering spirit of today's practitioners: I wanted to know what made them take the step to adapt the piano to the music they wanted to create.

In these interviews, each with their own set of background stories, I was fascinated by the range of different methods and mindsets that presented themselves. Some were intuitive and physical; some prepared the piano in detailed, time-consuming and systematic ways, at times modifying the instrument with mechanical motorized objects, turning the instrument into a self-contained music box, adding electronics, focusing on different tunings, or even dismantling the piano completely and removing its frame.

All musicians seem to be driven by a kind of restless imagination—this allows them to keep finding new things and to keep thinking of new ways to play the instrument. The musicians that I spoke to restlessly adjusted the piano like instrument builders, arriving at a multiplicity of individual approaches.

The fact that pianists are removed from the sound-producing mechanism through the interface of the keyboard creates a distance. The desire to reach inside of the piano is often driven by a wish to extend the sound palette, but also to overcome this distance—"seeking for another sensation of touch," as pianist Benoit Delbecq puts it. During the interviews that I made for "Inside Piano," John Tilbury told me:

I always think of the piano as some kind of Pandora's box. You open it up and it's a box of tricks, amazing sounds that come out of it." However, as he pointed out to me, musicality, listening, and psychology were things that guided him in his music, "not the discovery of a screw inside the piano. (Mayas 2013)

Likewise, this thesis and research is not about so-called "extended techniques"; it is about gaining deeper personal insight into the intimate relationships between instruments, space, and body, when cre-

ating and performing music and *timbre*—which we can begin thinking about in terms of a balance of frequencies and dynamics and their subjective perception over time and through space, although this is a definition that I expand upon throughout the thesis—as well as ways of exploring these relationships.

During the research for the radio program, I also noticed for the first time how musicians talk about the objects they use, and the way that they spoke resonated with my own feelings and experiences: here, objects were being described not only as additional instruments, but as things that allow for the development of personal relationships. Sometimes, musicians even described this as an “osmosis” between object and instrument. Sometimes, they referred to such objects simply as things that they love, which “grow” and evolve in the course of being used. Later on, during my research, these perspectives inspired me to further explore the role objects play in the creation of music and timbre.

The tension between on the one hand intimately knowing the objects and instruments that one uses, as well as knowing how to build a timbral, gestural, and material vocabulary through them—something I came to understand later—and on the other opening up for surprises and the unknown is highly stimulating and seems to be essential to improvisational processes.

Even today, I find that audiences are still surprised when the piano is being prepared or a pianist reaches into the strings. Discovering that the idea of preparing, changing, and expanding the sound of the piano is not a 20<sup>th</sup>-century phenomenon, but as old as the piano itself, however, puts what pianists do today in a very different light. It is in this light that I see individualizing the piano as part of a basic musical, compositional, and creative act.<sup>3</sup> Starting with a classical music edu-

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3) I discuss this individualization of the instrument from precedents to peers in chapter 2.

cation, and later on studying improvisation and jazz, for me reaching inside the piano, playing on the strings and metal frame with my hands and with various objects was a natural process; I've always had a joy for exploring and producing sounds and combining different textures. Hearing about the manifold approaches to the instrument and the myriad timbres that could be produced with it fascinated me. The desire to go deeper into this phenomenon eventually became this research and thesis.

In the beginning of the conversation that I had with John Tilbury, he jokingly suggested that I would probably end up asking him some unanswerable questions. Some years later, I still find myself searching further and deeper, and continuing to ask unanswerable questions about music and timbre and the many ways of listening to and thinking about it.

## 1.2 Outset and Aim

Amongst the many possible approaches to the piano—preparing it and playing inside of it, extending it with electronics, amplifying it, or de-constructing the instrument itself—I wanted to focus on the sounds and timbres produced in my practice as a pianist working in the realm of improvised music performance. I view improvised music<sup>4</sup> as a site-specific practice and a profound and ethical engagement with a situation, wherein a range of components—the performance

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4) In this thesis I use the label “improvised music” to refer to an approach to performing and composing music in real-time, that emerged in the early 1960s with influences from, for instance, new music, noise, electronic music, and free jazz. Key groups and movements include AMM, the New Silence in England, Echtzeitmusik in Berlin and various schools and approaches in Vienna and Japan, and all over the world. There is a lot written on improvisation within jazz, world music, (early) western classical music, sound art, etc., however I choose not to address these areas as such a task would lead too far beyond my research focus.

space, the objects or devices (including technology) for playing and processing, and in my case the instrument itself, as well as the audience—together constitute a set of constantly changing circumstances and conditions. In my practice, I have developed and expanded the vocabulary for inside piano playing, using preparations and objects that become extensions of the instrument itself.

*Timbre* specifically fascinates me because of the multitude of parameters and experiences that it entails: it takes in frequency and dynamics, and the relation between them, and is experienced over time and through space. Whilst timbre is often understood as a purely sonic perceptual phenomenon, this view of timbre does not accord with its use within contemporary site-specific improvisational practice, wherein changing spatial circumstances impact on the listening experience. This received view of timbre also fails to take into account the agency of the instrument and the objects used, as well as the performer's movements and gestures.

This research grew out of a need to explore the possibilities and affordances of timbre and to extend and situate these in relation to space, movement, and material, through my practice as a performing pianist. I wanted to embrace a deeper understanding of the compositional and relational potentiality embedded in timbre and the way it is contextualized in improvised music performance through timbre orchestration.

Perhaps this desire to extend timbre, and with it my practice, emerged from the grand piano itself: this massive, static, and immobile instrument that, more than any other acoustic instrument perhaps, usually remains in one fixed position. The fixity of the piano's position can limit an active engagement within a constantly changing body-space-time-continuum, and for this reason I felt that it needed to be challenged.

In this thesis, I have explored timbral improvisational processes through a series of investigative projects that were integrated into my practice and further extended through collaborations with sound engineers, an instrument builder, and a choreographer. The projects form part of my personal artistic development, extending my practice and offering a methodology to investigate timbre through explorative approaches to instrument, objects, space, and body. The four projects show multiple combined, artistic, and analytical approaches to timbre, whether through systematic mappings of vocabulary and technique, or experiments in amplification and recording (resulting in two audio papers and a series of multi-channel solo piano compositions in which I perform), or a custom-built device for live spatialization,<sup>5</sup> or gestural approaches to spatial composition, or the various perspectives that were articulated through dialogues and interviews with other practitioners. I want to address the entanglement of sound, material, body, and space in my listening and performance experience, not in an attempt to disentangle these things, but to reorganize and relink them, as components and agents, and to emphasize their complexity in timbre orchestration. I am ultimately looking for ways to stimulate and extend a performer's imagination by unfolding the complexities involved in creating with timbre: this constitutes the general aim of the research.

My research also contributes to understanding the performer-instrument relationship in improvised music and the role that an instrument plays in the creation of such music, as this to date has been mainly explored in the field of classical music, or in composer-performer collaborations (see, e.g., Doğantan-Dack 2015; Dullea 2011). I further explore the changed acoustic and performative capacities

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5) I use the term "spatialization" to describe possibilities to direct and diffuse sound through loudspeaker and microphone positioning in space. "Live spatialization" refers to moving and directing sound between speakers in live performance as opposed to being fixed in pre-composed pieces.



of the extended piano through collaborations which expand my approach as a pianist. Employing knowledge drawn from fields such as music technology and choreography has consequences for performer and audience alike, but what grounds the work throughout is my desire to stay with the perspective of a performing musician.

Taken together, these diverse studies constitute an exploration of the multilayered qualities of memory as a structural, reflective and performative tool in music making and beyond. Memory—temporal, spatial, and physical—exists at the threshold of improvisation and composition. Its capacity to reveal and create relationships between sound events is fundamental in the listening and creation process within a performance, which can be understood in terms of an act of *continuously remembering and listening* to what has just been played, and of creating a response to it.<sup>6</sup> Orchestrating or structuring music always refers to placing things in time, and mentally referencing them, as a listener and performer.

Remembering past sound events, as well as being aware of muscle or gestural memory, requires and combines intuitive and analytical skills and informs how we react and create.

I introduce the term *timbral memory* in this thesis in order to describe the strategic use of memory as a means of gaining knowledge about improvisational processes and as a central element within an extended understanding of timbre. Timbral memory acts as a compositional tool in multichannel performances and is present in the use of gestures and movements as reminders of past and future sound events, which in turn can become a means to structure time. It is also embedded in objects and spatial sonic experiences, and such memories can be used to construct a narrative within a performance.

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6) Memory is also used as a tool in cued improvisation practices, e.g., in Butch Morris' "conductions," (see Conduction 2019); John Zorn's game piece "Cobra" (see Brackett 2010); and Walter Thompson's "Soundpainting" method (see Thompson 2018).

This doctoral research documents a dynamic process characterized by a change of focus over time, partly in response to the development of a heightened attention in performing and listening. Decisions and methods arose from and through the artistic works themselves, which is one of the privileges and advantages of being inside an artistic process through practice-led research. The projects were developed partly in parallel, within overlapping timeframes, and in symbiotic relationship to each other, and are presented in terms of the artistic knowledge and logic gained through them, rather than in chronological order. “Orchestrating timbre” became an open and hybrid compositional approach, which can be applied to various improvisational contexts and engages with dynamic relationships and reconfigures them. It is a way of understanding and using the potential instrument-body-space interactions that such contexts afford.

Research into improvised music, in particular music which places focus on timbre, rather than pitch, rhythm, or harmony as a structural element, often points to and develops ways to transcribe, notate, and analyze it, much in the same way that one would approach and analyze pre-composed music. Conceptual and analytical tools, focusing on in-depth aural analysis, or reduced listening, have been adapted (particularly from electroacoustic music) to analyze improvised music performance as well. “Reduced or reductive listening” (*écoute réduite*) was a term coined by Pierre Schaeffer in 1966 and used and adapted by many musicians and musicologists since then (see Chion 1983; Smalley 1986; Thoresen 2007; Delalande 1998). Lasse Thoresen explains its purpose in the following way:

The repeated listening to the sound and the effort to determine its characteristics bring about a clearer aural awareness of the anatomy of different sounds. The resulting interiorization of sonic qualities and their orientation in an overall conceptual structure is a prerequisite for an intuitive, creative mental process. (Thoresen 2007, 5)

I make use of this repetitive listening in relation to single-sound events in the *Performative Timbre* project, which is described in chapters 4 and 5, and further extend the concept through comparatively and systematically listening to and mapping different aspects of the sound production processes.

Scholars have previously investigated and proposed the development of systems of graphic notations, detailed signs, or letters to represent and describe sounds and transitions,<sup>7</sup> undertaken spectral analysis, and used language to describe and categorize the spectromorphological characteristics of sounds (see Smalley 1997; Thoresen 2007), a number of recent dissertations have engaged with graphic, semiotic, or analytical systems and software as an approach to improvised music.

Likewise, a vast literature exists in relation to the social, cultural, psychological, and political aspects of improvised music, as outlined in *The Oxford Handbook of Critical Improvisation Studies* (Lewis and Benjamin 2016), and by the Improvisation Community and Social Practice (ICASP) international research initiative, which describe their purpose as: “the project’s core hypothesis is that musical improvisation is a crucial model for political, cultural, and ethical dialogue and action” (Heble 2019). Literature also exists that addresses influential groups (see for example Eddie Prévost’s *No Sound Is Innocent* or George Lewis’ *A Power Stronger Than Itself*) and the realm of music education. Generally, a lot of research has undertaken which has investigated the threshold between composition and improvisation (see Fuhler 2016a, 2016b; Zanussi 2017; Spence 2018), computer-aided or game-based research approaches (Dahlstedt et al. 2015); and studies can be located that have addressed the structure and concepts within improvised music in a broader sense, often taking one’s own practice as a starting point (see Grydeland 2015).

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7) Described by Thoresen as “a set of conceptual and graphic tools for the aural analysis of music with an enriched sonic morphology... for describing aural thought” (Thoresen 2007, 2-5).

In my practice and investigations, I came across one concept in particular, relating to the creative process in improvised music, which has compelling potential and to my knowledge has received little attention in the existing literature: *timbre orchestration*. Tristan Murail describes sound as a “field of forces,” pointing to its capacity to form dynamic relationships with the environment it is experienced in. Picking up on this idea, my research takes the multiple and complex aspects within a performance environment—instrument, body, space—into account in order to offer an extended understanding of timbre. From a performer’s perspective, I define the act of “orchestrating timbre” as an attentive reorganization of these active agents and the creation of musical structures on micro and macro levels through the spatial, temporal, physically and mentally sculpting and transitioning of timbre within a variety of compositional frameworks. This timbral approach, which navigates multiple media beyond the sonic, radiates throughout my research. Rather than analyzing recorded improvisations in retrospect through the means mentioned above, I note that I explore the orchestration of timbre by applying methods via a series of investigations that are undertaken through performance and through the creation of artistic works.

The methods and systematic and artistic approaches I employ are, however, not didactic. I do not construct a quantifiable categorization and terminology of timbre, and the artistic works and aesthetic choices used in their creation are not *explained*. Rather, I *unfold* the complexity of timbral processes, instead of reducing them, exploring and extending my practice and showing timbre to be a dynamic energy in performance, which continuously transitions between different states. I introduce an extended understanding of timbre, discuss complex listening modes, and offer systematic strategies of subjective mapping as an approach to technique and vocabulary that I advocate can be adapted and applied beyond my own practice in order to approach broader artistic fields.

I have chosen to focus on the piano and my solo practice and do not go into ensemble improvisations for reasons of transparency and simplicity and because this would open up many related issues concerning collaboration, collective decision making within an ensemble, etc., which are beyond the scope of this dissertation. There are however a few exceptions, and adaptations of pieces for ensemble are discussed in chapter 6.

### 1.3 Research Questions

The main research question is:

How do I orchestrate timbre?

This has framed the questions which I subsequently refine through the various projects, namely:

- What is the relationship of timbre to gesture/body, space, and materiality in my practice?
- How do objects (the piano, preparations, speakers, microphones) shape my ideas?
- How do I interact with space—how do I choreograph timbre?

The process of the research further led me to the following questions, which I discuss in chapters 2-8:

- How do I develop and understand technique and vocabulary?
- What role does memory play in improvisational processes, how can it be used, and made tangible, as a structural tool—spatially, sonically, and physically?

## 1.4 Atlas of Key Terms and Concepts

Throughout the thesis I use a number of key concepts and terms, which are explained here. I try to introduce them in the order of appearance in this thesis, however some concepts or ideas are intertwined, and it is sometimes impossible to know which ideas arrived first in my artistic work process.

### Improvisation and Composition

Improvisation and composition have often been portrayed as binaries or even dichotomic approaches to music making. However, in recent years, the thresholds, similarities, and distinctions have increasingly been discussed (in academic research and more generally) as having overlapping and fluid borders.

I utilize the terms “improvisation” and “composition” at times interchangeably, as I view them as tools and methods for music making, which can and often do exist simultaneously and to differing degrees in that process. I view improvisation as a *compositional* approach and a fundamental characteristic of music making, and thus independent of style and genre. Improvised music is often referred to as “real-time composition,” which captures the fact that composing and improvising are simply different approaches and responses to time and space. Improvisation can happen within structured frameworks, which are articulated prior to performing and provide restrictions or limitations and in turn offer a freedom of choices and possibilities one would not arrive at otherwise. These frameworks can be as obvious as the acoustics of a space, the use of a specific instrument, or the adoption of an agreed-upon timeframe, as well as the specification of more complex structured parts within a piece. Likewise, composition may utilize refined systems and concepts, or ideas, which one arrives at spontaneously in the moment through improvising.

My performances are mostly improvised or only partly fixed. As an example, multi-channel recordings, as in *Memory Piece* and the audio papers, lay a framework within which I improvise (see Intermission I and chapter 6). This can be restricting in some ways, yet developing and composing many different variations of the playback provides enough freedom for me to respond spontaneously to structures and material that I am not entirely familiar with, ensuring that an element of surprise remains present.

Improvisation is an immanent and continuous response to multiple aspects of the environment I find myself in, and a way to negotiate and navigate within it. I choose it, because it is site-specific<sup>8</sup> and allows me to continuously transform my own practice. For me, improvisation—in general and as it is expressed through the international music community which practices it—has philosophical, ethical, and political implications which transcend music itself and can be a model for other areas outside of music. Likewise, as an inherent part and precondition of music making, listening has agency and requires an open attention-giving attitude that also has ethical implications.

### Idiosyncratic processes

The development of ways of systematizing material and movements, and of knowing and internalizing my vocabulary and ensuring that it is at hand when needed, are all preconditions for improvisation within my practice. These strategies all allow me to understand, expand,

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8) "Site-specific" is a term mainly used in relation to contemporary art, sound art, and public art, amongst other fields. In this thesis, I use this term to the way in which the choice of material, technique, and its articulation in improvised music relates to and is created out of a set of characteristics that relate to the site, including the specific time, space, and situated circumstance. Hence, improvised music can be seen as being inherently site-specific. Robert Irwin has argued that all artworks fall into at least one of the four categories of "site-dominant," "site-adjusted," "site-specific" or "site-conditioned/determined" (Irwin 1985).

and deepen insight into the choices that I make. The mapping and detailing of technique enable an exploration of sound production processes; they offer multi-sensory and idiosyncratic points of entry into timbre orchestration. As tools and material in improvised music, technique needs to be continuously adapted and reinvented as performance situations evolve. Therefore, I argue for and offer a detailed and intimate approach to technique and material, which opposes the notion that (extended) technique can be generalizable, reproducible, or transferrable. Likewise, I feel that the term “extended technique” is somewhat reductive, because it divides instrumental approaches into traditional versus extended, or non-traditional, categories. This is to disregard the complex historical and philosophical contexts of instrumental approaches, something which I discuss further in chapter 2. I want to rather inspire a more engaged, complex, and detailed way of performing and listening, that reaches beyond finite representations and the simple acquisition of skills and leads a way into idiosyncratic processes of creation, which exist in a state of continuous transition, and take place in a performance context and outside of it.

## Orchestrate

*Orchestrate* [awr-kuh-streyt]: to arrange or manipulate, especially by means of clever or thorough planning or maneuvering;<sup>9</sup> to plan and organize something carefully and sometimes secretly in order to achieve a desired result; to arrange or write a piece of music to be played by an orchestra, organize, cause to happen.<sup>10</sup>

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9) This definition is taken from dictionary.com, <https://www.dictionary.com/browse/orchestrate> (accessed July 23, 2019).

10) This definition is taken from the Cambridge Dictionary, <https://dictionary.cambridge.org/dictionary/english/orchestrate> (accessed July 23, 2019).



*Synonyms: coordinate, manage, arrange, compose, unify, concert, harmonize, synthesize, score, integrate, blend, present, symphonize, set up, put together.*<sup>11</sup>

Referring to the extended understanding of timbre as described above, orchestrating entails arranging, composing, and carefully and attentively re-organizing the active agents present in a performance situation: material, space and body. Improvisation is an approach to musical performance, where musical structures are created instantaneously on micro and macro levels.<sup>12</sup> I understand timbre orchestration as the creation of these structures: on a micro level, this relates to how I sculpt, shape, and respond to a single sound or event while I perform, as well as how that sound or event transitions to the next. Attentively listening to the resulting micro-structure, and remembering it, leads to further acts of decision making and further macro-structures; within the framework of an entire composition in live performance, this in turn leads to the creation of overarching polyphonic maps of sound, movements, and objects, as well as variations, juxtapositions, and combinations of sound material.

## Transition

*Transition* [tran-zish-uhn, -sish-]: *movement, passage, or change from one position, state, stage, subject, concept, etc., to another; change.*<sup>13</sup>

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11) This definition is given by thesaurus.com, <https://www.thesaurus.com/browse/orchestrate?s=t> (accessed July 23, 2019).

12) I explore this further in my audio paper “A Fuchsia-Colored Awning” (Mayas 2019), where I interviewed several musicians—Andrea Parkins, Tony Buck, and Mazen Kerbaj—about their approach, concepts and thinking in improvised music.

13) This definition is taken from dictionary.com, <https://www.dictionary.com/browse/transition> (accessed July 25, 2019).

*Synonyms:*

*development, evolution, upheaval, progression, shift, conversion, passage, growth, progress, changeover, transformation, flux, transit, alteration, turn, metamorphosis, passing, transmutation, metastasis, realignment.*<sup>14</sup>

As part of an orchestrating process, transitions deal with the in-between areas and stages of the sound. I extensively investigate transitions in this thesis, and note that I use the term as a verb, defining the notion of *transitioning* (and thus the verb “to transition”) in terms of central, experimental, and diverse actions that transform energy from one timbral state or form to another. These actions are applied to (material) objects, gestures, bodily movements, and spatial positions (choreography) in the orchestrating of timbre. I apply transitioning in mapping the similarities and differences between sounds, movements and material, which I describe in chapters 4 and 5. I also address transitioning in terms of the act of unfolding the multitude of agents that are active in the decision-making process of performing timbre, which I describe in relation to the projects and resulting artistic works in chapters 3 to 8. As mentioned above, memory is an important factor in the process of composing and responding to structures in the moment, which I employ strategically in the projects.

## **Choreography**

*Choreograph* [kawr-ee-uh-graf, -grahf, kohr-]: *to plan the movements for dancers to perform, to carefully plan or organize a complicated event or activity*

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14) This definition is taken from thesaurus.com, <https://www.thesaurus.com/browse/transition> (accessed July 25, 2019).

*Synonyms:*

*plan, arrange, organize, prepare, plan.*<sup>15</sup>

I use the term *timbre choreography* to describe how I work with timbre spatially—how I undertake a spatial orchestrating and composing with timbre—in a range of different projects. I explore this through the interaction with loudspeakers and microphones and the creation of piano maps in chapters 2, 6, and 7 and through physical movement and the organization of my body and instruments in space in chapter 8.

### **Listening Modes**

Each project creates diverse listening modes, which I experiment with, seeing these modes as intimate and detailed approaches that can be adopted in relation to multiple aspects of a performance. The selective attention and focus that each listening mode provides unfolds the responses and choices that I make with respect to combining and transitioning timbres. This implies focusing and *listening to* gesture and movement, objects, or playing methods (as described in chapters 4, 5, and 8), but it also implies a deepening of perception in relation to the temporal and spatial aspects of a performance, which are emphasized through selective listening. Selective listening can be thought of in terms of listening to past or present sound events (as in *Memory Piece* in chapter 6) or in terms of amplified versus acoustic sounds and their movement in space (as in the creation of piano maps, which are described in chapters 2, 6, and 7). Each listening mode requires a specific type of attention and consequently calls for a change in my performance. Listening modes are ways to observe the details and relational qualities of sound and timbre and play a major role in the decision-making process within improvisation.

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15) This definition is taken from the Macmillan Dictionary, <https://www.macmillandictionary.com/dictionary/british/choreograph> (accessed July 25, 2019).

## Gesture

In using the term *gesture* in the context of musical performance, I adapt the definition given by Godøy and Leman, who describe gesture in terms of “movements made by performers to control the musical instrument... to coordinate actions among musicians... In the context of listening to music, gestures are movements that accompany or express the activity of listening.... Sometimes they are made spontaneously as they go along with the articulation of the musical idea or meaning” (Godøy & Leman 2010, 5). Gesture and bodily movement are an inherent part of sound-producing processes and as such function as active agents in the extended understanding of timbre. I use gesture in a variety of ways in my research: as a parameter to map technique and vocabulary in chapters 4 and 5, as a way to provide a physical and sensorial experience of sound, space, and time and to extend the way I use my body to create structure within a musical performance, in chapter 8.

Gestures can function as autonomous, transitional parts in performance and become *acting silences* when performed without sound as in *Accretion*, which I describe in chapter 8. They serve as moments of reflection, structuring a piece temporally and spatially and informing the overall compositional process of a piece.

## Intentionality in Musical Performance

From a musical performance perspective, I explore intentionality as part of a performer’s mindset, understanding intentionality as something which exists prior to and during the sound production processes but also as something that is present in the resonances, both sonic and physical, that are left over after a performance. Intentionality is thus important to the sounding and material traces that are present and visible after executing or performing a sound—e.g., a string vibrating or an object which moved as a result of performing with it.

Intentionality describes a process of creating purpose and of formulating objectives. It is grounded in the performer's capacity in terms of experience, pre-knowledge, imagination, etc. Intentionality is situated, and thus is related to the specific spatial and musical performance conditions and occasion. Intentionality implies a transitional motion, a driving force, *a structural forward-thinking*, in that I imagine a sound, object or movement, which in itself suggests a multiplicity of transitional possibilities in music making. Intentionality within physical and sonic processes is expressed through a range of performance aspects. These aspects differ and thus need to be detailed, and they include movements, the use of objects, and playing methods. I view intentionality as intrinsically connected to timbre orchestration.

## Hybrid

*hybrid* [hahy-brid]: *of mixed character; composed of different elements.*<sup>16</sup>

I use the term *hybrid* to describe the compositional approach that is connected to my extended understanding of timbre; tracing connections between space, material, and movement/body as non-hierarchical and non-separable and in constant interplay with the environment. I do not divide these agents into (passive) objects and (active) subjects, but rather treat them as changing configurations of dynamic relationships in the framework of a composition. This hybrid performance attitude can be applied to different improvisation contexts and further extended to multiple players and collaborations.

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16) Definition taken from Lexico <https://www.lexico.com/en/definition/hybrid> (accessed July 24, 2019).

## 1.5 Approaches to Investigating Timbre

Throughout my research, I employed an explorative and experimental method, that was both artistic and analytical, investigating timbre mainly through acts of performing and listening. What connects the projects that are detailed within the thesis is their integration into my practice of performing and recording with the piano. The projects are also connected through the investigative interviews and dialogues that I conducted with other practitioners (in the audio papers and “Object Stories” in chapter 3.2 and Intermission II). The methods that were used as modes of investigation in each project are described in detail in the respective chapter. Here, I share Magnus Bärtås’ research approach, which calls for a language and method developed from and through the practice itself, as he describes in his “workstories” (Bärtås, 2010).

The dissertation adopts a practiced-based artistic research approach. The knowledge which was acquired through the practice and investigative projects was disseminated and articulated throughout the course of the research, as well as in this thesis and the Research Catalogue exposition. I have performed and shared different stages of artistic processes through performances and presentations in many different contexts and spaces internationally, within academic institutions and outside of them. These have been important steps for me and created situations which have pushed my research forward, in directions which were unforeseeable and would not have been possible without a public discussion around them. Likewise, the performances and activities, which took many different shapes—from concerts to audio paper performances, artist talks, workshops, masterclasses, lectures, and dinner-table conversations—inspired discussions with other practitioners, colleagues, supervisors, students, audience members, friends, and family that went beyond my own research topics and ventured into questions around what it means to

be a practicing artist today. I see my contribution as being as much articulated through these activities as in this thesis and the Research Catalogue exposition. I also view this as a process which continues to develop.

The timbre of a sound is a phenomenon that is still difficult to define and articulate, although there have been many attempts to quantify or conceptually approach it (as I describe in detail in chapter 2.2). In the course of the research, I have developed a number of explorative strategies and modes to investigate timbre:

- I have introduced an extended understanding of timbre, articulating relationships between space, material, and movement/body as non-hierarchical and non-separable agents in improvised music performance.
- I have advocated that *technique and vocabulary* are tools and material in improvised music making that have to be individualized and adapted to each situation and in accordance with an extended understanding of timbre. I define these as being *idiosyncratic, multisensory, and continuously reinvented*.
- I discuss *intentionality* within musical performance as an inherent, traceable part of timbre orchestration that needs to be differentiated throughout different performance aspects.
- I have created and developed *modes of listening*, which I have viewed as intimate and detailed approaches in processes of sound production and as fundamental to timbre orchestration.
- *Gesture* and movement form a structural part of sound-producing processes and as such function as active agents in the extended understanding of timbre. Given this, I use gestures and movement as autonomous, transitional parts, providing sensorial experiences of sound, space, and time.

- I use physical movement, loudspeakers and microphones in order to explore *timbre choreography* as a spatial orchestrating of timbre.
- I have argued that *memory* functions as a connecting force in structuring and composing with timbre and as a reflective and transformative tool in music making and beyond.
- Through tactics of *mapping* and *cataloguing*, I have defined active agents in the process of timbre orchestration and choreography.

The process of mapping and creating a catalogue of sonic, gestural, and material experiences has revealed details and given insight into my practice, for myself as well as for others. I have found the tension that emerged between the impossibility of creating (complete) catalogues or maps of techniques and vocabulary and the need to systematize or structure experiences to be an important part of a highly dynamic process. This tension facilitated the thinking and imagining of transitions or modes of becoming, which is a crucial part of my research methodology. The various approaches to mapping which I introduced during my research became generative tools to create material, movements, spaces, and transitions, as opposed to being finite representations. These approaches included:

- *Piano maps*, which are described in chapters 2, 6, and 7, are ways to explore and compose timbre spatially.
- Two *mind maps*—the *Object Mind Map* and the *Playing Method Mind Map*. These maps, which are addressed in chapters 4 and 5 and represented in the Research Catalogue, structure material and playing methods. I understand them to be a mental structuring of my sound vocabulary, capturing connections between objects and actions and inviting listeners and viewers to make their own.
- *Perceptual timbre maps*, which are described in chapter 5, define the active agents in the orchestration of timbre: objects, playing methods, and gesture. The perceptual aspects represented in



these maps (the *Object Timbre Map*, the *Action Timbre Map*, the *Gesture Timbre Map*, and the concluding *Sonic Timbre Map*) reveal intentional thinking and orchestrating and relate to each other; they are guiding factors in creating trajectories while I perform.

The focus on three performance aspects and qualities—material, space, and movement—became an approach and attitude to improvising and orchestrating, choreographing and listening, which radiated throughout my research and the projects that I developed. This leads to a more complex and engaged way of listening and performing, which sets the performer in dynamic relation to a constantly changing environment. Sound and timbre become energies that activate space, movement, and body and translate into an ethical and deepened engagement with a situation, during a performance and outside of it.

## 1.6 The Research Catalogue Exposition

The Research Catalogue (RC) exposition “Orchestrating Timbre” (<https://www.researchcatalogue.net/view/382024/382025>) is part of the dissertation and is archived through the Gothenburg University online platform GUPEA together with the written thesis and is available here: <http://hdl.handle.net/2077/62283>. The RC is an international database for artistic research and an open source platform for the dissemination of self-published content as well as peer-reviewed publications, journals, and institutional publications.

I use this platform to present my practice and the various projects developed in the course of the research, through audio and video works, interactive maps and excerpts of performances as documentation material. I see it as a way to make my research more accessible to a broader audience, and view the provision of aural and visual ex-

periences as a crucial way to connect and understand the reflections and research provided in this written part of the dissertation.

The way the objects and timbres are exposed in the Research Catalogue, making a literal and direct use of its name, is also my choice of notation. The starting page of the RC is an introduction to my inside piano set-up and the objects that I use, which gives short video examples of different techniques. Further pages are accessible through the links found in the menu bar on the top of the page, which are labeled:

- A: Introduction
- B: Memory Piece
- C: Audio Paper
- D: Mind Maps
- E: Performative Timbre
- F: Perceptual Timbre Maps
- G: Piano Mapping
- H: Accretion

The “Memory Piece” page contains 8 videos, excerpts of live performances, and a link to the LP *Stereo*, which is an adaptation of a memory piece for the duo Spill, with Tony Buck on percussion/drums and Magda Mayas on piano/clavinet.

The “Audio Paper” page contains stereo versions of the works “Transmitting a Listening” (Mayas, 2017) and “A Fuchsia-Colored Awning” (Mayas, 2019), as well as video excerpts of live performances. The audio papers are multichannel compositions with music and voices, my own as well as interviews and quotes from other artists and practitioners, within which I perform. I chose the format of the audio paper, in addition to this written thesis and the audiovisual works represented on the RC, as a way to convey ideas and concepts touched upon in this thesis, through sound and while directly interacting with them in

performance. I talk in more detail about the audio papers in Intermission I and on the RC webpage.

The “Sound Maps” page contains two mind maps—the *Object Map* and the *Playing Method Map*—which are presented as interactive audiovisual maps. The maps invite the listener to trace sounds, to “compose” their own sound connections, or simply to play with them. The “Accretion” page contains excerpts of a live performance and a video essay around the piece. The “Performative Timbre” page gives a short introduction to the project of that name, and the “Perceptual Timbre Maps” page shows four interactive maps and videos: the *Object Timbre Map*, the *Action Timbre Map*, the *Gesture Timbre Map*, and the *Sonic Timbre Map*.

The RC exposition contains videos of live performances which I have filmed for the purpose of capturing them in a way that was practical and available to me at the time, as well as recordings which were carefully made and purposefully composed and edited, such as the LP *Stereo*, the audio paper compositions, and the video essay. Generally, I work with the advantages and tools that each medium and context offer and limit, meaning that new and different work is created, rather than only documentation as such. I do not share the widely held attitude that live improvised music is always superior to experiencing it through other media, in retrospect. There are many situations and circumstances when this music cannot be experienced live and a recording, a website, or a video is the only way “in.” There are many musicians and even entire scenes that were shaped and inspired by experiencing music through those channels. I do not see these different and new works as a compromise to the live experienced version; a simple one-angled video of a multi-speaker performance with live piano is limited in many ways and does not provide the same experience as “being there,” but it is still *an experience* and has value for me in its own right. The way the camera is positioned—it is often positioned at the frame of the piano, giving a detailed view of my movements inside the piano—provides different angles and in

some ways more insight into the performance process than an audience member would be able to experience live.

I use the RC exposition to present many different works in many different shapes. What the RC can or cannot do, offer, or deliver is dependent on the advantages and limits of each medium, but also the mood, background, and interests of its audience. Despite providing visual and aural experiences, I hope that the RC exposition also fulfils the important function of generating curiosity amongst its audience.

## 1.7 Audience

The thesis is aimed at practitioners, researchers, and listeners in the fields of music and sound art and artists and art-interested readers across the disciplines. It addresses broad compositional approaches which include space, material, and movement. Technique and vocabulary are basic pre-conditions in the compositional processes that are undertaken in any artistic discipline; as such, my research and the resulting projects consist of collaborations and use tools and methods which are applicable to a range of different artistic fields engaged in improvisation, detailed methods of approaching technique and vocabulary through strategies of mapping and cataloguing, and the creation of listening modes. The latter can be translated as or applied to a detailing of qualities and perspectives in the perception of art practice as such. As part of critical improvisation studies, this thesis has the potential to construct a bridge between artistic research in music, which is often viewed and treated as a self-contained discipline, and multiple other artistic fields, and to thereby inspire discussions, creation and education, and reach broader audiences.

## 1.8 Chapter Summary

This dissertation partly builds on, extends, and references the article “Transmitting a Listening” (Mayas 2017) and the RC Exposition “Creating with Timbre” (Mayas 2019), as well as many written reflections, journal entries, interviews, conversations with other practitioners, as well as their stories.

Below I provide a summary of the chapters and the thesis layout, which starts with an introduction and background to the research context (chapters 2 and 3). The main body of the text (chapters 4-8) consists of descriptions and reflections on the four projects and the thesis closes with a discussion of changes in and the outcomes of the research (chapter 9).

### **Chapter 2: Instrument Relations**

This chapter provides an introduction to inside and prepared piano playing, gives a short historical overview, and positions the author in the field of contemporary improvisational piano performance. It contains discussions of performer-instrument relationships in improvised music and the author’s practice specifically, and details technique and vocabulary as intimate approaches to the instrument. This is followed by an introduction to amplification and recording as research methods, which is supported by detailed descriptions of microphone and speaker interactions as timbral and spatial explorations, and a short historic introduction to timbre research in different fields.

### **Chapter 3: Objects**

This chapter focuses on objects and preparations used as instrumental approaches and material agents in music making. “Object Memories” constitutes a series of short reflections that are told from the

author's recollection and describe the role that objects play in the mental and physical structuring of sound material in the author's artistic practice. These are followed by "Object Stories," a collection of short stories by different artists and musicians, reflecting the manifold and unique ways that technique and vocabulary in music making are developed through objects. The stories oppose a compartmentalization into labels such as "extended techniques," showing a multiplicity of performance practices within improvised music.

#### **Chapter 4: Performative Timbre**

This chapter describes an intensive listening study, "Performative Timbre," undertaken in collaboration with Palle Dahlstedt. The author uses a subjective similarity measurement as an adaptation of the scientific timbre space method, articulating timbre in relation to material, gesture, and playing method, through an extensive listening and comparing process. This is followed by an introduction to strategies of mapping, as a mental structuring of vocabulary and technique, articulating connections and relationships between active agents in timbre orchestration.

#### **Chapter 5: Catalogue of Shapes and Motion**

This chapter translates the outcomes of the listening comparisons and ratings from the "Performative Timbre" study into graphical representations that were developed together with Palle Dahlstedt. Multi-dimensional scaling (MDS), a spatial analysis method, is used to visualize the collected data, resulting in four *perceptual timbre maps*: the *Object Timbre Map*, *Action Timbre Map*, *Gesture Timbre Map*, and the concluding *Sonic Timbre Map*. These maps are analyzed and compared to each other, revealing relationships in between and within the different performance aspects and unfolding details and complexities as part of timbre orchestration in improvised music.

### **Intermission I: Is It Still Magical?**

Intermission I comprises a verbal notation of two audio papers, “Transmitting a Listening” (Mayas 2017) and “A Fuchsia-Colored Awning” (Mayas 2019), which were created during the research and are represented in the RC exposition. This part of the thesis contains transcripts of interviews and quotes from both pieces in order to reflect the topics touched upon in both works, namely: improvisational processes and the role that memory plays in them; different systems of categorizing and notating sound material; modes of listening; and relationships between gesture, space, and sounds.

### **Chapter 6: Memory Piece**

*Memory Piece* was a series of compositions for amplified piano and multichannel playback. Recordings of past performances are superimposed with new live piano playing to trace sonic, spatial, and temporal relationships, which transform the past and create new sonic experiences. Detailed descriptions are given of the recording and multi-channel composing process, its technical means, and its sonic and aesthetic implications. The compositions operate as an autobiographical capturing of sound memories. Variations and adaptations of the work to different spaces, instruments, and ensembles are also discussed.

### **Chapter 7: Piano Mapping**

This chapter describes *piano mapping* as an approach to spatial composition, through the mapping and unfolding of space and sound relationships by means of speaker microphone interactions. The work process and development of a custom build spatilization tool in collaboration with Sukandar Kartadinata is described in detail, which integrates the concept of piano maps into improvisational performance processes. This results in a variety of spatial compositional possi-

bilities and perspectives as timbre choreographies. The author describes performances using the piano mapping tool in various spaces, at times together with multi-channel compositions such as memory pieces or audio papers.

### **Intermission II: On Choreography Across Disciplines**

Intermission II contains a dialogue about movement, memory, and improvisation across disciplines between the author and the choreographer Toby Kassell. It describes the work process and collaboration leading to the concert performance of *Accretion*, and provides background to the concepts and intentions behind the piece.

### **Chapter 8: Accretion**

A collaboration with choreographer Toby Kassell, this chapter describes gestural and physical approaches to instrumental performance resulting in the concert performance of *Accretion*, a piece for three pianos and one pianist. The chapter gives an introduction to and differentiates between various gestural approaches in musical performance. It details the work process behind the performance and explores the role and potentiality of gestures in relation to an extended understanding of timbre and its orchestration. *Accretion* expands musical and physical gestural approaches into larger frameworks of spatiotimbral compositions and choreographies, as an organizing of sound, instruments, body, and movement in space.

### **Chapter 9: Coda**

I close the thesis with a discussion of the contributions and outcomes of my research and changes in my own practice. I point to future research and possible extensions of the introduced projects.







## Chapter 2: Instrument Relations

### 2.1 The Individualized Piano

*Inside* or *prepared* piano playing has become quite common in contemporary music practice, both in composition and improvisation, from the middle of last century onwards. The desire and need to individualize the instrument is one of the key points of departure for this thesis and the research that it documents.

*Inside piano* is a commonly used term that refers to playing inside of the piano, on the strings, metal frame, and soundboard with hands and various objects. In contrast, in *prepared piano* objects are often placed between the strings or fixed in some other way and the piano is played using the keyboard. Practitioners have coined terms such as “hyperpiano,” which is used to describe modifications and preparations used with the acoustic grand piano (Maroney 2019), and “hybrid grand” (Dahlstedt 2015), which premiered already in 2011, and “Piano+” (Lexer 2012), which also include electronic modifications that are used together with the grand piano. Some research has been done on the challenges of performing the prepared and inside piano repertoire from an interpreter’s perspective (Dullea 2011), but little research has been conducted on the relationship between composer-performer and instrument in improvised music. Likewise, research around the changed acoustic and performative capacities of prepared and inside piano, and the consequences for performer and audience alike, is greatly needed in the field of inside/prepared piano performance.

#### Precedents and Peers

Experimentation in music is not a twentieth-century phenomenon: it has always been an inherent characteristic and substance of every

artistic practice. I would argue that searching for ways to change and manipulate the timbre of the piano has been part of the instrument's history from the very beginning, as already mentioned in chapter 1 (see Vaes 2009).<sup>17</sup> This is, with some variation, true for every instrument's history. Before arriving at a standardized model of the grand piano, builders experimented with a variety of techniques to alter the sound of the instrument, attaching frames, pedals, objects, and other mechanisms. Mandolin attachments in the eighteenth century, the Joseph Angst fortepiano (1820), tack pianos and the Luthéal mechanism (1919) are only a few examples of sound-changing mechanisms (see Bowers 1972). The development of these instruments expresses the desire to create an individualized piano and to have a variety of sounds at hand, as sound effects or for different performance settings and compositions. Borders between instrument builders, composers, and performers were fluid, a situation that is quite common again today in improvised music and sound art practices. The development of uniform and mass-produced instruments offered stabilization on the one hand,<sup>18</sup> but also led to a lack of acknowledgement of individual experimentation in performance on the other. In response, composers developed instruments and coined the terms *glissando piano*,<sup>19</sup> *string piano*,<sup>20</sup> or prepared piano,<sup>21</sup> once again individualizing the piano. I talk in more detail about the history of the prepared piano as well as recent approaches and practitioners in the radio documen-

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17) Luk Vaes (2009) puts extended piano techniques in a historical context in his thesis "Extended Piano Techniques, In Theory, History and Performance Practice."

18) For instance, the concert grand piano Steinway D-274 model was built for the first time in 1884 and remains almost unchanged to date. An estimate from 2003 suggests that more than 90 percent of concert grand pianos worldwide are D-274s (Steinway and Sons 2003).

19) See, e.g., "Music of the Spheres (*Sfærernes music*)," Langgaard, 1918.

20) See, e.g., Cowell, *Aeolian Harp*, published 1930.

21) John Cage composed many works for prepared piano, and coined the term, starting in 1938, with his composition *Bachannale*.

tary “Inside Piano” (Mayas 2013), mentioned above, which includes interviews with pianists Cor Fuhler, Chris Burn, John Tilbury, Andrea Neumann, Benoit Delbecq, Tisha Mukarji, Anthony Pateras, Reinhold Friedl, Frederic Blondy, and Sophie Agnel, as well as discussions of their music (see also chapter 3.3).

Playing inside the piano often requires more elaborate physical gestures than needed when playing other instruments, simply due to its size. The mere act of leaning over and into the piano, moving from the bass to the treble register, sitting down to play the keyboard and standing up to reach inside the instrument, often in quick transitions, demands practice and movements that need to be physiologically and ergonomically learned and understood. Examples of individualized and physically changed grand pianos have been developed by pianists Sarah Nicolls and Andrea Neumann, who have altered the design of the instrument to extend its sonic possibilities as well as for practical reasons.

Sarah Nicolls had her “inside-out piano” custom built. In this instrument, the soundboard and strings of a grand piano are elevated vertically above the keyboard, to avoid the physically straining actions that come with inside-piano playing and allow the pianist to easily access both the strings and the keyboard at the same time (Nicolls 2009). Andrea Neumann uses only the soundboard and strings of the piano, having removed these from the rest of the instrument. This inside piano is placed in a horizontal position upon which other small sound-making objects are placed (for example, fans, steel wool, erasers, wood, and so on). These are in turn amplified and altered via mixing board equalization. Neumann later had a lighter, smaller version of an inside piano custom built (see, e.g., van Eck 2017, 108-110). In contrast, in my own work, I employ modifications and extensions developed on the (mostly) amplified grand piano.

Along with my wish to improvise came an urge to engage with the whole instrument—to play inside the piano, moving away from the keys, and to try to unite the inside with the outside again. Even though I am classically trained and later studied jazz improvisation, I did not feel the weight of the western classical-music tradition, centered around and embodied by the piano, quite as heavily on my shoulders as so many of my colleagues seemed to. Nevertheless, I do not think I was or am completely free of this tradition—reaching inside the instrument and away from the keys was also a way to escape categorization and the judgment of my work by standardized western classical-music values. Learning to play inside piano meant learning to perform on a completely new instrument. I was fortunate to work within a community of young improvisors who were likewise trying to find their voices and their own ways of music making. I spent long hours approaching this new territory on my own as well as performing together with others. This discovery process felt playful and natural to me at the time, as if entering uncharted territory, a place where I had to find my own sound material and techniques, something that I was and still am drawn to. Like many of the pianists that I have interviewed, I feel that I discovered a lot of the playing techniques and vocabulary that I use on my own, and this enabled a way of musical narrating and constituted a unique way of *relating* to the instrument, other musicians, the audience, and the context that I faced.

Throughout the years, I have developed a set of techniques that, whilst they draw on the history of prepared and an inside piano vocabulary, are highly individualized and extend the possibilities for internal piano music-making. The techniques that I use are not so much “preparations” in the Cagean sense, which often involve a fixed setup for specific pieces, but are rather flexible in the sense that all preparations are instantaneously accessible and movable, and thus adaptable to different pianos, the acoustics of different concert spaces, and different musical requirements. The piano is transformed but it can

be returned to its unprepared state in an instant, which is an essential and critical aspect when I improvise.

An overview of a selection of preparations and objects that I use, as well as audiovisual examples and descriptions, can be found in the Research Catalogue Exposition: *Media Examples A1, D1, and D2*. There are, however, a myriad of combinations, nuances, and techniques within my setup, which are constantly new and constantly evolving. I find that the differences between prepared or inside piano approaches do not lie so much in the utilized objects or sounds, but in each pianist's specific touch and aesthetic and how and when the material is used and musically contextualized. As an example, a lot of pianists use EBows<sup>22</sup> or bow strings with fishing line or bow hair, but it will sound considerably different depending on how the EBows are treated; where they are placed; if they are prepared; what material is used to bow; whether bowing is done in front or behind the dampers; whether it is rhythmic or sustained; in which register it is; how soft, hard, fast, or slow the bowing gesture is; and, most importantly, what happens before and after, in a musical context. Cathy van Eck speaks about different definitions and capacities of musical instruments and how musical ideas are shaped by the instrument itself, noting that:

As soon as a musical idea is played on an instrument, one will never be able to hear only the idea... one cannot subtract the instrument and retain the music... it is not endless possibilities, but rather the finiteness of these possibilities which render an instrument fruitful for music making. (Van Eck 2017, 50)

The specificity of an instrument shapes the performance in a significant way and I adapt to different pianos every time I perform. Exten-

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22) The EBow or Electronic Bow is a battery-powered electronic device originally invented to be used on the electric guitar. It uses a pickup (an inductive string driver) feedback circuit to induce forced string vibrations, which sound similar to a sustained bowing of the string.

sive variations in sound and layout require adjustments in listening and in touch and gesture. Meeting a new piano, I look at the metal framing, the strings that are at its borders. I memorize their pitches and test the harmonics in different registers. I look at the strings that might be inaccessible to me. I sit down and play a few notes, experience the touch of the keys, test the dynamics. I feel the strings, testing how far I can lean over and into the piano. How tense are the strings? How old? How responsive to rosin? Is the felt covering up the strings behind the bridge? How do they sound when plucked?

The instrument-specific outset, the piano with its acoustic possibilities, the way that sounds project, the piano's sonic limitations, the physically challenging and straining position of leaning over and into the instrument, adapting to different instruments, are all defining pre-conditions for the music that is to be created. The particularities of the performance situation inform each other and become part of the composition and performing process.

Dick Raaijmakers uses the term "closed" instruments to describe conventional musical instruments which have found a static, finished form, such as the grand piano, and have only been "opened" again by musicians, artists and composers in the second half of the twentieth century (1989, 9-12). Van Eck describes the "unfinished" aspects of instruments and pieces they are used in, noting that they "keep the relationship between performer, object and sound in constant motion and create the possibility of composing with these relationships" (*ibid.*, 163).

Likewise, the ways of altering and individualizing the piano that are described above facilitate a flexible instrument/performer relation, which transitions and changes during a piece and with every performance. This openness and idiosyncratic adaption of material—of the instrument, objects, and sound—is an essential aspect in my composing and orchestrating with timbre.



## Technique

*I have no time for technique because I must always be making one: any technique can be discovered after any technique is forgotten.*

John Cage (1961, 150)

In my experience, the development of technique and vocabulary are inherently personal, which requires a detailed and intimate relationship with the instrument and is created as a behavior in response to a given context or situation. As circumstances change, especially in relation to the site specificity of improvised music, techniques have to change and adapt too.

I want to oppose the widespread terminology and approach connected to “extended instrumental techniques,” which is common when describing “non-traditional” or “unconventional” ways of instruments that are played across genres today. Such labels are reductive and imply that a dichotomy exists between “normal” and “necessary” versus extended and “unnecessary” techniques. However, extending and individualizing instruments in various ways is very much part of many instruments’ traditions and histories. I would rather draw attention to the inter-relationships of material, space, and movement in improvised music performance, which demands that we look at technique and timbre in terms of multi-sensory experience. Technique always demands time to be developed and is always physical *and* cognitive—it always needs to be thought and mentally learned before it can be translated or manifest physically, and it is exactly this intimacy and need for attention to detail that makes “technique” so difficult to define. The time spent is not transferable and cannot sufficiently be explained in an instructional guide. I think of technique or virtuosity in a musical context as the ability to execute an idea, in a clear and exact way, whatever that idea is. There is as much virtuosity involved in pressing a key on a laptop at exactly the right time or knowing when *not* to play as there is in being able to execute many different physical movements at a high tempo at the same time. A mere description

of techniques, a tutorial of playing inside the piano, not only defeats the purpose of a creative practice, it also gives the wrong impression of a possible shortcut, presenting results rather than suggesting the development of a distinctive relationship with the instrument while focusing on multi-sensory aspects of performance processes. Likewise, a software which offers prepared piano samples is of course useful in computer-aided synthesis and composition, but simplifies these complex relationships and nuances and results in an anonymous and uniform approach to instruments, where technique might be used to create effects rather than being meaningful and personalized.<sup>23</sup> I therefore argue that technique and vocabulary need to be (re) defined as tools and material in improvised music making and must be thought of as always *idiosyncratic*, *multisensory*, and *continuously reinvented*. Given that I perform sound in active relation to objects, the instrument, my body, and the space, such an approach is crucial, if I am to be able to reveal the details that define my technique and make it unique, and give that technique value.

Furthermore, the organization and categorization of the material, and of each technique, are essential to constructing a narrative and a context of use. Learning to categorize the sounds that I work with and to have them “at hand” when they are “needed” is crucial to understanding and applying a sonic vocabulary. Tension arises, here, between the need for structuring and organizing material, and the impossibility of a complete catalogue. However, the purpose of indexing or ordering material and movements, as I do in the mind maps and the perceptual timbre maps, lies in the process itself. The intention is not to represent something finite, but rather to understand the complex relationships at play in the production of sound and how it is composed and situated in the context of an improvised piece of music. To engage with my main research question, “How do I orchestrate timbre?” I first need to ask: “How do I develop and understand

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23) For instance, Prepared Piano by IRCAM.

technique and vocabulary?” This in turn requires a close listening and comparing of sonic and physical material and movement, in order to reveal the intentions, approaches, and relationships between different elements of performance, which I discuss in chapters 4 and 5. The process of creating a catalogue of (sonic) experiences in various ways shows details and gives insight into my practice, both for myself as well as for others. To reiterate the point that I develop above: it is not my intention to provide a technical “how to play inside piano” guide. Such a guide would not work anyway. In sharing that process and revealing how this thinking, listening, performing of timbre, and technique unfolds, I seek to inspire a more engaged, complex, and detailed way of performing and listening that reaches beyond finite representations and the simple acquisition of skills in order to open up a range of possible processes of creation, which all continuously transition between different states. Hence, technique cannot be understood as a fixed and transferable entity, but rather must be thought of as something which is mentally and physically learned and needs to be continuously relearned, reperformed, and reinvented if it is to fulfil its purpose in improvising responses to site-specific circumstances.

## 2.2 A Few Notes on Timbre Research

The timbre of a sound is a phenomenon that is difficult to define or even to talk about, although there have been many attempts to quantify or conceptually approach it. It is often referred to as the “color” of a sound, and some have proceeded by simply describing what it is *not*; others have invented different scales and systems with which to categorize it. Some have approached timbre by focusing on how different timbres are *produced*, rather than describing its sonic outcome; some have compared it to language; or described the frequen-

cy and balance between various parts in the spectrum.<sup>24</sup> In psychoacoustic research, timbre is described through “timbre spaces,” which are graphical representations that translate perceived (dis)similarity ratings of multiple timbres into a distance model (see, for instance, Wessel 1978).

Scientific timbre studies have mainly been carried out in the fields of (psycho)acoustics, music psychology, and computer music. Whilst a review of these research areas is beyond the scope and purpose of my own artistic research, I note that the chapter *Musical Timbre Perception* by Stephen McAdams (2013) lays out an introduction to these matters. Rather than such a review, my aim here is to point to ways that timbre is understood and approached in various fields of research that are relevant to my own musical practice and research questions. In that spirit, one can begin by noting the importance of Hermann Helmholtz’ *On the Sensation of Tone* in early research into timbre and sound (1954). Helmholtz invented resonating devices in order to explore timbre and its spectral shape, comprising a fundamental work and new theory of sound perception “through defamiliarizing common terms” (Kursell 2018, 339). A vast literature also exists on timbral approaches and sound synthesis in electronic and electro-acoustic music. Signal generation and processing technology in the 1950s and 1960s enabled a completely new discourse on timbre research in that sound signals could be shaped and made available for multidimensional-data analysis and be visually represented. Pierre Schaeffer’s *Treatise on Musical Objects* contains a “finely wrought meta-language for the relationship between human listening and musical sound” (Valiquet 2017, 255) and serves as a foundational text and research guide for electro-acoustic music. Schaeffer’s concept of *typomorphology* and his definition of different listening functions

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24) Kleiner, for instance, describes “timbre, the subjective perception of spectral content (frequency and balance between various parts in the spectrum)” (2008, 77).

suggest guidelines and classifications of sound objects and their relation to musical structure for creative invention, listening, and making, rather than serving exclusively as an analytical tool. His theories and concepts have been utilized by countless musicians and researchers—among others, by Denis Smalley and Lasse Thoresen—who have adapted and further developed them, often through indexing, listing, and defining further characteristics of sounds.

Smalley coined the term *spectromorphology* (Smalley 1986) to articulate and categorize listening experiences and thinking around acousmatic electronic music. “Spectromorphology,” he explains, “is concerned with perceiving and thinking in terms of spectral energies and shapes in space, their behavior, their motion and growth processes, and their relative functions in a musical context” (Smalley 1997, 124-125). He describes the need to “make collective sense of a wide range of individual electroacoustic musics” (ibid., 125) and ways in which we articulate those experiences.

Thoresen further developed Schaeffer’s theory of character and value in relation to sound-objects by introducing the concept of “integral sound characters,” which links sound to its temporal behavior via reference to the relationship between timbre and musical structure. Further, the *Aural Sonology Project* offers, among others, conceptual and graphic tools for aural analysis through “a detailed and objective approach to the transcription of sound-based music” (Thoresen et al. 2009, 319; see also Thoresen 2015, Thoresen 2019). Thoresen sees a need for an intersubjective agreement to transcribe and describe sound-objects in relation to Pierre Schaeffer’s “reductive listening” intention, in order to create a meaningful discourse about music in words. Here, he refers to Schaeffer’s “reduced listening” as a listening to sounds just as sounds, abstracted from any meaning or causes (see Thoresen 2007, 4-5). Again, the aim is the development of a universal language to objectively talk about and analyze listening experiences. This differs substantially from my own research aims, where I embrace a subjective method and pursue an extended understanding

of timbre creation and perception, by linking timbre to multisensory, idiosyncratic, and relational performance techniques.

Still, a quantified system or measurement of timbre or its notation does not exist at present. The difficulty in formulating such a system lies in the fact that timbre is a perceptual phenomenon that circumscribes sound as a whole and is defined through its temporal and transitory attributes.

“So,” acknowledge Murail et al., “it’s ambiguous, in fact timbre doesn’t exist in a way. It’s like common ground where everything comes together. So, timbre is amplitude, it’s not just pitch. It’s amplitude, pitch, it’s time [...]” (2003, 12).

Hence, timbre already contains musical structures, in that it is defined through frequency and intensity experienced over time and through space. The perception of these parameters (frequency, intensity, duration, etc.) is, however, subjective, context-dependent, dependent on the current behavioral and emotional state of the listener, and affected by their cultural conditioning, etc. Even scientific timbre space studies struggle with generally compatible and comparable definitions of timbre (see, for instance, Siddiq et al. 2015). I discuss the timbre space method in more detail in chapter 4.2.

Studies in timbre are studies in listening. Timbre can be understood as an attitude towards music making, which I find captivating and close to my own musical practice, as it treats sound as a phenomenological whole, and is mainly concerned with its perception. My own interest in timbre orchestration stems from a curiosity about and need to articulate and expand compositional structures in my artistic practice, through approaches which embrace spatial, material, and bodily aspects of sound in improvised music performance. Timbre can offer up such an approach in that it does not only play a paramount role in our perception of the building and releasing of tension in musical structures throughout different parameters, but likewise is also active in our perception of our surroundings and environment. Stephen

McAdams therefore notes: “It may be that because timbre perception is so closely allied with the ability to recognize sound sources in everyday life, everybody is an expert to some degree” (McAdams 2012, 3).

Psychoacoustic research shows that our perception of timbre changes depending on the volume and pitch of a sound. In this sense, timbre helps us define the material and shape of a sound source, as well as its position in space, and gives us information about the sound-producing mechanism.<sup>25</sup> This suggests that timbre can be understood as a phenomenon through which we experience musical space as well as materiality. Smalley likewise describes this as “spatiomorphology,” and has written on the experience of space through spectromorphological concepts (Smalley 1997, 122). Hence, timbre is experienced through a multitude of perceptual parameters and approached in conceptually diverse ways, with a vast amount of research having been conducted into timbre across multiple disciplines. There are of course also countless artistic explorations of timbre in music making in a range of different cultures, whereby parameters concerning pitch, harmony and rhythm have been joined or conceptually replaced or extended with timbre, noise, and other temporal and textural sonic experiences.<sup>26</sup>

Spectral music refers to a musical school which was founded in France in the early 1970s by Tristan Murail and Gerard Grisey (see, for instance, Fineberg 2000; Anderson 2000; and in relation to the piano, Nonkin 2014). One of the most important schools of composition in contemporary music, it is concerned with timbre and sound spectra as organizing principles: “the music has made color into a central element of the musical discourse, often elevating it to the level of the principal narrative thread” (Fineberg, 2000). Tristan Murail has

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25) Spectral cues are utilized in source identification, spatial hearing, and auditory perspective (see Chowning 2001; McAdams 2013).

26) E.g., Echtzeitmusik, noise music, and various practitioners from the world of electro-acoustic improvisation, such as Axel Dörner, Merzbow, Francisco López, amongst others.

referred to spectral composition as an attitude towards music and composition, rather than a set of stylistically refined techniques and called for a music which embraces a “totality of sonic phenomena” (2005, 124), going on to pose that:

Rather than describe a sound by describing its ‘parameters’ (timbre, register, volume, duration), it is more realistic, more in keeping with physical reality and perception, to consider a sound as a field of forces, each force pursuing its own particular evolution. (ibid., 122).

Murail talks about a compositional process which does not differentiate between form and material, but rather is an “organization of energies” and a symbiosis of the two (ibid., 135).

This organization of energies is very much in line with my own musical thinking: the inherent structure and orchestration of timbre in relation to material, gesture, and space lies at the heart of my research, and rather than offering quantifiable categorizations of timbre and its perception, I am instead concerned with contributing an extended understanding of timbre, revealing its performative qualities, and using its potential in the composing performing process.

## 2.3 Placing the Audience Inside the Piano

Many timbral subtleties of inside piano playing do not translate or project very well into space—the acoustic output can be quite soft and at times does not reach the listeners in all its detail. The practice offers much broader dynamics than the standard employment of the keyboard, and the often very fragile and soft soundscapes demand an alternative performance approach.

Amplification and recording have constituted an important outset for most of the projects conducted in the course of this research; I used these methods in order to approach the instrument and ex-



plore the timbres produced. In live performance, I virtually place the audience inside the instrument through the setup described below, as a way to bring soundscapes closer and make details of timbres available. I investigate space and sound through interacting with microphones and loudspeakers, resulting in expanded timbral possibilities in composing and performing with the piano.

There is very little literature or information on amplification or recording techniques for inside or prepared piano performance. The amplification and recording method is clearly dependent on the specific space, instrument, the performer, or which pieces are being performed. However, I have found that the way standard keyboard playing is amplified and recorded is often simply carried across and employed when working with inside or prepared piano playing. In most cases, this is very ineffective and does not take into account the changing dynamic and timbral range.

In this chapter, I describe how I have worked with amplification, the different kinds of microphones and speaker setups that I have experimented with in collaborations with sound engineers, as well as the flexible setup that I have chosen when performing. I also specify how I have worked with recording in multichannel compositions and various projects in Intermission I and chapters 6 and 7.

Below are a few examples of composers and practitioners whose work has specifically called for the amplification of inside or prepared piano playing, or has taken account of the changed acoustic projection of inside/prepared piano playing.

Composer George Crumb requires amplification of the piano in some of his compositions. The piece *Makrokosmos* requires playing on the strings with at times very soft outcomes, such as producing overtones through plucking and muting strings. However, there are no specifications as to what microphones to use: "... a conventional microphone," writes Crumb, perhaps reflecting what was technically

achievable at the time (1974, 5). Alvin Lucier uses amplified vessels or teapots inside the piano, although the focus of his work lies in amplifying specific resonances of the piano within these objects rather than amplifying the inside piano sounds as such (see Lucier 1990; Lucier 1991).

Martin Iddon uses amplification in his piece *head down among the stems and bells* (2019b) in order to draw attention to the physicality of the performance, stating that: "...the amplification is there precisely to allow listeners to hear the sounds of the piano which traditional playing disguises, the 'minute life' of the piano... What I'm ideally after is a music .... where the performative physical effort required to create it is always audible too" (Power 2014). This suggests an amplification of extraneous noises used to produce certain sounds, offering the audience/listener a physical closeness to the performer, which inside piano playing often does not give access to; the techniques and movements mostly take place hidden inside the body of the piano, not visible to the audience. Here, Iddon specifies precisely how the "minute life" of the piano should be amplified to achieve this effect, providing a drawing marking the exact positions, types, and functions of microphones.<sup>27</sup>

Pianist Benoit Delbecq, who uses various preparations inside the piano, including different types of wood and triangular pieces of eraser placed between the strings, states that: "The main problem with prepared piano lies in its acoustic output. Depending on the instrument you're playing on... you definitely have to increase the energy to trigger a decent acoustic power... it requires a lot of piano strength but it doesn't sound loud" (Shoemaker 2002). Playing inside piano, e.g., producing harmonics on the strings, can have an even softer dynamic output.

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27) Iddon comments within the score to *head down among the stems and bells*: "The piano should be amplified using as many as 8 pencil-style condenser microphones" (Iddon 2009a, 1).

Pianist, composer, and sound artist Gordon Monahan prepares the piano using “materials of the traditional preparation repertoire: bolts, screws, broken chopsticks, rubber, weather-stripping, and vibrating nuts and washers” in *This Piano Thing* (Monahan, 1989). He then places transducer pick-ups inside the instrument and augments them with additional air microphones, which he considers to be another type of preparation. Through this amplification method, he is able to use the “magnification of these extremely close-up sounds as prime sound material on which to focus” (ibid). This is an interesting amplification method; however, different playing methods and sonic output are sought in the prepared piano and inside piano playing, and the latter requires a different amplification method as a result. I discuss how I use pick-ups and other microphones in combination below.

Chris Burn is a pianist, composer, improviser, and interpreter who has investigated amplification and electro-acoustic techniques with the grand piano since the early 1980s, as well as later modifying acoustic piano sounds with electronics and combining both the acoustic and electronic in live performance. He initially amplified vibrating percussion instruments such as gongs, as well as the piano’s strings, with a hand-held microphone. He then moved away from the electro-acoustic for about a decade, as the acoustic sounds he produced inside the piano with various techniques and preparations had a “strong kinship to those produced by electronic means” (Burn 2019). However, he started working with microphones and a volume pedal in the 1990s, seeking to amplify the sympathetic resonances “produced by silently depressing keys and hammering others” (ibid.). This quality of acoustic sounds produced inside the piano to resemble electronically produced sounds is something that I find intriguing and which I equally like to play with in my performances. I do so, however, not through electronic processing but exclusively by means of amplification and spatialization techniques.

The reason for amplifying the piano in my own explorative work has been the desire to create a situation where my subjective listening experience, leaning over and into the piano, and the way I use the instrument, is reflected in the setup and equipment I use. In this, I have wanted to have more control over the sonic output and the way that sounds project and translate in a room. Details of timbre, the inside piano space, the instrument, and object-specific resonances and reflections which are not usually audible are thereby made available to the audience. This in turn changes their, and my, listening perspective.

In recent years, I have spent extensive time experimenting, recording, and amplifying the piano with different microphones and loudspeakers, work that was undertaken together with sound engineers Douglas Henderson, Roy Carroll, and Stig Gunnar Ringen, as well as Palle Dahlstedt. I tested various recording techniques and microphones with Douglas Henderson over the course of a few months in 2016, whereby we tried to capture different aspects of my inside piano playing, such as bringing out the physicality of performing, the presence of the sounds in the room, etc. Listening back to those recordings through stereo as well as surround speaker systems, Douglas Henderson suggested I try quadraphonic or multi-speaker systems for live performances as well. I then started experimenting with the setup that I use in many of the projects that make up this thesis: this involves amplifying the piano with four to six microphones, placing speakers in the corners of the room and the piano in the middle of the space, and allowing the audience to sit or walk around the piano. I have tested this setup in a variety of different locations: first in Berlin in early 2016 at the venues *ausland*, *Vivaldi Saal*, and my studio. Further in Gothenburg, and then in Los Angeles during a 3-month residency at *Villa Aurora*. Many of these performances are documented in the RC.

Palle Dahlstedt further investigated amplification techniques with me during a workshop in April 2016, playing with a variety of micro-

phones (these are described in detail below). Stig Gunnar Ringen worked intensely with me over a one-week period in 2017, deepening amplification approaches as well as testing the piano mapping tool that is described in chapter 7.

Through this setup—by placing microphones in multiple areas of the instrument and routing them to different speakers— the piano is projected into the space. Virtually enlarging the piano to the size of the entire room, I create an immersive listening experience, which gives the impression that one is inside the instrument. The audience is now in a similar listening position to that which I experience with my head inside the piano, enveloped by the surrounding sounds. Placing the audience effectively *inside* the piano allows me to share and unfold the creating-composing process in a more intimate and immediate way.

I explore the performance space by working with microphones and loudspeakers; their position in space; and the directionality, diffusion, and immersion of the projected sound that this setup provides. In essence, the setup allows me to create a *piano map* in the space—a microphone-loudspeaker configuration which maps the piano's architecture and layout, and magnifies it. The piano can begin to be thought of as a sonic sculpture, where its physical shape, the sonic reflections within the piano's body and how it projects, the layout of the registers from bass to treble, etc., together build a dynamic whole, which is amplified and expanded. Changes in the spatial configurations of sound always imply timbral changes in the way sound is perceived, structured and choreographed as part of a composition. These timbral changes in turn affect the choices I make, as an improvising pianist; such choices become the result of listening to piano maps in space. I explore these compositional choices further in the experiments with different microphones and speaker setups described below.



Figure 1: Multispeaker setup in Sjöströmsalen, Gothenburg University, October 2016

### Exploring Timbre Through Space—Interacting with Microphones and Loudspeakers

Recording and amplification have been primary working methods for me and preconditions for the development of most projects, “Performative Timbre” and “Piano Mapping,” as well as the multichannel compositions *Memory Piece* and *Audio Papers*, which were created as a result of it. I am aware of the complex history of the topic of spatial interaction through and with microphones and loudspeakers in electro-acoustic music and sound art. However, I discuss this as an improvising pianist: for me, recording and amplification are not a means to represent space, but rather tools to investigate an extend-

ed understanding of timbre, which includes space as a performance component.

As I started engaging with microphones and speakers, I became interested in the possibilities of changing and manipulating sound and timbres, both while performing and on a recording. This type of manipulation offered a way to communicate and represent a range of different aspects of my performance—the room, a gesture, a movement in space, or different levels of presence—and to do so to varying degrees. Microphones capture and create different aural realities that are not available to us otherwise; their listening is not filtered through knowledge or emotion—rather, they define and impact on the aesthetic and emotional relation we have with space and the environment by providing particular listening experiences.

Initially, I tried to mimic my own listening position, when I am leaning over and into the instrument, by wearing binaural microphones in my ears for amplification, and placing microphones near my head and ears when recording. I sought to get as close to the sound source within the instrument as possible. The effects of these tests, however, were not satisfying: they did not come close to how I experience sounds when I play. Partly, the result did not seem loud enough in its projection, and the capacities of the binaural microphones were not equal to the mechanisms and sound filtering of my ears. Likewise, the microphones placed near my head did not pick up the sounds close enough to where they were produced and captured too much of the room sound instead. Wearing a microphone on my wrist was equally impractical and did not satisfy my aims: the sound from the microphone was either too soft or the microphone experienced feedback problems as a result of it moving around so much. I experimented with a “helpinstill,” an electromagnetic pick-up bar or sensor strip (similar to humbucking guitar pick-ups) covering the entire range of the piano, which is placed under the strings. Whilst this generated very loud and detailed results with virtually no feedback issues, I found that it colored and changed the acoustic piano sound too much.

I then tested the use of quadrasonic microphones,<sup>28</sup> which are suspended over the strings in the middle register, with each microphone capsule pointing to a different direction. The outcome was a round and organic, enlarged sound, however to achieve this it had to be placed in the middle register quite close to the strings and on a practical level it was difficult to find a position that would not interfere with my performance and movements. Using a multichannel speaker setup, I was looking for more sonic differentiation and directionality within each register and wanted to engage with multiple microphones which could fulfil a variety of functions. In the end, I chose: four super cardioid condenser microphones to “close mic” the different registers of the piano; a contact microphone for surface sounds on the soundboard, with a more percussive and mid-range timbral frequency range; and a mobile guitar pickup, to be able to zoom into certain sounds and create feedback if I want to.<sup>29</sup>

The super cardioid microphones pick up relatively few reflections from the room and PA-system, the capsule and the good off-axis response make it easier to combine multiple microphones, and they are easy to fit in the grand piano, even if I need to get close to the preparations and objects, due to their small magnetic stands which attach to the metal frame (see Fig. 2). The amplification and choice of microphones was partly inspired by Andrea Neumann’s inside piano setup (described, e.g., in van Eck 2017, 108-110), which she uses with various microphones and a mixing board. Due to the very soft acoustic output of her instrument, Neumann uses microphones mostly to

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28) Namely, the QM12 quad (<http://www.lineaudio.se/museum.html>) which are no longer available, and the Core Tetra mic (<http://www.core-sound.com/TetraMic/1.php>), which is a cheaper version of a sound field microphone, however with a very low output both for recording and amplification and in the way the capsules are arranged not ideal for amplifying purposes inside the piano.

29) Namely, DPA piano microphones 4099, an AKG C411 or K and K sound contact mic, and a Dean Markley promag grand guitar pickup.





*Figure 2: Microphone setup, May 2017, Ohlinsalen, Gothenburg University*

pick up direct surface sounds. She also places them directly on the strings, for further processing. In contrast, the super cardioid microphones I use pick up specific resonances and reflections of the much louder acoustic output of the grand piano. Apart from the distinct differences in the way that the microphones pick up the sound, their precise positioning and directional character—especially of the super cardioid microphones—enable me to focus on the frequency range of each register, privileging timbre and acoustic space as integral to my work. Ideally, each microphone should be equalized (that is, filtered to enhance/diminish specific frequency ranges) in a distinct and precise way to find the optimal response to the range I want to amplify. In the period where I worked with Stig Gunnar Ringen, we also applied delay to the amplified sound coming through some of the speakers (we worked with six loudspeakers and one subwoofer), to

address the latency (time delay) produced by the equipment used, as well as the spatial relationships between instruments, microphones, and speakers. We further balanced the volume levels of the speakers, with the center speakers being considerably softer than the rear and front speakers. We experimented with whether the sound from the acoustic source, the grand piano; or the sound from the speakers should reach the audience first, or whether both sources should reach the audience at the same time. However, creating such distinct listening experiences is technically difficult to achieve and control and depends on many different factors, including the listening position of each audience member. In the end, I found that for the purpose of creating an immersive listening experiences and placing the audience inside the piano, a careful balancing of speaker levels and speaker positioning were the most important components.

Preferably, the speakers should be positioned quite high and angled in a way to diffuse the sound, pointing away from the piano, which helps with the leakage of sound into the microphones and avoids the sound being too directional, as well as addressing feedback issues. The directionality of the sound coming through the speakers can also be problematic for the audience sitting or standing close to one particular speaker, and this is not always possible to avoid. I found this problem to be enhanced when dealing with prerecorded sound, which I use in the multi-channel compositions *Memory Piece* and *Audio Papers*, which further requires a precise balancing of volume levels of amplified and prerecorded sound (see chapter 6).

Experimenting with different microphones and loudspeakers and their placement, both in recording and live amplification, helped me to understand and structure the way that I listen and play, and to clarify what I want to project and share with others. This enabled me to respond to and perform in a more articulate and concise way, and enriched my spatio-timbral vocabulary.

## Changes in Listening and Performing

How does working with speakers and microphones influence and change my relationship with space and timbre, as an improvising pianist playing inside the instrument? How do I interact with space and choreograph timbre in this new setup? I describe the creation of immersive and intimate listening experiences for both the audience and performer, as well as the broader volume range and control of sonic output that my specific setup provides, above. However, the amplification and spatialization of sound allow for more than just a changed or enhanced listening experience; they can also become a compositional method, facilitating decisions about where a sound happens and when. Microphones and loudspeakers have come to function as instruments alongside the piano within my work process, forming a connection between the space and me, and I have found myself developing new playing techniques and performance setups in response to the possibilities that amplification offers. My engagement with microphones and loudspeakers is a timbral and spatial exploration, where the individual qualities and implied aesthetic of these technologies surface and impact upon my playing. As van Eck points out, amplification moved from its initial purpose and idea of “the same sound but louder” to the development of new (electronic) instruments and, likewise, new playing techniques on amplified instruments (Van Eck 2017, 38). I have noticed changes in my playing that result from direct interactions with the different timbral subtleties that each microphone picks up and transmits, and the different functionality that it fulfills within my performance. I directly interact with the contact microphones that are placed on the soundboard, as they mainly capture the sound of, i.e., a chopstick or my fingers gently scratching and moving across the soundboard (a gesture which would hardly project any sound without the amplification and becomes an addition to the sonic material I use). The guitar pickup amplifies different frequencies and resonances depending on how far or close it is from the sound source. Depending on where on the strings I place it, the harmonic

range that the pickup amplifies changes: closer to the tuning pins, many of the harmonics are present and the sound is harsher, with higher frequencies dominating the sound, while in the middle of the string the fundamental frequency is present. The way I use the pickup is in some ways quite similar to Stockhausen's *Mikrofonie I* for tam-tam, two microphones, two filters and potentiometers, and six players, where the microphones are hand held and moved closer or further away from the instrument in order to provide different levels of volume, timbre, and spatial projection of the sounds produced (Stockhausen 1964). The guitar pickup that I use amplifies resonances of, e.g., a vibrating magnet or an EBow on a string, which would not be perceptible for the audience or me otherwise. It is also mobile and this movement from one place to another needs to be coordinated with the rest of the techniques and movements I am performing, and in that way it has a direct impact on the structure of a piece.

The increased level and sound detail that are made available by amplification not only influence the way that I play, for instance by requiring less physical effort, but also enable me to engage in a much softer sound vocabulary. Hence, a different listening mode also implies and calls for a change in the physical performance, a learning of new movements and gestures, which need to be incorporated into the overall listening-performing-composing process.





*We think with the objects we love; we love the objects we think with.*  
Sherry Turkle (2007, 5)

## Chapter 3: Objects

### 3.1 Thinking with Objects

How do objects shape my ideas and how do I shape musical structures through objects? My idiosyncratic collection of objects inside the piano, and the way they are laid out and placed, is a composition in itself, setting a scene of possibilities. The objects expand the piano, becoming both instruments in themselves and part of the piano, transforming and adapting it to the situation and to what is required in the moment. Together with the piano they are also extensions of my movements and body, facilitating and manifesting my musical ideas. As such, they play a major part in my decision making in improvisational processes and timbre orchestration, while I am performing.

Continuing the narrative developed in my earlier comments on the instrument-performer relationship, as well as in relation to technique and vocabulary as multi-sensory approaches, in the coming chapter I will focus on questions of materiality in my performance, and on the objects and preparations that I use inside the instrument as material agents in music making.

Bruno Latour puts forward Actor Network Theory as a way of speaking about material semiotic relations and the agency of “human and nonhuman actors,” which are both understood to take part in the same story and social network (Latour 2005). In embedding an imaginative process, objects carry meaning; in my practice, that meaning is revealed in the relationship that I develop with them. The interaction with objects and instruments helps me understand sound-producing processes and (musical) gestures on a sensorial level. Rather than being tools to fulfill a purpose I assign to them, objects stimulate an artistic imaginative process and prompt ideas that I was not aware of prior to engaging with them.



Erin Manning calls this relational quality and capacity “object-events”: “We perceive with objects, catching the edges of their contours, participating in the relations they call forth... This quality of relation is what gives an object-event its potential infinitude” (Manning 2009, 81). The detailed and intimate relationships that I maintain with objects in my practice triggers infinite artistic possibilities and infinite expressions of artistic agency. The physicality of each object allows for and limits the actions that can be performed with it, and likewise objects seem to “find” movements and resulting structures. The specific shape, weight, and materiality of each object invites and triggers actions, gestures, and sounds, thereby suggesting ideas and structures within a musical composition.

In chapter 2, I address the way in which musical ideas are shaped and originate from the instruments they are performed with. The same might be said of objects more generally, and the systems which they compose. Jean Baudrillard, writing in *A System of Objects*, points out that “objects do not merely help us to master the world by virtue of their integration into instrumental series, they also help us *by virtue of their integration into mental series*, to master time...” (Baudrillard 1996, 94, emphasis original). Technique and vocabulary, as I have argued in chapter 2 of the thesis, imply a need for a system, an internalized knowledge, or an idiosyncratic logic and mental structuring of the actual physical material at hand. Detailed attention must be paid to how one uses and develops sound material and timbre if one is to be able to control and apply timbre in an improvisational context (see also my discussion of mind maps at chapter 3.2). In my performances, I instrumentalize and individualize objects, and in so doing I set temporal, spatial, and timbral parameters, which initiate a dynamic feedback loop of action and reaction. Sherry Turkle states that “objects bring theory down to earth”, building a connection between the physical and abstract, thought and feeling and function as tools to think and create with (Turkle 2007, 8-9). “Physical objects engender intimacy,” she explains, through the sensual relationships that we de-



velop with them (ibid., 323). This intimacy is part of and a precondition for an idiosyncratic approach to technique. Thinking and creating through objects is something that I constantly do within my practice, as is illustrated in the constantly changing collection and setup of the instruments that I use. The objects contained in my current work set-up are:

- Metal Qi Gong balls
- Jade Qi Gong balls
- Bamboo skewers of different thicknesses and lengths
- Fishing line and nylon thread of different brands, colors, and thicknesses
- Magnets of different sizes, strengths, and shapes
- Forks
- A chopstick
- Masking tape or other sticky tape
- Customized EBows (Piano Bows)
- Rosin of different kinds (powdered and solid)
- Small metal bowls
- A plate that is made of slate
- A rubber mallet
- A guitar plectrum
- Plasticine
- A magnetic bowl
- A metal whisk
- A small guitar bow (Piranha Bow)

Setting up the objects inside the piano is quite ritualistic, even though objects and placement change constantly—sometimes, I try out

and engage with new things, and some things I leave untouched for months. Putting rosin powder on my fingers feels like wearing a work uniform, a literally embodied part of performing. Some objects have been part of my work setup since the very beginning, others might only be used for short periods. The collection keeps changing and expanding. Certain objects are placed regularly on the same spots—for example, the metal balls that resonate on the hitch pins behind the bridge—and yet, sometimes this is not possible, and due to different layouts of the instruments, the ball might not always remain in that position and move and roll of its spot too easily. Sometimes I set up a fork, a magnet, or fishing line in unusual positions, in order to force a surprise. I have spent time with each object, getting to know its physicality, how it feels in my hand, what I can do with it and what it makes me do.

Instruments, I argue, facilitate and limit our musical thinking. My musical vocabulary, the way I structure and think about a musical narrative, and the choices that I make when I improvise, are all contained in and are possible through the objects that I use, the piano being one of them. Getting to the core of how I think and act musically means engaging with the relationships that I develop with these objects through the tactile, haptic, and aesthetic experiences that they provide and the sensory response that I receive from them.

As the instruments differ largely from place to place, pianists are confronted with constant unfamiliarity, which can be both fatiguing and exciting. Objects tie a connection between the piano and me, they offer a sense of safety and trust. Susan Stewart speaks of "... this capacity of objects to serve as traces of authentic experience ..." (Stewart 1993, 135), and I can sense these traces in the objects when I perform, as experiences of past performances lived with and through them.

## 3.2 Object Memories

Collections of short autobiographical stories and memoirs such as *Evocative Objects* by Sherry Turkle (2007), Sophie Calle's *True Stories* ([1994] 2017), or Walter Benjamin's "A Childhood in Berlin" ([1932-1938] 2010) often have objects at their core, as material agents which facilitate, signify, and connect events and relationships. Placing objects within a narrative is an act that comes very close to the ways in which I think about and work with material in my practice; as such, I test this strategy through three stories (below). Whilst I was both writing these stories and reading stories from other musicians (see "Object Stories"), I noticed how the work process is often closely connected to a sense of community and an ongoing exchange of ideas by way of meeting and playing with other people. Communicating, spending time with each instrument, discovery, and idea, alone and with others, adds layers of time and experiences, of trying and failing, and memories which give that work value and context. For me, these stories are also a way to connect loose ends, starting at the beginning of my experiments inside the piano and how that experience ties in with my decision-making process when I perform today. In writing the stories, I picked three objects which are very dear to me. These represent different periods in my musical life, and each object facilitated the development of a very different musical approach. I begin with the stone ball, which is perhaps the oldest object that is still in my collection; I then turn my attention to the magnets, which I first heard about through pianist Cor Fuhler in 2001, but only started experimenting with many years later; and finally, I finish by addressing the fishing line that I have employed in my practice as a result of a collaboration with composer Phil Niblock.

### A Pale Green, Stone Ball<sup>30</sup>

Heavy, about 5 cm in radius, it is used and old and I have owned it for about twenty years. In a performance with a dancer, at a house concert in my living room, she moved around the piano and unexpectedly took this ball and placed it on the hitch pins at the bridge, where the strings are connected to the soundboard. And suddenly the sound changed when I pressed down the keys, like the soft hiss of an old shellac record or a distorted guitar. I was amazed. Later on, I learned that other pianists use similar techniques and objects and whilst these are self-invented in each case, they are also shared. From then on, I used this “effect” as a technique in my playing. I collected more balls—different sizes, of stone and metal—and experimented with them. This object enables and transforms so many sounds; gently rolling it over the strings with my hand makes the softest glissandi, moving around between pitches: a very fragile sound. I use it in combination with other techniques and objects, for example, I bow a string with one hand and roll the ball over that string with the other, making a sound resembling a pigmy flute. I still come up with new ways of using it and somehow holding this stone ball in my hand while I perform makes me feel safe. There is actual trust, as if there were memories embodied in this object, as if we had been through many experiences together, which we have.

### Magnets

Dutch pianist Cornelius Fuhler, who is based in Australia, told me about using magnets on piano strings when I took a lesson with him in 2001, when I just started out to reach inside the instrument. He mentioned strong magnets made of neodymium with a strength to lift many kilos and which, attached to the piano strings, bring out different harmonics, when playing the respective notes on the keyboard.

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30) Taken from “Transmitting a Listening” (Mayas 2017).

There is often a time delay between the initiation of an idea and the right moment in time to engage with it, and it was only many years later that I became interested in experimenting with magnets myself. I started using magnets of all kinds of shapes, strengths, and sizes, in a variety of ways, often to initiate sounds, sometimes by setting column-shaped magnets into motion which vibrate on the strings, or other times by moving a small round magnet across the string in an interrupted glissando. As preparations on the strings, they afford huge flexibility in comparison to similar sounds of the Cageian prepared piano repertoire, producing everything from gamelan to toy-piano-sounding timbres, and they can be removed in an instance and still create endless microtonal nuances. I love the aleatoric element they entail, when throwing small, cube-shaped magnets on the strings, which land in unpredictable positions, adding a visual and theatrical touch to the performance. Some magnets can break off little splinters when hitting together too suddenly, which then changes their shape and makes them sit or vibrate on the string in a new position, bringing out yet another timbre. Recently, I started amplifying magnets placed on the strings with a guitar pickup, revealing deep drone-like durational sounds, unveiling and honing in on new layers of magnetic vibrations.

### **Fishing Line**

One of the advantages of playing inside the piano is undoubtedly the way in which it is possible to produce sustained sounds (which can be achieved by, for instance, bowing the strings). I first started using fishing line on the strings of the piano for a project with composer Phil Niblock, where he asked me to bow the lower register strings in a sustained way on various pitches, which he then superimposed, filmed with small hand cameras attached to my wrists and turned into the audiovisual installation work *N+M* (work by Niblock 2010). I had not used nylon strings or bow hair prior to that, as I thought of my way of

playing as more pointillistic—I was more interested in fast-changing structures than sustained pitches or drones. This experience certainly opened something up for me, not only in the obvious sonic plane of adding long sustained notes to my vocabulary, but in introducing a different temporal feel and pace to my work. I remember the process of recording each pitch for around 15-20 minutes and trying to be as consistent and steady as possible, and the very satisfying, calm feeling that gave me: despite the big arm movements necessary to produce the bowing sound, I felt like I could keep going for hours, getting into an almost meditative working pace or rhythm, immersed by the changing timbral details, changing harmonics, and the tempo of the pitch that I was bowing.

I expanded the use of fishing line in my practice by tying it to one or multiple strings, which I can perform with one hand or by seamlessly changing hands; and by weaving fishing line under one or multiple strings bowed with both arms, changing the position of the fishing line on the string to allow for more variety and bring out different harmonics.

### 3.3 Object Stories

In 2018, I decided to ask musicians, colleagues, and friends who used objects additionally to or as instruments in their practice to contribute in generating a small collection of short stories. The result, “Object Stories,” is not a general survey or study, rather it came about because I was interested in their idiosyncratic relationship with and approach to music making through these objects. The stories here are all written by the respective musicians indicated in the heading, although I reproduce them in partly shortened and edited form here. I asked each musician if they could share a short text, story, or anecdote about a single object (of their choice) which they use in their

practice. I asked them to write about how they came to use this object, what it means or represents to them, what it enables them to do, and how it makes them feel, and whether there was anything else they would like to share about the object in the context of an object-performer experience.

There is an incredible diversity of approaches in these 16 stories, which reflect the manifold and unique ways technique and vocabulary in music making are developed through objects. The authors talk about what objects can evoke and afford, and they describe the situated knowledge which is developed and gained from dedicating time to objects as (additional) instruments. Rather than short representations of techniques, these “real-life” stories reveal the reasons and intentions behind the diverse ways in which musicians relate to instruments. The stories challenge a compartmentalization into labels such as “extended techniques” (something that I likewise oppose in chapters 1 and 2 of the thesis) and instead celebrate the uniqueness of creating. An object, a movement, a sound, or a technique always has to mean something to the performer and listener, these stories suggest, if it is to be of value.

Often the transformation or transitioning process of the object itself is at the core of the stories, which tend to describe moments where the object demands that the performer adapts and changes their approach and in turn develops new ways of using the object, sometimes over many decades or over the course of half a century, as in Gino Robair’s story of a bicycle horn that becomes so completely detached from its original function that it has to be continuously reinvented. In turn, the objects also ask for a transformation of the instruments they are applied to, as well as a transformation of the performers’ approach to those instruments, which is at times so serious that it seems to invent an entirely new instrument.

There is an expression of incredible joy in finding and “foraging” for objects, in natural or urban environments, as in Dave Brown’s encounter with the streetsweeper blades, Benoit Delbecq’s contin-

uously changing and growing collection of wood sticks, or Johannes Bergmark and Rosalind Hall's "meetings" with objects in secondhand stores and flea markets. Here, the element of finding or "stumbling upon" a new object or playing technique is essential and seems to resonate with the entire performance attitude—of improvising with the environment, and with what is at hand and what is presented by a particular circumstance. Marta Zapparoli speaks of the need for imperfection, unpredictability, and risk that is involved in her instrument setup, which is provided by the instrument-objects; while James Welburn's story of the innocent pipe describes it as a "wildcard" which invites "accidents" into the music and offers ways of "unlearning" or reinventing.

The objects that are addressed in the stories are mostly entirely unique; they are repurposed and made to function in addition to other instruments and in turn the objects change them. Sometimes, object-instruments are gradually destroyed: they disintegrate through extended use and travel, as in Steve Heather's story of a metal camping plate; or they simply wear off; or they are returned to their place of origin, as in Burkhard Bein's story of the stones that are found only on one particular beach in England.

Objects can at times be embodied by the performer—literally, as is the case of Ute Wassermann's palate whistle, which she places in her mouth behind her teeth. Sometimes, objects form such a crucial part of the instrument-performer relationship that playing the instrument without them becomes nearly unimaginable, as in Rosalind Hall's story about the loss of the echo mic, or Clayton Thomas' loss of a metal bar. Instrument builder and performer Johannes Bergmark goes so far as to describe the relation between his sound objects, which mostly work in combination with each other's sonic properties, as that of a "large family gathering," which speaks of a unique and refined performer-instrument relationship.



All of the “Object Stories” describe the sounds produced through these object-instruments and invented techniques as detailed, unique, rich in timbre, and multi-sensory: the touch and texture of the material, how it relates to the performer’s body or gestures, its diverse use and flexibility seems to be essential and shows a multiplicity of performance practices within improvised music. The process of finding/choosing the adequate objects is a complex one—it happens by way of chance, discovery, searching, making, systematic improvement—and it is often related to specific playing conditions. The most important and exciting part seems to lie in the development of a musical language that is appropriate to this object and combining it with the other object-instruments in one’s collection and thereby activating its potential. Bringing it to life, so to speak. In my own practice, this is often a process which happens over many years and leads to personal relationships with and compositional approaches through objects I perhaps would not have discovered in any other way. The development of such relations is crucial to understanding technique and vocabulary as idiosyncratic, multi-sensory and continuously re-invented (see chapters 1 and 2).

### **Burkhard Beins<sup>31</sup>**

#### *Stones*

I collected my first musical stones on a small beach near Dover. In the early 1990s, I drove several times to London with my old Mercedes to play some small gigs, joining Maggie Nicol’s Gatherings, or John Bisset’s Relays. On my way back on one of these occasions my ferry to Calais was delayed for several hours. And since Dover itself is not one of the most exciting towns to hang out in, I decided to drive to the next small beach I could find on the map: St. Margarete’s at Cliffe. At

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31) **Burkhard Beins** is a composer/performer (percussion, drums, and electronics) based in Berlin (<http://www.burkhardbeins.de/>).

the end of the steep road that took me down the cliffs, I found this lovely little beach full of pebbles. The waves going slowly in and out on the pebbled beach was causing a beautiful crackling of the stones. I had a great time just listening and then making some recordings with my cassette walkman. But I also collected some stones because they also sounded great when they were clicked together or rubbed on each other.

I'm still using that particular kind of stone in the context of playing percussion with sound objects. It seems to be a kind of flintstone pebble that comes together with white chalk cliffs. I have not found them at any other beach so far. They are perfect to work with because of their size and shape—I'm always trying to find those which are almost flat on the bottom, so they don't wobble when I leave them resting on a drumhead. Also, the texture is great. They don't crack easily when I hit them together and the surface becomes rougher in a nice way when they are worn off a bit.

I figured out that this rather simple principle has quite some potential to be explored. I rub them loosely together in the air. When I'm amplified with overhead microphones, I can also go closer to the microphones and play with the left/right panning on the PA. When I press down the lower one of the two pebbles on a drumhead, the friction sound becomes amplified by the resonating drum. Altering the pressure on the drum can create an up or down glissando. But I can also have a metal plate resting on the drumhead and press the lower stone on that—or on a metal bar, playing with the subtleties by making tiny changes—or rub the bar itself with one of the stones. Although these pebbles last very long, they do wear away over the years, and they occasionally crack. So, at some point I need to replace them. I remember that some years ago I managed to convince Mark Wastell and Rhodri Davies to drive with me to St. Margarete's at Cliffe on a free day after playing a concert with The Sealed Knot in London. We spent a lovely sunny afternoon there and I had the chance to collect new pebbles. I had the last pretty worn off ones with me in my

case of preparations and objects and decided to throw those back into the sea.

**Steve Heather<sup>32</sup>**

*Joy of Camping*

I carry with me when performing a suitcase full of objects that I see or hear as an extension of my drum kit. I reach for these objects when I feel the need to extend the sonic boundaries and techniques of the traditional kit. Every object has a story, meaning, history, and an individual purpose. One of my most beloved objects is a metal camping plate given to me by another percussionist friend (Sean Baxter) at the end of a European tour. Needless to say, this metal plate had seen better days. When given to me it looked more like frisbee chewed on by a large playful dog or a miniature Star Ship Enterprise limping home after a losing battle with an intergalactic dark force. Unfortunately for the camping plate, life hasn't become any easier since entering my hands. When bent it crackles randomly like digital distortion. Dragged across the rims of the drums it creates a nasty white noise that is hard to beat. Laid flat on the snare with a light chain upon it, the plate and the chain give the drum an entirely new life and sonic depth. The plate has endless possibilities, limited only by my imagination and its life span, as it slowly disintegrates. The plate has now traveled to many places, seen many drum kits, surfaces and been coupled with wire brushes, chains, and saw blades. I carry it with me continually and along with it comes the friend that gave it to me. If the camping plate could speak, I'm sure it would say, "BRUTAL!"

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32) **Steve Heather** is a composer/performer (percussion, drums, and electronics), based in Berlin ([www.steveheather.net](http://www.steveheather.net)).

### Rosalind Hall<sup>33</sup>

#### *Echo Mic*

I first started looking for new sounds for my alto saxophone by making reeds out of many kinds of materials such as metal, wood, plastic, and even chocolate (which didn't last long). The reeds produced different kinds of vibrations and forced me to discover new techniques for playing. I then began using objects in and on the bell of my alto saxophone for the same reasons.

The preparation I have spent the most time with over the last ten years is a children's toy called an echo microphone. It is a plastic imitation microphone with a spring in the length of the tube. The spring is attached to a small cup to capture and amplify the voice. The cup is just under the microphone head, so when sung into, the microphone creates an echo effect from the vibrating spring. A kind of acoustic spring reverb. When turned upside down, the head of the microphone fits snugly in the bell of the alto saxophone. What is captivating about the effect in the saxophone is that the echo tones create a kind of feedback loop, as they are fed back into the bell while new tones are played. Without using effects pedals, this is as close as I could come to creating a continuous sound with the instrument. The preparation also creates its own place, a kind of cave in the bell, and this has allowed me to explore solo performances where I feel I am still playing with something—the cavernous space created in the horn, and the feedback tones from the spring. The tiny lapel microphones I use also fit very neatly in the top of the echo mic (where the pretend lead would be) and in the air opening on the side, meaning the actual space I play in doesn't feature in the sound, only that of the echo chamber in the bell.

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33) Rosalind Hall is a composer/performer (electronics, synth, saxophone) in Melbourne, Australia. Her performances with the echo mic preparation can be accessed here: <https://vimeo.com/82956165> and <https://soundcloud.com/rosalind-hall/slow-heat-excerpt>.

My preparations were collected exclusively from secondhand stores or as recycled objects. I didn't want to premeditate acquiring a preparation: it had to be foraged for or stumbled upon. I found the echo microphone in a secondhand store in Katoomba in the Blue Mountains, Australia, while I was playing at The NOW NOW Festival. Initially, my performances involved many swift changes of reeds and preparations during the set, but these all slowly fell away as I was more and more enamoured with using the echo microphone with a regular reed.

There is something primal and otherworldly to reverberation, being enveloped by sound. It's not so much that the echo affirms existence as that it affects the quality of the sound—with enough early reflections, the sound seems submerged, underneath the earth and in the ether. The reflections that happen in such a small tube mean they are at the same amplitude as the initial sound. When playing new sounds at the same amplitude as the reflections, before they die out, a kind of acoustic drone is created. A never-ending, timeless sound.

I always thought: if I lose the echo microphone, I would have to give up saxophone. Saxophones can be replaced, but not the echo microphone. Of course, the toys are still manufactured and I have tried many of them, but none have the same kind of loosely tensioned spring (refined over years of travelling with it and dropping it at various airports) and thin plastic to allow the kind of vibration the saxophone needs.

I did eventually lose the echo microphone, in a cab in New York. I tried to replace it, I even tried to find it again—calling all the Latin bars in Brooklyn as the taxi driver had said he sang in one of them every week. The last time I played the echo microphone was for Cecil Taylor by his bedside. It felt like a fitting end for the instrument. I made many recordings of the preparation over the years and since losing it, I have created compositions using samples of the sounds mapped to a keyboard and re-performed. They are kind of swan songs and laments. I haven't played saxophone much since either. In playing more with synthesizers, I have found myself drawn to the same quality of sound

in these instruments as the echo microphone provided. So, the sound is not dead, it has just taken on another form.

### **Tony Buck<sup>34</sup>**

#### *Cog*

There are many small objects, little instruments, and various pieces of detritus that end up in an improvising musician's toolbox; there are numerous reasons why and how they ended up there, and why they remain or get left behind. Over the years, many such items have come and gone; some to return at a later date and some to be left in the draw of a past period of one's music making. Relationships develop, change, and evolve, just like the music itself.

For me, some devices also become mainstays—a relied upon accomplice in many of the situations, approaches, and ways of making sound. One such object for me is an old motorcycle gear cog I bought at a Berlin flea market stall some 15 or 20 years ago. This humble piece was bought as a set of three, initially for their resonance, their bell-like pitch when struck. Within this set, there were three distinct pitches of a surprisingly pure tone. They were also extremely inexpensive. After a short time, it became apparent to me that these objects were capable of many other sound-creating and manipulating possibilities. Quite slowly, these other possibilities revealed themselves, one consequence of which was to choose only one, the largest of the three, to remain in my arsenal of equipment.

I found this cog could be used as an extremely good, but instantly removable and manipulatable, dampener for a drum. It could be ground upon or around a rim to produce an impressive, industrial-like guiro sound. I could elicit impressive screeching sounds by scraping it with sticks and other objects. It could spin on drumheads, drawing

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34) **Tony Buck** is a composer/performer (percussion, drums, guitar) and video artist, based in Berlin (<http://tony-buck.com/>).

out a warm and admirable whirling sound. It could provide a very useful, uneven surface over which to sweep a brush or stick, making it possible to set up strange and machine-like sequences of snaps, cracks, and pops.

Its edge could be used with a wire brush to create a reasonable simulation of an electronic-like crackle... and still, I can extract the original, pure, bell-like pitch from it by striking it with a mallet. For me, one of the main reasons an object is useful as a musical tool is its versatility, flexibility, and its transformative possibilities; the prospect of finding new uses for the familiar; the potential of finding inspiration as the music unfolds anew, in real time, in each performance. This cog, then, conforms to all these requirements, and then some! I'm still finding new uses for it to this day.

From a more pragmatic, less aesthetic, perspective, as a percussionist, with many small and large instruments and devices to travel with, unfortunately one of the deciding factors that often influences what comes and goes is the very real fact that everything adds up, in weight and space, and before every trip some hard decisions have to be made. Versatility and multiple functionality, then, are therefore very important practical aspects to be considered. Again, the motor-cycle-gear-cog fits the bill wonderfully. (It's also relatively light... did I mention that?).

It still remains in my travelling kit to this day, and although it is probably the main reason I can't travel with my equipment as hand luggage (it looks a bit like a saw blade, to be honest), it still earns its place as a flexible and an essential piece of gear.

## Jim Denley<sup>35</sup>

### *Membrane*

In trying to re-imagine flute playing, I found that music from the Solomons, and particularly an instrument called Sukute, as played by Celine Rokona on an LP recorded in 1969, was particularly inspiring. On that recording, she hits the end of the bamboo against her thighs and cheeks while also blowing. In response, I use a rubber membrane to block the end of my truncated bass flute, which I call “Stumpy” (just using the mouthpiece and the last section of the instrument containing the foot keys). With my right hand I can gently strike the skin like a tiny *darabouka* while I blow. Initially I used plastic, which gives a tighter, sharper sound. I’ve tried various plastics—condoms, material from rubber gloves, etc.—but have found that rubber balloons give a warmer percussive sound and you can also rub and bend the membrane, thereby altering pitch. They break pretty regularly, but it only takes a few seconds to replace. It’s a simple device that effectively creates a new instrument, allowing for percussive possibilities and changing the overtones of the instrument.

## Marta Zapparoli<sup>36</sup>

### *Magnetic Matter*

I’m an Italian sound artist, improviser, performer, and self-taught researcher based in Berlin since 2007. In my music making, I’m mostly working with analogue media: tape recorders and reel-to-reel tape machines and recently in addition sculptural antennas. My main object is the tape recorder and of course the tape inside of it. I think analogue phonography has led to some sort of metallurgy of sound, made

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35) **Jim Denley** is a composer/performer (saxophone, flute) based in Sydney, Australia (<https://soundcloud.com/jim-denley>).

36) **Marta Zapparoli** is a sound artist, who is based in Berlin (<http://martazapparoli.klingt.org/>).



sound malleable and mutable and this fits into my working method so well—with digital sound processing, this is not possible. I utilize the analogue tape recorder due to the significance of its physicality, the risk, potential, and imprecision involved; the different impact and freedom of handling which this machine can offer; the background noise, the rough sound, its chemical-physical characteristic. What I particularly love is the trait of the magnetic tape to change in quality after long-time use. The different qualities of listening, particularly in the low-end frequencies. There is a certain warmth in the bass, and the lack of digital compression allows for a more realistic sense of dynamics and space. The sound quality of the tape reflects the vision of sound, the idea of materiality that I have towards the sounds of the outside world. This machine allowed me to use my hands as a connection-interaction between a different flux of energies. When I scratch and manipulate the tape, beyond separate forms, there is a continuous development of form, and beyond variable matter, a continuous variation of matter—in short, it brings out the life proper to matter. From another perspective, a mystical one (which I believe), a kind of ghost exists that can appear in the machine as malfunctions, glitches, interruptions in the normal flow of things: something unexpected appears seemingly out of nothing and from nowhere. Those accidental moments can be positive and playful during my performance.

### James Welburn<sup>37</sup>

#### *Innocent Pipe*

I have a battered piece of metal pipe, about the length of my forearm, which has become a surprisingly regular feature in my music and live shows. It was given to me by a friend who used to use it as a

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37) James Welburn is an experimental bass player and composer, based in Lillehammer, Norway ([www.jameswelburn.no](http://www.jameswelburn.no)).

“drumstick” on empty metal barrels—that’s where it picked up all its indentations.

In our early noise rock band, I quickly realized it could either really damage my electric bass guitar or I could make surprisingly musical sounds with it. Today, it’s a regular tool for sonic exploration, it invites accidents, like a kind of wildcard I can reach for. Its roughness connects with the abrasive nature of music that I am drawn towards.

With its many beaten edges, it can generate enough friction to “bow” the electric bass. Rough random beaten metal (the pipe) upon designed/textured metal (the string). It can create bell-like resonances, and even delicate metallic textures. Its “voice” can be excited in many ways. For example, dropping a small vibrator (like the kind they sell in the toilets at Berlin’s Schönefeld airport) inside it creates a metallic scream. The pipe can also work as an oversized guitar slide, or it can strike all the strings hard into a chorus, or it can be more focused towards one tone. It has featured in many live performances and on recordings. Once I lost it on a busy festival stage, I had to go back later that night and search for it. For some reason, someone could tell it had an important role to play and they’d put it somewhere safe. It looks like junk metal... yet it’s clearly an “instrument”. Whenever I am stuck for ideas—on stage or in the studio, in improvisation or composing, I reach for this beaten-up pipe and it can take the music to a surprising place. When I travel, I never have it in my hand luggage, always in the checked-in luggage, because once an overzealous airport employee tried to take it off me at the security check... He thought I might try to cause some harm with it. Luckily, I could talk him out of that idea, and they didn’t make me throw it away. Ever since then, it always goes in the plane’s hold. To conclude, I have found in my discussions with other musicians, some of whom are way more trained than me, that at some point we try to unlearn our musical habits. For me, the pipe has been a path to innocent playing, as long as I don’t learn it too well.

## Andrea Neumann<sup>38</sup>

### *Fork*

My deceased godmother was an aristocrat. During her life, she had supported me from time to time with material and immaterial goods. Part of that was the family silver, which she intended, piece by piece, as my inheritance. Engraved on each piece was the family coat of arms and her initials AvG. I wasn't aware of what family-historical importance cutlery can embody up until then.

The first time I saw forks used as instrumental preparation objects was with pianist and spinett player Christoph Schiller. The prongs are stuck between 2 or 3 strings of the piano. Setting the fork end in motion, the fork vibrates between 10 seconds and several minutes, depending on quality and string tension. It creates a bright sound, rich in overtones, a pulse which slows down and eventually ebbs. A light push is enough, and the fork sounds. In 2004, I performed with Steffi Weismann and Ana M. Rodriguez in a project called "Scrap" at Werner-Otto-Saal at Konzerthaus Berlin. Inside-piano sounds were processed and transformed through a computer and a video camera projected details of the instrument onto a large screen. My godmother was sitting in the audience and saw how the camera moved along a fan, a glass ball, an EBow, a peg, a shaving brush, a bamboo skewer and zoomed onto a delicately vibrating silver cake fork, whose bright sound rich in overtones spread in the entire room and which in close-up revealed the initials AvG.

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38) **Andrea Neumann** is a composer/performer (inside piano, electronics) based in Berlin (<https://soundcloud.com/andrea-neumann-981647670>).

## Clayton Thomas<sup>39</sup>

### *I Should Have Given It a Name*

I recently lost my favorite preparation. It was a metal rod, about three feet long. It was hollow, with a 3 cm perimeter. I thought it was aluminum, but on trying to replace it, I realized morosely that it wasn't. It's sound was too rich and complex; it's weight too significant (without being heavy). Maybe it was a fancy alloy. Maybe it was an industrial steel-copper cocktail. I'll never know. But losing it has meant more than losing an object, I feel like I've lost an avenue to a language.

The bar didn't look particularly special. It was just a long bar. But it had a sound. And the sound opened up a huge array of musical options for me in the 15 years we spent together. How it worked: I have a particular setup, with my bass strings sitting very high off the fingerboard of the bass. The downside of this is that it's very hard to play conventionally. The upside is that preparations (particularly objects woven through the strings) can resonate without being dampened or hindered by the fingerboard. On a normal setup, this bar of mine was woven through the strings would just hit the neck and not resonate. It might make a dull "thwack".

But with my setup, the bar and the sound floated. Things I could do with that bar: I could hit it with a heavy soft mallet, and it would resonate like a gong (quite a low foundational tone, with a wide spectrum of overtones), added to the full resonance of the strings of the bass vibrating together through the body of the instrument. I could hit it with a hard mallet and it would have a very high impact pitch, and resonate the strings, creating a cutting, hard, metallic sound, which could compete with a drummer's snare. I could vibrate the strings of the bass with my left hand, and hold a metal object, or glockenspiel mallet head, against the bar, while it was woven in the strings, and an incredibly fast, high, and loud buzzing sound would emanate from

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39) Clayton Thomas is a musician (double bass) based in Sydney, Australia (<https://claytonthomas.bandcamp.com/>).

the contact point. I could move that up or down the length of the bar, away or closer to the strings, and the pitch would shift like it had a low-pass filter on it. I could weave another smaller bar further down the bass (towards the scroll), and the two bars would act as added bridges, cutting the string length but without limiting the resonance of the strings. This opened up the possibility of playing with two or more mallets and treating the bass like a drum. Each string length, from scroll to tailpiece would be cut into four distinct pitches. Meaning that I had 16 pitches to play with across the bass. I could move the two bars up or down, or “wobble” them to create variety. Playing with the bow in this setup opened up a whole other range of sonic options: for example, bowing the strings above the rod, while the bar vibrated slowly in the strings, produced an extremely high, wide, and slow tremolo, which could be played simultaneously across all four strings creating a mobile cluster/dense texture. Bouncing the bow on the strings with the bar, or two bars woven through, would create a dense, ghost-like chord, un-played but audible. By contacting the bouncing strings with another stick or mallet, a singular texture, which could shift pitch with proximity to the bridges, could be created. The bar created a set of territories which were distinct but allowed emotional and dynamic range. They turned the very complex possibilities of the double bass into something more fundamental and functional—a folk instrument.

### **Ignaz Schick<sup>40</sup>**

#### *Object Attachment*

When I was a kid strolling around our small farm, I always had a strong affection for found objects. Small stones, pieces of driftwood from a small riverbank, special shaped or colored leaves from trees. Every

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40) **Ignaz Schick** is a composer/performer, turntablist, sound and visual artist, and curator, who is based in Berlin (<https://zangimusic.wordpress.com/ignaz-schick/>).

time a triumph: cuckoo or jay feathers, deserted snail houses, fallen-off empty wasp nests, or the empty eggshells from some wild birds. Even more exciting: the dry snakeskin I once found on one of our grass hills. Or, what would usually get me into trouble: small shiny brass or copper pieces stolen from the junk metal in my father's workshop. I did not have any specific use for those little collections, I would just gather and store them somewhere in my playing zones. I just loved the shapes, colors, and materiality of each of them.

One day my mother had enough of my constantly broken pockets and just sewed them up, hoping that by doing this she could prevent me from collecting useless objects and from destroying my pants all the time. Later, when I got into art and music, objects became important again to me, or rather my interest for found objects started to make sense; for making collages, assemblages and sound pieces, music machines, or installations. At first very naively, later on in a more refined manner. I started investigating the sonic possibilities of objects, first by using normal and pick-up microphones, later by using rotation and vibration, trying to bring out the inner sonic potential of a found/given object.

Not only, but especially during my "Rotating Surfaces" period, objects played an important role in my set-up. I was especially attached to a metal spring which I soldered to the cartridge of my turntables: I was hoping for some special amplified spring sound, but the contact broke and all I could hear was this acoustic, singing droning note caused by the friction between the metal spring and the rotating rubber slip mate. In this moment, a whole new sonic universe unfolded with such a simple principle that it would become the base of my new setup: I would test all kinds of objects by using the rotation of the turntable to animate them to resonate and sound. And for some pieces/performances in Portugal and Australia, I even brought back natural found objects into my setup: dry leaves, small branches, palm tree bark, eucalyptus leaves, small branches with thorns, laurel, small stones, etc., etc.

In the meantime, I have returned to using vinyl in my turntable set-up. Still, every time I take a record into my performance collection there is this moment of hesitation: do I really want to sacrifice this one record?! There is some weird, respect-demanding aspect of a brand-new record, it creates a certain resistance which I need to overcome every time I start using a new vinyl. Maybe it is fear or too much respect for an in-the-end banal and everyday object. So why not just misuse it?

### **Andrea Parkins<sup>41</sup>**

#### *Hot pink "Post-it" Notes*

I work with a "kit" of sound-making objects that I have been collecting for many years. To play the objects, I activate them physically and gesturally, and then process their sounds via my Max-based processing instrument.

I see all of the objects in my collection as indexical to me. While some of them are precious to me because they hold personal historical meaning, others are functional items from daily life that I also feel quite connected to as instruments. For example, I use "Post-it Notes" as sound-producing objects. I extract two or three Post-it tablets from their plastic wrapping, and then instead of peeling off each note piece by piece I grasp the glued edge of a tablet with my fingers, and riffle its pages up against the microphone. Or I pick up two tablets, one in each hand. I quickly interleave their pages, and then "shuffle" them together like a deck of cards, next to the mic. I prefer the hot pink Post-its. It seems to me that hot pink notes are made with slightly thicker paper than the other colors, and so are more responsive sonically when used to create both textural and percussive sounds. The hot-

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41) **Andrea Parkins** is a sound artist, composer, and electroacoustic improviser, based in Berlin and New York ([www.andreaparkins.com](http://www.andreaparkins.com)).

pink pages hitting the microphone or striking against each other can have great punch and impact in the mid-range. When rubbed against the laptop microphone, the pages can sound like brushes circling on a snare drum. (The delicate crispness of the papers' edges can be heard in the higher frequency range). The Post-its work well as input for my processing, which blurs and morphs the precision of the Post-it sounds with randomized pitch-shifts, glitch, and bursts of feedback.

As a quotidian or functional object, a packet of Post-it Notes has potentiality. Each page in a packet is normally used as a writing surface: for a brief annotation, or a quick message or reminder. It's also temporary: once the annotation has been placed in its proper location, or the message/reminder has been delivered, the note has no further purpose and is discarded, or sometimes it simply gets lost. But when I use the whole Post-it packet as a singular object to make sound, it has a different potentiality. If it's a deck of cards, it is an empty deck, with no marks or characters. It's not a fortune-teller's deck; there is no message.

When working with an object in this way, its meaning and even its indexical character is displaced. The gesture that activates the object into sound quickly becomes disembodied, and the object as an identifiable *thing* disappears, perhaps even before the sound lands in acoustic space. In my hands, objects are material and concrete, but their meaning changes: not because they represent something new, but because they become something else.



## Benoit Delbecq<sup>42</sup>

### *Martoché*

When I was 9 or 10 years old, I found myself crafting a special kind of hammer, I called it a “*martoché*” (a mix of *marteau* and *mailloche*, hammer and mallet), in order to be able to play directly on the strings of the upright family piano. I used a long paint brush for radiators, taking advantage of the shape to make the gesture easier. I asked my mother for some felt—she found red felt, I remember I loved that color, the same as most pianos’ felt—and stapled a piece around the brush hair. I remember being really curious about the sounds I could produce and used it for a while. I added scotch tape too, to experiment. But it’s only years later, probably around 1984 (aged 18 or so) that I started to craft little bits of wood and I curved them in order to be better “trapped” by the strings’ tension. My main interest in using the sticks is adding to their sonic possibilities, to continue my research in phase shifting or speed illusions as well as hemiolas, with the keyboard, vertigo-like fabrics of animated sounds; adding sort of contra-punctual vocal endeavors too. I continue to randomly pick up wood sticks in forests, parks, gardens, dry them and cut the ones I intuitively think will sound interesting. The nice thing about it is that you never know how they’re going to sound. I have boxes and boxes of them, and even my kids sometimes bring me a wood stick thinking “you might not have tried this one.” Also, the ones I use, I usually remember where they come from, and, of course, they come from all parts of the world. They’re usually between 8 and 20 cm, with a diameter between 0.5 to 2 cm, but the lower part is beveled down to between 1 and 3 mm. Some sticks have a knot in their wood, some don’t. Some are very dense (rosewood...), some are very light (elm...), hence their behaviors are to be tamed by playing them. And, of course, the shape of the stick is most important. When cut by machines follow-

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42) **Benoit Delbecq** is a composer/performer, and pianist, based in Paris (<http://www.delbecq.net/>).

ing mathematical proportions they generate more “logical” overtones and sub-tones; I’ve tried that, but I really prefer when they are sort of unpredictable, overtone speaking. Now, the good thing about it is that you improvise and adapt in order to make do with what you have, there’s no routine at all. Still, each stick will produce a kind of sound that will stay within its own “family” of sounds. And then the overtone’s choreography and geography of sonic behavior is proper to each instrument.

Now, back in the years I also started to prepare... the preparation itself, i.e., the wood stick itself by planting thumbtacks in the upper part of the string. I mean old school tacks with a hard, plastic wrap. I have boxes of these particular tacks in stock because today they’re really hard to find! The plastic wrap around the tack buzzes and it gives the resonances a very different feel, close to the traditional likembe from Congo (a thumb piano with sizzling metal rings around the blades). Also, I stick old homeopathic school tubes (aluminum) on the stick with hard glue, in order to have a more metallic resonance, plus I can always put a little nail or anything small from the haberdashery shop inside the tube. This gives me a larger pallet of sizzling sounds... Now, writing this to you, it is obvious that the curiosity I had found using my homemade *martoche* had already opened my ears and will to experiment... Unfortunately, this object has disappeared from the family house.

### Ute Wassermann<sup>43</sup>

#### *Palate Whistle*

12 years ago, I saw a guy twittering like a bird in the street market in Brisbane. He sold palate whistles, a variation which you find in German toy shops called “Zwitscherblättchen.” Composer Liza Lim, know-

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43) Ute Wassermann is a composer/performer and vocal artist, who is based in Berlin (<https://vimeo.com/user20410741>).

ing of my interest in bird whistles, which I use among other objects to disguise my voice, has pointed this out to me. I bought a big package and keep ordering them since then. They are made from half-moon shaped felt with a very thin membrane in the middle. You put them in the roof of your mouth behind the teeth. While singing various fricative consonants, the membrane will start to vibrate (and tickle), adding vowel-like distortions and turbulences to the consonantal vocal sound. This caught my attention as I am interested in singing sounds which seem to be disconnected from the voice, like extreme and superhuman vocals, shimmering between electronic, animal, inorganic, and human sound qualities.

I reinvent principles of vocal articulation distorting and shifting the relationship of mouth, tongue, palate, and breathing patterns. Hiding a membrane inside my mouth, an invisible object, yet very noisy, seemed to be an exciting idea. I like the destabilizing and irritating effect it has on the vocal sounds, more so, if used in combination with other bird whistles, resonators, and objects. The palate whistle inside my body is a kind of transgressive object. It feels almost like a body part or a kind of implant, yet it is a sounding object. It redefines the threshold at which the voice (or the body) makes contact with the outside world.

### Johannes Bergmark<sup>44</sup>

#### *Sound Objects and Me*<sup>45</sup>

In 2006, I wrote “The Corn Grinder From The Venus Temple—About Found Sound Objects” (Bergmark 2006). Re-reading it now, I am

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44) Johannes Bergmark is a sound artist and composer based in Sweden (<http://bergmark.org/>).

45) This text has appeared in parts in: Johannes Bergmark’s masters thesis “The Hell Harp of Hieronymus Bosch. The building of an experimental musical instrument, and a critical account of an experience of a community of musicians” (Bergmark 2019).

struck by the long list of objects that I used at the time, as parts of the *Whalefish*, which was my main instrument then. There were 141 described objects (if I counted right). I have since forgotten many of the details I wrote about them, and when I go through the list, I can recognize 31 that I still use today, with the instruments that I call *Platforms*. To them, hundreds of new objects have been added. Most of them also disappeared from use in one way or another (having been abandoned, lost, broken, forgotten, or stolen).

The shift of instrument from the *Whalefish* to the *Platforms* represents a shift of my interest in sound objects. Since I began to improvise freely in 1985, I did it with the mindset that anything could be used as an instrument by anyone, inspired by the meeting with surrealist musicians and inventors Hal Rammel in Chicago (since then moved to Wisconsin) and Davey Williams and LaDonna Smith in Birmingham, Alabama. Especially the latter have cultivated this attitude and have always welcomed “non-musicians” to play with them, a play not limited to be called music, or anything else.

Inspired by Hal, I began to make my own instruments (and even began my education as a piano technician), and I eventually discovered the possibilities of the contact microphone, which opens the field of microscopic (microphonic?) discoveries: any object could now bring out a rich and full sound, even for an audience, regardless of how little it sounded acoustically. The contact microphone in the center of the one-man-band-kind-of instrument that I intended the *Whalefish* to be became a central focus for a number of objects that I began to use on it, and after many years, when the *Whalefish* was very worn out, I constructed a set of instruments that were simply amplified cupboard doors and called them *Platforms*. Their use and design are much more flexible than the *Whalefish*, and they are intended specifically for amplifying small objects.

To choose to describe just one or two objects is the most difficult thing, since they are very much a collective of individuals, like a large family gathering in every concert. One by one they could hardly be

described as instruments, and they often work in teams or combinations, where one is a tool, one is a conductor for sound vibrations, one is a resonance, a damper, etc. One typical combination is a type of stick (that can be a piece from a big firework, having fallen down on Berlin at New Year's Eve, an unused welding rod, a grill stick, etc.) with a type of surface (a broken piece of glass, enamel, sand paper, rusty metal...).

What is the reason for me to pick up a new instrument, or object, and when and why do I decide to leave it?

I lose interest when there doesn't seem to be any mystery left to discover for me. I want to still be able to wonder what these objects want to tell me. And what do I want to tell them?

I "listen" to new and found objects first with my hands, and eyes, and the ears usually come last. The circumstance of the object, the meeting with another one, with a situation, environment, perhaps a story, never leaves it alone as a single entity. That meeting I apprehend as very similar to the spark of poetic beauty, the meeting of two realities (including the former use and the new) that Pierre Reverdy described and which André Breton adopted as the description of poetic beauty in surrealism: "The image is a pure creation of the mind. It cannot be born from a comparison but from a juxtaposition of two more or less distant realities. The more the relationship between the two juxtaposed realities is distant and true, the stronger the image will be—the greater its emotional power and poetic reality" (Breton 1969, n.p.). It has been expressed many times with the quote from Lautréamont: "beautiful as the chance juxtaposition of a sewing machine and an umbrella on a dissecting table" (1988, n.p.).

## Dave Brown<sup>46</sup>

### *Foraging for Streetsweeper Blades (for Magda Mayas)*

I was performing a show with the prepared instrument trio Pateras/Baxter/Brown in Bern, Switzerland in 2006. Sharing the bill was the Australian duo of cellist Anthea Caddy and sound artist Thembi Soddell. I noticed that Anthea was employing thin metal strips to garner percussive sounds from the body and strings of the cello. One of her striking actions was scraping these metal strips across the cello's strings and bridge, which when amplified produced searing scream-like sounds along with the more percussive employments I'd observed earlier. I was fascinated and asked her something stupid like, "Where did she get them made?" She replied, "They're discarded streetsweeper blades from Australia." She merely picked them up from the streets and gutters of Melbourne. She promptly gifted me one and after gentle but swift inauguration into my arsenal of utensils, these slim metal blades transformed my approach to the semi-acoustic guitar.

This initial experience led to a minor obsession with streetsweeper blades and these, new to me utensils, became the basis of a slowly developing group of prepared guitar techniques that I brought into service when performing. Firstly, I utilized the blades as devices to help alter the intonation of my instrument by weaving them through the strings of the guitar above the fretboard. This also led to them deadening the resonance of the strings to a degree, creating a percussive effect. By complete accident, through inadvertently knocking the blades while in place and amplified, I discovered their variable tonal and percussive abilities that were defined by a combination of their lengths and transverse positional placement through the strings. They made beautiful, pitched twangs dependent on their placement and level of amplification. Due to my practice of utilizing contact microphones on the headstock and body of the semi-acoustic guitar

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46) **Dave Brown** is a composer/performer (guitar, bass), based in Melbourne, Australia (<http://www.candlesnuffer.org/>).

it appeared obvious to me to employ extra numbers of these fine blades, that vary in length and flexibility, to create further tonalities and twangs by weaving them through the strings above the nut (hovering over the truss-rod cover) and below the bridge (suspended between it and the tailpiece). All these combinations formed a beautiful adjunct to the little, badly tuned percussion orchestra I was building by other means along the length of the guitar strings. Through experimentation and practical discoveries, these deployments of streetsweeper blades quickly became a standardized setup I utilized for my prepared guitar techniques. These placements have remained largely unchanged for 10 to 12 years.

On less frequent occasions, I will dramatically sweep the blades along the length of the fretboard while they're intertwined with the guitar strings, this produces a searing, scraping sound not dissimilar the scraping sounds I initially was inspired by when conjured from Anthea Caddy's cello.

For a three-year period, I resided in the Western suburbs of Melbourne, this was during the time I was first discovering and expanding my prepared guitar techniques. I had a regular coffee and kick to kick (Australian Rules Football) with a local companion. One of our coffee haunts was run by Ethiopian immigrants and situated in the Footscray mall area where, because parking was at a premium in that vicinity, I'd often park my car some distance from the coffee joint. This was a boon, as I'd wander through the backstreets and alleyways with a sharp eye searching, hunting for streetsweeper blades! After coffee, I'd trek back to the car clutching a handful of streetsweeper blades while juggling a football with the other arm.

## Gino Robair<sup>47</sup>

### *One of My Favorite Things*

A favorite object of mine is a small, bugle-shaped bicycle horn that I've had since I was 6 years old (ca. 1969). It came with my bike, a blue Schwinn Stingray that had a banana seat and sissy bar on the back.

Originally, the horn had a black, rubber bulb to honk it by hand, but in about 3 or 4 years, the base of the bulb rotted away and I was stuck with a honk-less horn on the bike. Eventually, the Stingray was sold when I got too big to ride it, yet for some reason I kept the horn and it ended up in my drum trap-case, with an old shoelace tied to it.

Fast forward to the late 1980s when the Splatter Trio began playing. I used to blow into the horn while playing the kick and hi-hat with my feet, using my right hand as a sort of wah-wah mute. After a few years of this kind of punishment, the reed fell out of the horn and I couldn't fix it, so then I use it for wah-wah air sounds until...

I discovered that if I place the horn flat against the head of a drum while blowing through it, the air pressure would cause the head to vibrate and create a nice, loud tone. By moving the horn as I blew, I could activate different harmonics of the drumhead. The most exciting use of it is with pedal-tuned timpani.

It's likely that this horn will outlive me.

## 3.4 Mind Maps

As part of investigating and mapping my technique and vocabulary, and also as a preparation for the project described in chapters 4 and 5, I made a structured inventory list of material I found to be representative of my vocabulary. This list was developed into two concep-

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47) Gino Robair is a composer/performer (percussion, electronics, prepared piano), based in Walnut Creek, California ([ginorobair.com](http://ginorobair.com)).



tual mind maps which represent connections between sounds and reflect upon:

1. The material/objects used to produce sounds.
2. The actions/playing methods used to produce sounds.

My aim in making these maps was to show the complex interactions and potentialities that objects provide as material agents in music making, and to demonstrate how I work and perform with them. The maps illustrate the interdependence of objects and actions, as well as my own musical thinking and categorizing; they also reflect how I intuitively map my vocabulary when I improvise.

### **The Object Mind Map**

First, I mapped sounds through the objects that I used to produce them, as this seemed to me like the most natural and practical way to group sounds.

Lines indicate connections between sounds in the map. I note that I list my hands as an object when I use them without any additional objects to produce sounds with, inside the piano or on the keyboard. As there are many different ways of using one single object, I tried to be as clear and short in my descriptions as possible.

### **The Playing Method Mind Map**

I also produced a second map that illustrates the relation between sounds and the methods or playing techniques used to produce them. I chose to start with the basic sound-producing mechanisms and actions used to set the strings, etc., in motion, including striking, bowing, and plucking. Pressing down the key of the piano, for instance, results in the striking of a string with the hammer, which is

a similar method to striking the string with a mallet. In the process of making the map, I soon found that I needed subgroups and had to invent new terms to differentiate between similar playing methods and to describe them in more detail. I was not always able to find them in descriptions of other string instruments' playing methods either, and some techniques seemed too idiosyncratic to describe by recourse to a general terminology—e.g., the sound produced by making a column-shaped magnet vibrate on a string. Reflecting on my playing methods and the intentions behind certain actions, I noticed a strong aleatoric element. I chose to group those sounds together under the term *initiating*: after the initial action of setting something in motion, the movement/vibration and sound either continues without any further agency from my side, or the sounding result is in some ways beyond my control, and intentionally so. Of course, one could argue that simply pressing down a key will set mechanisms into motion which, after an initial action are beyond my control as well. However, I decided not to include this playing method in the initiating category, as a pianist's touch, as well as their ability to stop the sound by letting go of the key, can be very refined and controlled through practice. In contrast, when throwing a magnet on a string, I can, for instance, predict roughly where and how it will land, depending on the angle, direction, and distance from the string, however, there is a lack of control simply due to the magnetic quality of the material itself. Importantly, I found that the attitude or intention behind all of the sounds in the *initiating* group, whilst connected with other categories of sound-producing mechanisms (in the case of throwing a magnet on a string it would entail *initiating* as well as *striking*) differed from the rest of the methods that I use.

An interactive audiovisual version of each map is available in the Research Catalogue exposition as *Media Example D1* and *Media Example D2*. Furthermore, I made videos of most sounds represented in the

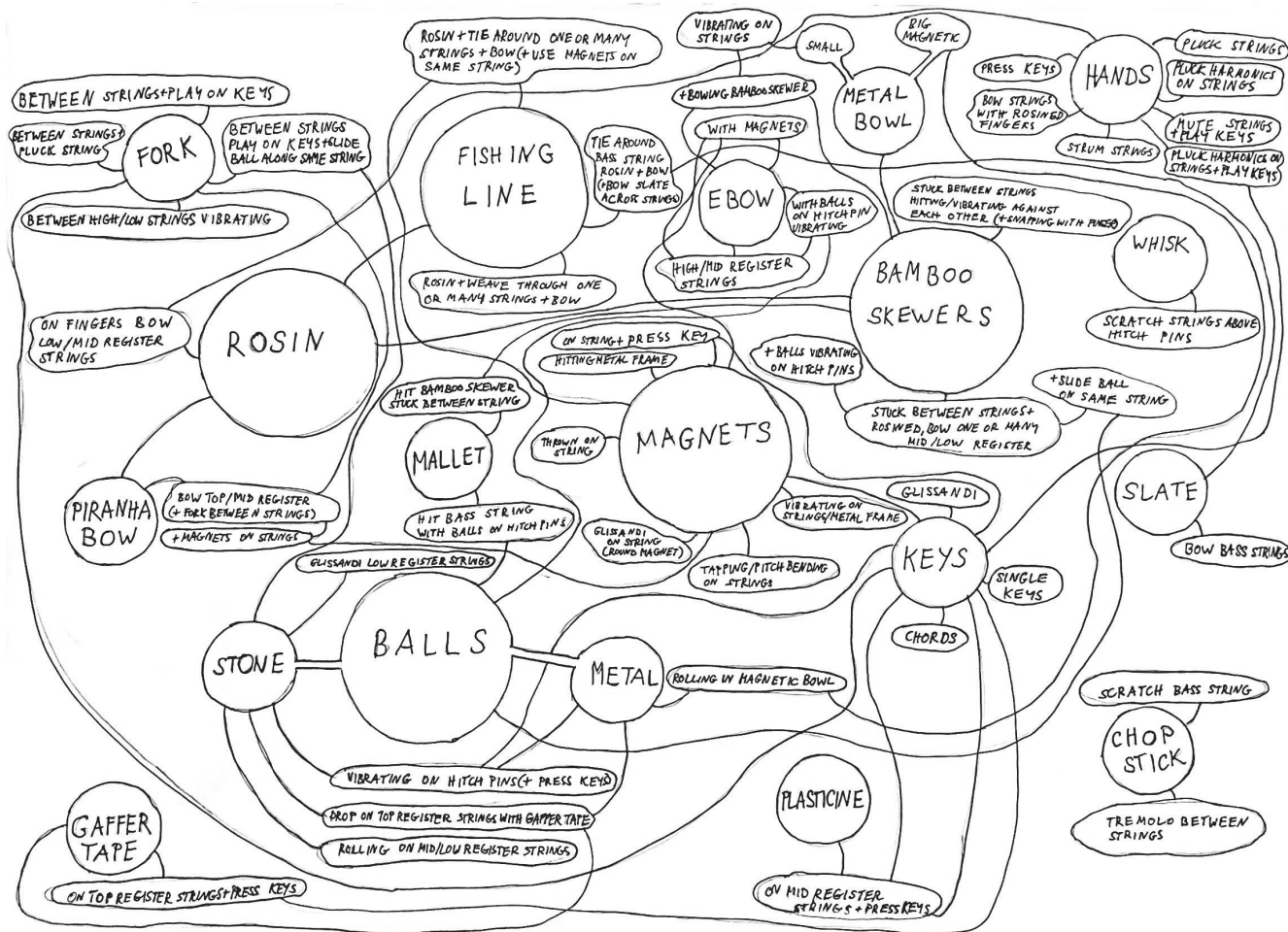


Figure 3: The Object Mind Map

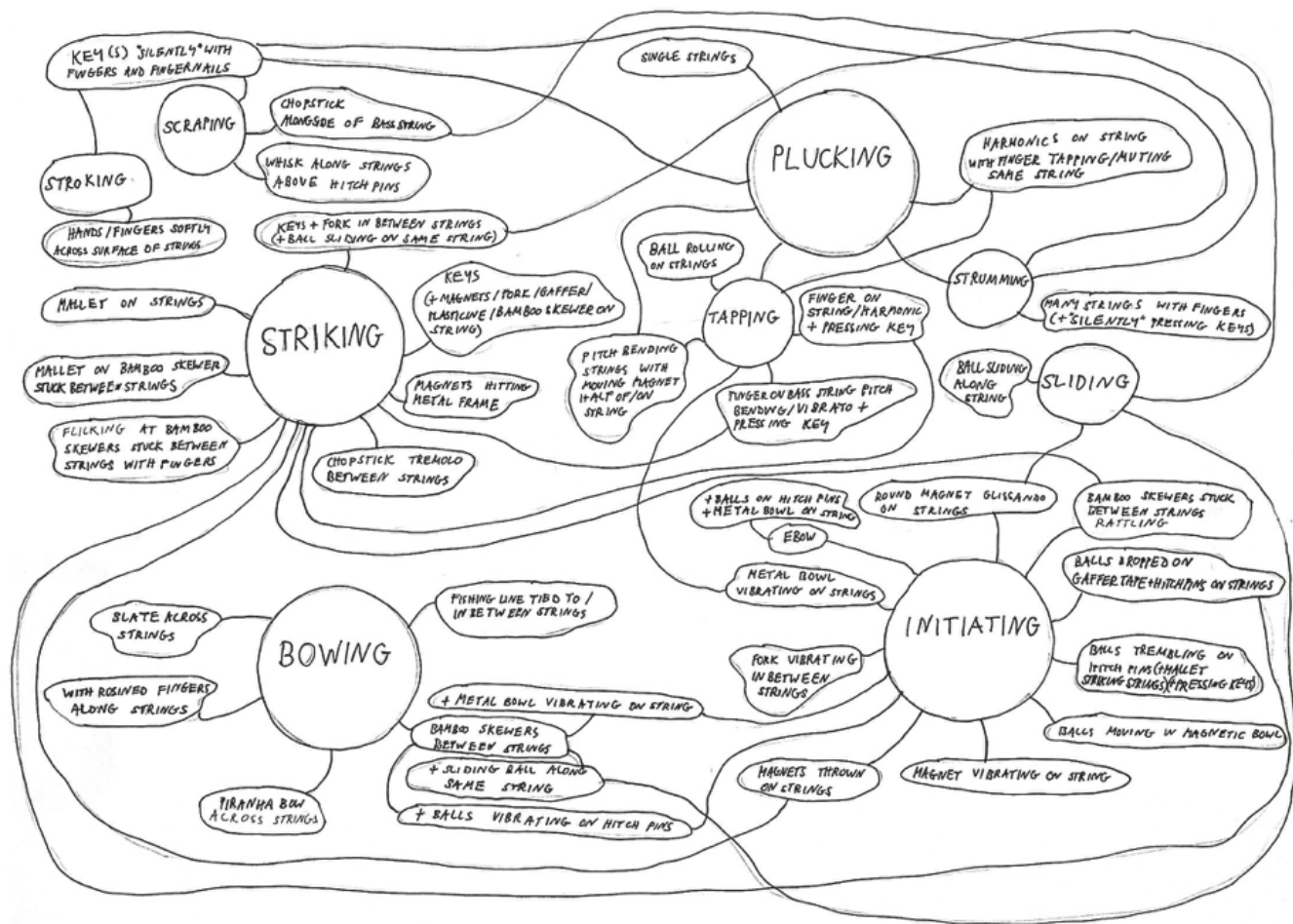


Figure 4: The Playing Method Mind Map

mind maps and used in the *Performative Timbre* project discussed in chapters 4 and 5, which are likewise available as *Media Example A1*.

Jean Baudrillard speaks about “an object *abstracted from its function and thus brought into relationship with the subject...* such objects together make up the system through which the subject strives to construct a world, a private totality” (Baudrillard 1996, 86, emphasis original). The mental structuring of my sound vocabulary, as is represented in the mind maps described above, is an attempt to capture connections between the objects and actions that constitute my practice. These connections indicate possible compositional micro-structures which are performed with objects and shaped through them. The two maps each have a different focus and through approaching sound and timbre from these two different yet intertwined angles—namely, in terms of objects and actions—different groupings or combinations of sounds take shape. The Object Mind Map details the variations and possibilities performed with each object and shows how, most of the time, several objects are used simultaneously in different combinations. This further suggests a major difference in approaching timbre that can be thought of in terms of (i) *thinking in objects*, a mindset that opens a variety of timbral possibilities, as most objects can be performed in multiple nuanced ways, covering many different playing techniques; and (ii) *thinking in playing techniques*, which already implies a certain timbral decision that is made beforehand by the performer, who reaches for a sustained sound (bowing), a percussive sound (plucking), etc., irrespective of which object is used to do so.

The compositional possibilities of the two approaches detailed in these two maps, exist simultaneously and to differing degrees, can be amplified, re-linked, combined, or applied to other objects and actions. The endless nuances of technique are impossible to entirely capture in such maps, yet the attempt of collecting, mapping, systematizing, and repeatedly performing still revealed a myriad of details and suggested a range of possible transitions to me—timbral as well

as temporal and spatial. The maps likewise leave out what cannot be shown—a degree of intimacy, which can only be experienced through time. Despite these omissions, I hope that the mind maps bring the process of working and thinking with objects in music making closer to the reader, making it more graspable; this is something that I have sought to do throughout this chapter, by both describing that process through my own memories and through the stories of other practitioners.









## Chapter 4: Performative Timbre

### 4.1 A Study in Listening

“Performative Timbre” is an intensive listening study of a small selection of my piano vocabulary, which uses a subjective similarity measurement. The study was developed and conceptualized in collaboration with Palle Dahlstedt, between autumn 2017 and spring 2019.

In this chapter, I describe how I performed the study using an adaptation of the Timbre Space method and in line with an extended understanding of timbre. Focusing on my idiosyncratic sonic vocabulary, the project revealed qualities of timbre in relation to objects, playing methods, and the gestures used to produce sound. The enduring and repetitive nature of this comparative listening study generated different listening modes, heightened my awareness of the compositional capacities of timbre in improvised music making, articulated and confirmed my understanding of instrumental technique as described in chapters 2 and 3, and had a transformative effect on my artistic practice.

My aim lay in finding out how and why I group certain sounds together: was this pure habit, or intuition, or a question of personal aesthetics and taste, or simply a pragmatic decision to do with the possibilities and limitations of body and instrument, or was it related to an underlying artistic logic? How do I listen to and structure my sound material in improvised music performance? How do I orchestrate timbre? These research questions are discussed in chapter 1 and formed the outset for this study. Mentally organizing and structuring my sound vocabulary seems natural to me, and I see this as a pre-condition for improvised music; I have never, however, attempted to do so systematically or in such extensive detail as in this study. The tension between creating a sound catalogue, articulating different no-

tions and relationships within its frame, and the obvious limitations such a frame provides, was challenging, yet stimulating and generative in its process.

In late 2017, I made recordings of a large number of sounds produced with the piano, which form an integral part of my vocabulary, and chose 50 sounds out of those recordings to represent through a small, selective, sound catalogue. A custom-built software tool developed by Palle Dahlstedt enabled me to listen to all possible sound pairs in a randomized order, 1,225 in total, and to compare these sounds to each other by focusing on various details and asking specific questions about them. The questions focused on similarity of the sounds in relation to objects, playing methods, physical gesture, and overall timbre, resulting in 4 rounds of listening with a total number of 4,900 sound pairs, which I listened to and compared over a period of a few months. This resulted in four sets of collected data, which are represented in *perceptual timbre maps* (these are discussed in chapter 5 and are available as interactive maps in the Research Catalogue Exposition).

“Performative Timbre” was possibly the most arduous out of the projects developed during my research, in terms of its conceptual outline, the range of methods that it required, and its artistic implications for my practice. Articulating the process of performing timbre was highly challenging: not only was the process of recording and selecting the sounds that would make up the catalogue intensive, the process of comparing timbre through different performance aspects and qualities, and of describing the possible intentions behind the performance of each sound were lengthy and rigorous tasks. At times, I questioned the whole notion and benefit of the project. However, in retrospect it is clear that timbre orchestration concerns dynamic, performative relationships rather than the use of defined categories, and “Performative Timbre” therefore frames my entire research, both in terms of the time that it took to develop and perform this work, as

well as its capacity to address and articulate theories and concepts relating to vocabulary, technique, and timbre orchestration. It also connects to other projects in this thesis through its use of timbral memory as a generative tool in real-time compositional thinking.

## 4.2 The Timbre Space Method

During my research into relevant timbre studies, which are outlined in chapter 2, I came across the Timbre Space method, which is mainly used in the field of acoustics, music psychology, music information retrieval, and computer aided sound synthesis, and can be described in the following terms:

The term 'timbre' encompasses a set of auditory attributes of sound events in the addition to pitch, loudness, duration, and spatial position. Psychoacoustic research has modeled timbre as a multidimensional phenomenon and represents its perceptual structure in terms of timbre spaces (Peetersetal, 2011, 2902).

The Timbre Space method comprises of a sound comparison, which is undertaken through a perceptual listening and scaling exercise that is conducted by a number of participants. Usually participants compare one sound to another, or, in some studies, sound relationships between pairs of sounds. The data from this perceptual scaling is used as input in computer software using multi-dimensional scaling algorithms (there are various computer programs enabling this). These algorithms translate similarity data into spatial relationships, where the relative distances between elements correlate to their measured similarity. Hence, the Timbre Space method facilitates a graphic representation of the perceived similarities and differences using distance values. Attributes of sounds that are perceived to be similar are represented as being more proximately located in space, and

those that are perceived as dissimilar are represented as being further apart. The spatial representation can have any number of dimensions, and a higher number of dimensions allow for a more correct distance representation. For data visualization purposes, 2- or 3-dimensional representations are most common. Grey was among the first to develop and use Timbre Space representations in his research and spoke of a “psychological distance structure” (Grey 1975).<sup>48</sup>

In a perceptual study of sounds to be compared in a Timbre Space, sounds are most often normalized in terms of their pitch, duration, and volume, so that the timbre is the only differing aspect. This is done to reduce difference to only one parameter, and to make it possible to attribute any perceived differences to this particular parameter. These studies often work with and derive independent acoustic correlates of sounds “correlating the position along the perceptual dimension with a unidimensional acoustic parameter extracted from the sounds,” e.g., the attack time, the spectral centroid (the balance between high and low frequencies), or spectral flux, which describes the evolution of the spectral shape over a tone’s duration, etc. (McAdams 2012, 3). Stephen McAdams describes the aim of such studies as lying in the content-based search of large sound databases, providing tools to benefit music information retrieval and musical machine learning applications, musical source identification and tracking, as well as drawing conclusions on timbre as a form-bearing dimension (McAdams 2013, 60, 61). Similar views have been expressed in studies comparing timbre spaces to each other, in the aim to move towards a “stable timbre conception adapted to human perception and independent of pitch and loudness” (Zurich University of the Arts, 2017). Further, new approaches in empirical timbre studies of musical instrument sounds exist, which include the “musical” parameters of pitch and volume. These are described in the following manner:

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48) An overview of timbre space method and history, as well as examples of timbre spaces in comparison can be found at the “Sound Color Space—A Virtual Museum” website (Zurich University of the Arts, 2017).

This considerable broadening of the data basis for each instrument will certainly lead to results that are (1) reproducible and hence reliable, (2) closely related to the actual circumstances in music, and thus will (3) yield more realistic and universal information about the perceptual similarities of the timbre of musical instruments. (Siddiq et al. 2015, 240)

In general, timbre studies are mostly outside the “actual circumstances in music” and they are usually comprised of sound material that is synthesized, or, if “natural” recordings of acoustic instruments are being used, balanced to make comparison possible. The performance or compositional aspects are generally not taken into account and many other aspects and qualities which comprise a musical context are absent. This becomes problematic, however, when conclusions about the sounds’ function in a musical context, such as the building or release of tension, are drawn. For the purpose of my research, an adaption of the Timbre Space method was necessary, making it possible for me to include *performance aspects* such as the body and movements of the performer, the materiality of instruments and objects, and likewise consider the impact of different listening modes and approaches, as well as the intentionality of the sounds that are performed or composed.

### 4.3 Approaches in Creating and Structuring a Sound Catalogue

“Indeed, without a narrative, without the organization of experience, the event cannot come to be. This organization is an organization of temporality...” remarked Susan Stewart (1993, 22). The “organization of temporality” is something which happens in real-time, during the improvisational performance process, which makes it even more complex, as no performance or piece equals another. My aim is thus

not to describe or analyze a specific piece, composition, or recorded improvisation. The structure in improvised music changes constantly and the analysis of a recorded improvisation leaves fundamental matters of vocabulary and technique, which form the building blocks of timbre orchestration, untouched. Structure in improvisational music derives from and is embedded in sound material and how it is combined and placed in time and space. Timbre—its spectral, dynamic, temporal, spatial, and gestural information—suggests and opens to manifold musical transitional possibilities. As such, it was crucial that I took into account the development of the material and of my vocabulary, even if these are more nuanced than I was able to capture in a sound catalogue. However, as I mentioned briefly in introducing this method, in retrospect I experienced the process of creating a sound catalogue as generative: in comparing and unfolding the sound material itself through detailed and intensified methods, I gained profound insights into the resulting timbre relationships and their compositional capacities.

In the first and second year of my doctoral studies, I started out by undertaking a spectral analysis of the sounds that I use in my practice. These were both recorded and real-time. In this, I was inspired by compositional approaches in spectral music and the use of programs such as Audiosculpt, Spear, Max MSP, etc. I found that the information provided through this method (frequency and intensity in relation to time) was interesting and added to my knowledge about the sound material. It “sharpened” my listening, as I was able to take sound spectra apart and, for example, selectively and repeatedly perceive one harmonic frequency at a time, which I wasn’t aware of prior to that. However, the further development of the “spectrograms” (the visual representation of a spectral analysis) and their integration or translation into my artistic work did not seem feasible. I realized that I was trying to arrive at physically measurable information about sound material that was fundamentally idiosyncratic. In the process, I attempt-

ed to purposefully produce all sounds inside the piano on the same string, for better comparability and to produce somewhat quantifiable results. This would have been in line with Pianist Sebastian Lexer's approach of summarizing playing techniques. Lexer engages with improvisation, extended techniques, and augments the piano with live electronics. He gives an overview of extended techniques in his dissertation "Live Electronics in Live Performance: A Performance Practice Emerging from the *piano+* used in Free Improvisation," where he writes "...each personal approach shows unique aspects. This selected overview will focus on methods applied to a single pitch in order to draw attention to the differences in approach and sonic variation possible..." (2012, 103). Due to this vast vocabulary of techniques and objects, he decides to:

...summarize playing techniques, the objects, and preparations employed, and their placements in more general terms with an attempt to establish possible grouping of objects and performing gesture. This employs a stylized notation developed for the purpose that focuses on the relationships between gesture, material, and method rather than considering the sonic outcome alone. (ibid.)

In the resulting 28 graphic examples (with accompanying audio) of extended techniques, Lexer generally speaks of "preparations" and "objects" without further specifications, although he gives a few examples of materials and variations used by different pianists in the descriptions. He further distinguishes between silent and sound-producing playing gestures (ibid, 106).

During the course of the "Performative Timbre" project I found that the application of all playing methods to just one string of the piano, in an attempt to produce measurable or quantifiable results, to be unfruitful. It did not represent my vocabulary; many techniques could not be included as a result of this restriction, as they had been

developed using a specific object in a specific register, sometimes across many strings, and simply do not work or have the same sonic outcome if performed in a different register. This approach would have been equally as restrictive in relation to timbre as it was in relation to register and technique. The method of applying all sounds to one string fundamentally changed the way in which I performed the sound material, gesturally as well as sonically. Instead, I decided to embrace the idiosyncratic way that each sound is performed, taking into account that the sounds would differ in relation to most perceivable parameters, which would produce bias in the comparisons and ratings as part of the “Performative Timbre” study: sounds are played in a variety of registers, volumes, and durations in order to reveal and maintain their identity and the aesthetic and intention with which they are performed. This required that I arrived at a subjective similarity measurement methodology, using sound material which was not synthesized or made comparable in any way, as well as being the only subject who would record, choose, compare, and rate the sound material.

As described above, the spectrograms lacked perceptual and experiential aspects in their analysis as well as their representation. Furthermore, the method left many aspects of performance untouched, such as a performer’s relationship to the instrument, the materiality of objects used, as well as the gestures and movements involved in sound production. It became clear that a sound catalogue would have to be structured in a way that related to the idiosyncratic thinking and creating within my artistic practice. Initially, I struggled with the contrast between a “scientific” versus a phenomenological or “intuitive” approach, in part reflecting the fact that a lot of studies around timbre take place within the fields of music psychology, acoustics, or audio engineering. Arriving at the point where I could embrace a subjective, experiential method, which was integrated and derived from my practice, was admittedly a very difficult process and meant positioning myself and this study clearly as an



artistic and phenomenological approach in music performance and timbre research. Thomas Clifton compares scientific and phenomenological approaches, advocating that:

the question is not whether the description is subjective, objective, unbiased, or idiosyncratic, but very simply is whether or not the description says something significant about the intuited experience, so that the experience itself becomes something from which we can learn, and in so doing, learn about the object of that experience as well. (Clifton 1975, 70)

I have approached sound material from various angles in my research and within the different projects that I have developed. In this study, it became essential to shift to a performative approach, and to embrace the situated knowledge I could gain from that position rather than adding to the vast research on timbre which already exists in other fields. As a performer and improviser/composer, I am in the unique position to offer insights into the perception and application of timbre within my artistic practice, inside changing dynamic relationships of space, material, and body.

The tension between the need to create a sound catalogue and the unattainability of performing, capturing, and articulating all the nuances and variations of sounds accompanied me during many steps of this study. Questions I struggled with in the research process related to which and how many sounds I would choose to conduct the listening comparisons, which aspects and qualities I would compare, and whether this would partly be defined by the language I chose. I was further thinking about ways of describing and articulating timbre, but also about how I might address the nuances and details of my physical gestures without necessarily inventing a new terminology. At the same time, I found deep pleasure in the process of systematizing vocabulary and techniques and articulating perceptions and intentions. "The catalogue itself," Baudrillard reminds us, "however—its ac-

tual existence—is rich in meaning: its exhaustive nomenclatural aims have the resounding cultural implication, that access to objects may be obtained only via the pages of a catalogue which may be read through ‘for the pleasure of it,’ as one might a great manual, a book of tales, a menu...” (1996, 4).

A catalogue is a very seductive idea and the impossibility of ever completing it has made the process and its limitations and possibilities, what was missing and what was gained, a fruitful one. Investigating timbre, unfolding it into detailed components through endured, repetitive listening, revealed its intention and capacity to create and function as a dynamic, interactive agent.

#### 4.4 Performing the Study

The perceptual approach in the Timbre Space concept is something that I found very appealing and suitable for my purpose of understanding the way I use timbre in musical structures. Even though its goals and application differ largely from my own artistic research, I chose to adapt its method and create the “Performative Timbre” study instead. Comparisons are always concerned with relationships and my own research investigates timbre in relation to performance aspects and aims to bring these interdependencies to the surface.

My aim has not been to draw quantifiable conclusions about inside piano sounds and their timbre. As such, I did not synthesize or balance the sounds that I used regarding duration, volume, or pitch, as that would impact their idiosyncratic character. I also refrained from extracting audio features and measuring sounds via computer software as part of the analysis and focused only on the experiential and perceivable aspects of my sound vocabulary. Furthermore, because this thesis addresses an extended understanding of timbre, I ensured

that this was reflected in the questions that I asked regarding material/objects, playing method, and gesture.

### Recording and selecting

Through the structured inventory list and sound maps that are described in chapter 3.4, I had roughly decided which material, sounds, and techniques to record. The recordings were made over a period of a few days in December 2017, in my living room in Berlin, using the same setup and microphone positions. The microphones used were two Neumann TLM 103 microphones and a Focusrite Clarett 8 Pre sound card with a Schimmel grand piano, model K175. During the entire study, I used the same headphones, Sony noise cancelling MDR-NC 13.



Figure 5: Setup for recording sessions for *Performative Timbre*, Berlin, December 2017

I tried to mix the recordings as little and close to my listening as possible, so that the recordings would not be over-produced, sometimes using both microphones, sometimes just the one closer to where the sound was initiated. I wanted to tailor the recording to my perception of performing the sounds. I occasionally used a compressor to bring out more details and make softer sounds or attributes louder. Each sound was recorded numerous times, sometimes requiring 20 takes of simply plucking a string until I found the sound was captured in a way that was satisfying. The working process created and required a mindset where every little nuance mattered.

**December 28, 2017**

I record some of the sounds 10 to 20 times. Listening to the details of the many recordings, for example a tiny cube magnet in the middle register sitting on two of the three strings of one note, I notice something I haven't observed before: the multi-phonetic which I hear in the attack stays throughout the sustain part of the sound, but as the sound decays, it "resolves" the harmony and sounds only the fundamental.

I asked myself what constitutes a "perfect" recording and execution of a sound; would I cut out any extraneous noises, turn the sound into a "clean" sample? Or treat the recording as a performance, and accept the situatedness of each performed sound?

Going deeply into the details of performing the sound was an extremely valuable process, which made me listen with more precision and attention. It revealed aspects that I was not aware of. The entire process of the study continued to reflect back to the questions I set out with as part of "Timbre Orchestration": How do I articulate intimate and interactive processes of technique and vocabulary?

**December 27, 2017**

This is not a catalogue of extended techniques, it's a Material Action Timbre Study. It's not a guide for composers or performers, nothing to apply and imitate directly, but rather something to inspire, a method showing how we can think about and apply timbre.

I ended up with a few hundred sounds, including many variations of the same sound. At times I would record, listen, and record again, selecting the sounds that I found aesthetically pleasing and representative of a specific technique I wanted to include. During the process of the study I was struggling with the fact that this sound catalogue could only be representative of a fraction of my sound vocabulary, and that I had to be selective with respect to the material. This confrontation with an obviously endless variety of sound material and timbral nuances of a single playing technique revealed the fact that technique must be re-invented and re-learned every time it is performed; an approach and a mindset of heightened awareness and flexibility to performance circumstances.

**December 30, 2017**

In the end, I can't separate an action from a movement, a memory, or a sonic image I have of a sound, from my taste, my aesthetic choices. That's what this is about. Finding out about my choices and the reasons behind them.

In discussion with Palle Dahlstedt, I finally decided to cut the catalogue down to 50 sounds, considering the sheer number of listening comparisons I would have to do. In the selection process, I realized how some actions reflected a learned habit, both physically, i.e., through muscle memory, and mentally, which is often so embodied that it is not separable from my personal taste.

This reflective and microscopic listening and selecting of many different versions of the same sound suggested adjustments and changes, or reassurances of techniques and choices, in direct connection to my performance and artistic process. I tried to capture thoughts and observations in a “listening journal,” which was very much part of the entire study—this formed a continuous, reflexive protocol which I kept while listening, pausing, repeating, writing, and listening again.

**December 28, 2017**

Trying to record sounds in a “neutral” way, meaning, in a sense “pure.” Or is it OK to have extra sounds and noises, the mechanics of the sound production as part of the recording, like the sound of a guitarist’s finger tapping and sliding on a string or the breath and spit of a reed player? A well-played sound, a well-executed sound: a sound that transmits its idea—it must be clear, without second guessing. It will still be magical, but not random. Technique means detail and intimacy. That’s virtuosity. Being able to hear and perform as nuanced and detailed as possible. Movement and object and sound in line, corresponding.

It was interesting for me to discover that I seemed to prefer sounds which were performed with a certain decisiveness, separate from a “clean” or “perfect” technique and how a single sound can convey that, even in a recording situation which was meant as a demonstration of a playing technique. Every performance happens in a context, or rather performing a sound means contextualizing it. There are external factors in the environment which influence a performance, as well as the knowledge and experience brought into it and all that is perceivable in the simple action and recording of pressing down a key on the piano.

**December 28, 2017**

This is meticulous work! Which one sound to pick? Not as a representation of all. Coming back to that over and over again. This is not a full catalogue. It's a snippet, an excerpt, a study.

**January 2, 2018**

Stop looking for the perfect sound! The constant doubt, whether I should record and capture more nuances, the sound played softer, slower, more fragile, longer, with a different attack? The basic need to contextualize, I guess.

The endured recording and listening process felt like an intensive practice and a study in focus as well as memory. Having to decide which sound out of a batch of 20 to pick meant remembering sounds and movements and mentally building up a catalogue of myriad nuances, almost as a repertoire, enriching my vocabulary. These lessons in timbral memory enhanced my abilities in listening, perceiving, and creating, focusing on my initial research outset of unfolding improvisational structures and orchestrating timbre.

### **Software Tool**

To conduct the study, Palle Dahlstedt built a software tool which enabled me to listen to all possible sound pairs out of the 50 chosen sounds in random order. I would then give the pair a (dis)similarity rating based on different perceptive performance qualities and the questions I had placed at the center of the study. The tool randomly picked sound pairs, without revealing the names or descriptions of the sounds I was listening to. I then compared sound A to sound B and rated it on a scale from 0, very different, to 1, very similar. The tool stored my ratings and I could go back one step if I thought I made a mistake, which enabled me to conduct one listening session over a longer period of time. One question or listening round would make

up 1,225 possible sound pairs, which I compared and rated accordingly.

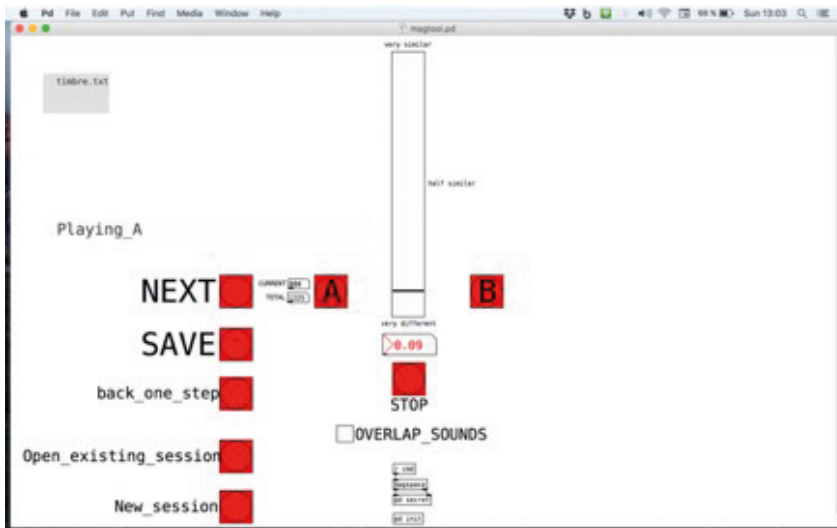


Figure 6: Screenshot of the software tool used in *Performative Timbre* developed by Palle Dahlstedt in collaboration with the author

This way of randomizing the order and listening to sound pairs in all possible combinations also enabled me to hear each sound in many different contexts and to observe how it changed perceptually in response to what I had listened to prior to listening to it, taking on different meanings and impacting my perception of it. Another function built into the tool was playing sounds simultaneously, overlapping them, or listening to them in succession.



## 4.5 Guiding Questions

As mentioned above, the 50 sounds that I used in the study were partly based on the *mind maps* (see Fig. 3 and 4). Further, in the recording process, I would pick the sounds which were aesthetically pleasing or representative of a certain technique I wanted to show. After selecting the 50 sounds, which I describe in detail in chapter 5 and make available in the RC exposition, I decided on the questions I would ask.

1. How similar are the sounds to each other, in terms of the objects used to produce them?
2. How similar are the sounds to each other, in terms of the playing methods used to produce them?
3. How similar are the sounds to each other, in terms of the physical gestures made to produce them?
4. How similar are the sounds to each other, in terms of their timbre?

There were some questions, e.g., regarding the possible functionality of sounds, which I was interested in pursuing, but which proved to be impossible for me to answer at the time, or at all.

I wanted to investigate whether I could use certain sounds or materials only in certain contexts—i.e., as textural elements, as layers, exclusively in combination with other sounds, as transition material, etc.

**January 4, 2018**

When does a sound become a phrase, a fragment, a texture? Any sound becomes a texture when it's played long enough, repeated or played with little variation, but I don't use just any sound for that purpose. Either, because I don't think every sound lends itself to be used texturally or because of pure habit.

I was wondering whether certain sound material lends itself to be used in one context more than in another. However, this way of thinking, especially in improvised music, seemed restrictive to me and triggered the opposite effect in terms of a structural compositional approach: it opened my imagination in a way that I want to think of any sound to be used in any way at any time. The restriction does not lie in the sound material itself but rather in the musical context and what seems appropriate at the time, to the performance space and circumstance.

Another obvious question concerned the comparison of the spatial projection of the sound material. However, this differs immensely from space to space, instrument to instrument, listening position, whether I choose to use the sustain pedal or not, etc. It seemed to me that there would be too many variables to draw any conclusions from, and I decided not to apply spatial projection as a parameter in the listening comparisons. Instead, I used the four guiding questions raised through reflection on the mind maps.

#### **4.5.1 Question 1: How similar are the sounds to each other, in terms of the objects used to produce them?**

*Sense is already built into objects by virtue of their form, their morphology.*

François Bayle (in Desantos et al. 1997, 16)

The question of how similar sounds are to each other, when considering the objects which produce them was an obvious first question for me to ask, as it reflected how I would naturally systematize and define sounds; it was perhaps also the easiest one for me to answer. To be consistent in my similarity ratings, I added "rating rules" during the listening process, which I describe in detail in chapter 5. As an example, I decided to rate sounds as being "half similar," if they shared

an object in the sound production, as some techniques utilize more than one object to produce sound.

One main impact that “Performative Timbre” had, and which I experienced during the process of undertaking the study, was to change the levels of listening and focus that each question generated and required. In this first round of listening, I had to be careful not to confuse the object used with the method used, in my perceptual rating. Again, I noticed so many details and subsets of performing the vocabulary, which sometimes made me go back and forth and second-guess my choices and ratings until I found a comfortable *pace* or *rhythm* of listening. While comparing sounds through the objects that were used to produce them, I felt I was getting closer to my understanding of the relationship between sound and material and how this interdependency unfolded.

**May 12, 2018**

Is rosin an object? Or is it facilitating the use of other objects? It is material, I put it on my finger, it is powder, it turns into a sticky layer, it's an object covering my fingers and the string. Is there a difference between passive and active use of objects? Is an object passive if it's just placed somewhere to resonate—isn't that an intentional activity as well?

#### **4.5.2 Question 2: How similar are the sounds to each other, in terms of the playing methods used to produce them?**

The mind map of different playing methods which I drew prior to the listening test was very helpful in understanding similarities between sounds and methods. However, I had to rethink many of the groupings and again, I had to make sure that I did not confuse the playing method, or action, of how a string is set in motion, with the gesture and movement used to produce the sounds in my perceptual rating. It also meant defining what a playing method actually implied for me,

and, as described in chapter 3.4, it made me rethink how I would label and group the actions. This sometimes resulted in long discussions with colleagues and contemplations about different ways of plucking a string, minute details of its action and appropriate names regarding, i.e., other string instruments and playing techniques.

**June 5, 2018**

Bowing scraping, striking, plucking, initiating, strumming, tapping ... techniques overlap. Even though an EBow produces a sustained sound it is not bowing! It's initiating. What's the difference between scraping and bowing? Is it about noise, the material used, or the friction?

Strumming equals plucking, except strumming is a horizontal and plucking a vertical movement.

Bowing involves: longitudinal bowing, vertical bowing, bowing with other objects from left to right across the strings. Why is it all the same? Exciting the string through movement continuously over a sustained period.

#### 4.5.3 Question 3: How similar are the sounds to each other, in terms of the physical gestures made to produce them?

Firstly, the question of the presence of similarities between sound and gesture revealed big discrepancies between physical movement and timbre. A "small" gesture, a barely noticeable bending or pressing down of my finger, could have very different results: in the case of setting a fork stuck between the strings into motion, this produces a long-lasting, vibrating, textural sound. But a similar gesture that lets a magnet strike the metal frame inside the piano results in a percussive, loud, and relatively short sound. Listening with this question in mind, I would perform the gestures and movements, which produced each sound, silently, in the air in front of me.

**July 17, 2018**

The different questions require different modes of listening. It makes me think about the force and energy used to produce certain timbres, the effortlessness of other movements. How much space does a movement take up? Does it have the same direction? How long is the gesture, its duration, its tempo? Is it about physical movement or about how it feels or about what it looks like?

François Bayle sums up the different aspects of physical performance and its effect on music and the listener in the following terms: "In the studio, we are provoked by the conditions there, by the various interfaces provided by the technical tools. So, I would say there are two major periods in my work: the standing period and the sitting period. This difference in work habits made for a different music. It is perhaps idiotic but it is true!" (in Desantos et al. 1997, 17). Even though he is working in the electronic music field as opposed to the (electro)acoustic, I could very much relate to this: sitting or standing at the piano results in immense differences in movement and sonic outcome each condition affords or limits.

**July 17, 2018**

Am I sitting down or standing? Am I straight standing or bent over, am I using one or both hands? That is an important factor in making musical transitions, it affects the overall structure.

"Like a painter, my music is also the product of my hands, ultimately. My spirit selects and saves what my hands do," states Bayle, "but it is the hands that perform the work. These imperfect gestures shape the sound's morphology and serve as signs to the listener" (ibid., 18). While in Bayle's acousmatic work the physical gestures might not be visible, but can be aurally perceived, I also feel the weight of the bodily and visual aspect of my performance, what it transmits, how it shapes the sounds and influences the perception of the listener, which was all amplified through this listening round and this specific question.

July 28, 2018

Sometimes gestures can have the same kind of momentum to them, performed with the same attitude, the same pace, the same weight, yet produce very different sounds. It matters with what intention the movement was performed.

The exercise had an incredible effect in regards to bodily awareness, and, for the first time I began to think about physical micro-structures, and how I lacked a language to describe all the different nuances of bending a finger, turning my arm or body, of physical tension, of different grades of weight, and falling and releasing. It also connected to other projects I started developing at the same time, such as *Accretion*, which is discussed in chapter 8, where physical gestures and bodily movements are partly separated from sound and used to structure a performance.

#### 4.5.4 Question 4: How similar are the sounds to each other, in terms of their timbre?

The question regarding the similarity between sounds with respect to their timbre in a way sums up the study: after taking the sounds apart and looking at different aspects of sound production separately—objects, actions, and gesture, here I was trying to listen to the sounds in a way that included all of these aspects again.

This was probably the hardest question to answer, and the listening round took a long time, because I felt that I was relying almost exclusively on my intuition and that my answers would differ from day to day, or mood to mood. I constantly had to remind myself not to be influenced by other perceptual aspects and qualities in my rating, e.g., not to rate two sounds as being similar in timbre because they were produced with the same object. This was however a very interesting discovery—the same playing techniques or objects did not

necessarily mean that I perceived the sounds to be similar in timbre. I took a long time taking the different “measurable” elements of the sound—volume, pitch, duration—apart mentally and listening to them analytically, separately, and then focusing on the sound as a whole again. Here, the overlapping function in the tool was of great help, and I would often trigger sound A and B at different times so that they would overlap during different phases of the sound. I sometimes spent 5-10 minutes with one sound pair, going back and forth, taking a break and coming back to it, while at other times it only took a few seconds to rate. Deciding on a consistent rating system was also challenging, as this question was particularly perception-based and I was left with no technical or material aspects of the sound to hold on to. I often found that sounds would differ in timbre despite having the same pitch and that, again, the intention with which it was performed had an impact on my rating.

**July 15, 2018**

This study somehow becomes a meditation, an exercise in focusing. Comparing the similarities is about revealing possible transitions and structural choices, the transitions existing within the sound, the change of energy, noise, pitch, and volume, the fluctuation that suggests what can follow. I noticed things in the sounds I haven't heard before, frequencies, nuances—the comparisons reveal things.

**July 17, 2018**

I'm imagining transitions systematically. A lot of this has to do with memory, sound memory: for example, is sound A as similar to sound B as sound C is to sound D?

Intention of course entails dynamic and temporal aspects, etc., but it also made me realize how the timbre question was perhaps the most “musical” one—meaning that I heard and imagined the sounds very much in a context and not in isolation. This is perhaps because the concept of timbre consists of so many parameters that we judge musical: rhythm, pitch, harmony, and dynamics experienced over time and through space. Sounds also relate to the complexity of both

immediate and long-term artistic feedback in the creative process through listening, playing, body, and memory, and in the nature of this listening study it raised reflections on repetition.

## 4.6 Thoughts on Repetition

A repeated sound is never identical; even when it is looped, it will be perceived differently each time it is listened to. Repeating a sound, as a structural tool in music making, changes our perception of what came before and what follows. Repetition affects our relationship to time and creates variations and textures, separate sounds develop into textures over time, and subtle timbral, dynamic, rhythmic, and spatial differences and nuances emerge.

Joseph O'Connor speaks about repetition as a “celebration of the particularity of every event... Repetition becomes an invitation to pour attention into the texture of the sound while also sculpting discernable relationships between musical participants” (2018). In “Performative Timbre,” listening and the creation of different listening modes took a central role. This implied a different focus and perception of time: through this endured listening exercise, whereby 50 sounds were repeatedly compared to my memory of them, as well as how they differed or appeared similar, I found myself perceiving a fluid sense of time, almost like a meditation: a sense of being “in the moment.”

In the beginning of the process, I asked myself whether I could *perform* the study. The process of listening to myself performing, which I captured in a journal through a performance writing, and which is then represented in the perceptual timbre maps, seemed like a removed action—removed from my actual practice with the piano. However, in retrospect, I feel that this meditative state of remembering and listening and simultaneously responding to it, creating a



timbral memory, seeped deeper into my performance. Even though I describe this as an inherent part of improvisation as such, this study heightened the awareness of this process, and the focus gained from it constituted the real benefit.

## 4.7 Afterthoughts

I always try and disconnect things from each other. Often my temptation is to bring disparate kinds of materials into the space: text, images, costumes, materials of space and so on.... For me there is a desire to keep stuff separated out, so that as a viewer you have an active and fecund job of reading between separated objects. The work of combining hasn't quite been done for you.

Tim Etchells (2016, 112-113)

This quote from Tim Etchells about his approach to performance reflects my experiences whilst undertaking this study: in separating and taking things apart, not only did I gain a lot of insight into the tiniest details and micro-structures of different aspects of my performance, but I was also presented with the task of making connections, of imagining how the gaps between gesture and timbre and object could be bridged and how these things could be set into relation.

Initially, the subjective nature of the study made me question the relevance and value of my findings for others. In a break from listening, I went to a photo retrospective on Diane Arbus and in the descriptions on the gallery wall found this sentence, which resonated with me: "...In a seemingly contradictory way, the more specific a photograph of something was, the more general its message became."<sup>49</sup> It seems to me that a meticulous attention to detail in one's own artistic work and

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49) The quote is from a description of the portraits on the actual gallery wall, visited by the author in June 2018 (Arbus 2018).

research is imperative to revealing anything valuable about it. With this in mind, idiosyncratic and subjective approaches are revealed to be both valid and in fact necessary to expose meaning that can affect and interact with artistic processes in general.

July 9, 2018

I start hearing the listening test as a piece of music, how the sounds complement each other or not. How it sounds within a musical structure is a side effect of the study. Or is it the purpose? Which part of the sounds are similar? How could it move from sound A to sound B? Where do they overlap?

As mentioned earlier, I found Tristan Murail's description of a sound "as a field of forces" (Murail 2005, 122), as simple as it might seem, to be very much in line with my thinking. The 50 sounds that I listened to over and over again, with their different attitudes, aspects, and contexts had turned into a dynamic energy that allowed me to re-think, re-feel, and re-perform them. The adapted and extended Timbre Space method allowed for detailed observing and thinking about timbre and revealed so much about the selected sounds and how I perform them. As a result, I started seeing connections and interactions between movement, timbre, and material, as well as links between the physical, aural, and visual in my work. Creating a sound catalogue, then, is a process which is not finite, even if its limited frame suggests this: the necessary limitations, reducing and selecting in turn, opened possibilities which set things in motion and affected my overall creation and composing abilities as a performer.

To practitioners as well as listeners across disciplines, the study offers a method of approaching (sound) material and engaging with it in a focused, detailed, and performative way, showing its relational properties through a comparative listening or observing, and its relevance for proposing possible transitional and compositional structures. The paradox of needing to take things apart, disassemble them into detailed components, in order to be able to see their connection

to the whole became very clear and pronounced during this study and can be seen as one of its key outcomes.

“Performative Timbre” created a variety of new listening modes and an overall, enhanced perception of sound material and performance approaches, as well as confirming and articulating my theoretical approach to technique and vocabulary as *idiosyncratic*, *multi-sensory*, and *in a state of continuous transition*. The project further confirmed my extended understanding of timbre as a presence and force in music making and listening, detailed through its relationships to material, gesture, and playing method.

In chapter 5, I turn to a discussion of the visual representation of the collected data in four *perceptual timbre maps* and give further details on the rating process and its implications for artistic processes.



## Chapter 5: A Catalogue of Shapes and Motion

### 5.1 Records of a Performed Listening

The “Performative Timbre” study described in chapter 4 articulated an understanding of timbre as it relates to material, gesture, and playing method, through an extensive listening exercise and the comparison of 50 selected sounds. The “Catalogue of Shapes and Motion,” which I discuss in this chapter, is a continuation of that study, involving the visualization of the four sets of data that were generated in the study in response to the guiding questions (see chapter 4.5). The catalogue employs a multi-dimensional scaling method (MDS)—a common statistical tool that is widely used to visualize the level of similarities in a data set—in order to produce four *perceptual timbre maps* (MDS, see, e.g., Grey 1977). In conventional studies using the Timbre Space method, MDS is used to evaluate, analyze, and represent the collected data.

*The Catalogue* offered me the opportunity to explore the data collected through the *Performative Timbre* study, and to remember and reflect on the decisions that I made in the subjective similarity measurement that formed part of that study, as well as to draw further conclusions about how I orchestrate timbre in my practice. Visualizing the listening outcomes and ratings through the production of perceptual timbre maps also facilitated a comparison to the *mind maps* I made prior to the study (see chapter 3). Taken together, the perceptual timbre maps form a catalogue of shapes and motion and describe objects, gesture, and action in relation to timbre and to each other, visualizing the complex interdependencies of the active agents present in timbre orchestration. The mapping and connecting of sounds further showed an intentionality within timbre orchestration within its different performance aspects, revealing the aspects of *object timbre*, *action timbre*, and *gesture timbre* as guiding factors in the

creation of trajectories while I perform. This insight, garnered through creating and revisiting complex listening modes and approaches, and observing changes in the course of the study, contributed significantly to my research on and knowledge about timbre orchestration. The maps are also represented in the RC, where the added video and audio functions make the research process and outcomes even more accessible to readers.

Graphic representations of perceptual studies are of course always a simplification of complex relationships. The timbre maps do not display time, processes, or the reasoning behind the decisions that are made; they are visually intriguing to me, though, not because they superficially suggest a finite truth: it is clear that the maps function as an additional layer and another view to the process and conclusions that I arrived at through “Performative Timbre” (see chapter 4), adding to the resulting extended understanding of timbre instead of simply representing it. A comparison is always a reflection on a series of dynamic processes, and, rather than being just an outcome, these maps unfolded the idiosyncratic relationships that exist between sound, material, and movement. Translating of a project or a process into another form allows it to become something else—as it takes another shape, it becomes another work. The maps discussed in this chapter constitute snapshots of my subjective perception and listening, and they show the way that I understood timbre relationships at a given time. They can also be viewed as a score to be performed, or as the record of a performed listening.

The maps are entities in and of themselves—they use strategies of *mapping* and *cataloguing* in order to show relationships in a different medium, an approach which I have used across all of the projects that make up the current research into improvisational processes. Pragmatically, the process for translating the data collected from the listening study into four graphs, developed with Palle Dahlstedt, was the following: the similarity matrix from each listening study, i.e., the

values for pairwise similarity of all possible sound pairs with regards to one specific aspect (object, method, gesture, timbre), was transformed into coordinates for a 3-dimensional similarity graph using the multi-dimensional scaling algorithm (see, e.g., Grey 1977), which was performed using the open source software PERMAP; the graphs were then realized as 3D scatter plots using Mathematica.<sup>50</sup> The graphs exclusively use distance values—the closer the sounds and their names are in the spatial graph, the more similar I perceived them to be; the further apart they appear, the less similar they were perceived to be.

## 5.2 Describing Objects and Playing Methods

Representing data in a visually appealing and transparent way was challenging. The resulting maps are nonetheless complex and require engagement and time. Here, it is necessary to access the RC and listen to the sounds within the interactive maps and videos (see *Media Examples F1-4*), which make the grouping of similarly perceived sounds instantly accessible, as well as offering comparisons between the maps. For the sake of simplicity, I named the 50 sounds according to the objects that were used to produce them. I further labeled them according to playing methods or actions, represented in different colors, with a color legend displayed on the side of each map (see Fig. 7). Sometimes, a sound is produced with one single object; at times, there are up to three different objects used to produce and describe one sound. In total, there were 15 different objects utilized in the study and the following abbreviations are used to describe them:

Fk	Fork
Bl	Ball

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<sup>50</sup>) Mathematica is a technical computing software and real-time interactive program for making perceptual maps.

Mg	Magnet
Sk	Skewer
Ha	Hand
Ny	Nylon
Ch	Chopstick
W	Whisk
Eb	EBow
Ky	Keys
MgBw	Magnetic Bowl
SBw	Small Bowl
Mt	Mallet
Rn	Rosin
Sl	Slate

“Hand” is used when the sound was produced with no additional object but my hand(s). “Keys” is used whenever keys were used additionally to other objects.

The descriptions of playing methods below are discussed in detail in chapter 3.4, 4.5 and in the *Action Timbre Map*. These are not universal definitions of playing methods, but terms I chose to describe the actions which produced the 50 inside piano sounds used in this study.

1. *Tapping/releasing*  
sound produced through touching and releasing my finger or an object of the string
2. *Plucking*  
exciting a string through grabbing under it with fingers or an object and releasing it in an upward motion
3. *Striking*  
hitting the strings, metal frame, etc., in a downward motion with hands or objects



4. *Scraping*  
movement along the strings or soundboard with fingers or other objects, with pressure/force, containing noisy sound components
5. *Bowing*  
producing a sustained sound through movement along the strings, vertical or horizontal movement with a finger or an object
6. *Sliding*  
movement along the string/metal frame with an object, with little amount of friction
7. *Initiating*  
setting an object/the instrument in motion beyond further control of the sound's development
8. *Strumming*  
Setting (several) strings in motion through horizontal movement across the strings



*Figure 7: Playing Method Map legend as represented in the perceptual timbre maps*

Sounds produced using two playing methods simultaneously are represented with the two respective colors—e.g., a purple dot (tapping/releasing) with a smaller yellow dot (bowing) inside it. Here, the main

playing method is represented by the bigger dot and the secondary playing method through the smaller dot, although the borders between main and secondary methods often blur.

This labelling of playing methods is obviously quite subjective—it could have been approached in many ways. One difficulty lies in the fact that there is simply no common language for addressing the huge variety of inside piano techniques and for describing sounds in this way. I “borrowed” names from playing techniques used in relation to other string instruments, i.e., plucking, bowing, or strumming. However, some of the techniques are unique, meaning that I would have to either invent many new names or group techniques together under the same name. I decided to do the latter, to keep things simple and to be able to make comparisons. As an example, a stone ball rolling sideways on the strings could have been labeled *rolling*, however I decided to go with *tapping/releasing*, as I find the action quite similar to tapping the strings with my fingers or other objects.

At times, the actions describe a movement of how a string is set in motion, at times the sounding outcome is the focus, but mainly the *playing method* for me describes a mindset: a timbral choice or intention. A playing method shapes the timbre of a sound and already implies a certain timbral envelope: *bowing* always refers to a sustained sound, *plucking* and *striking* often lead to a percussive sounding attack in the sound’s envelope, etc. However, these are general observations with a lot of room for variation and nuance within each category. Further, *initiating* here references a playing method which has a strong aleatoric element, a certain mindset, and a specific intention behind it, with no timbral implications. It refers to an initial action of setting-in-motion without any further agency from my side, intentionally giving up control of the further development of the sound. *Initiating* is often combined with other playing techniques: a magnet vibrating on the strings, for example, involves *initiating* (the setting of the magnet in motion, which places its further movements beyond control) as well

as *tapping/releasing* (as the magnet taps the strings and releases them through the produced movement).

### 5.3 Fifty Sounds

Below is a legend that describes the 50 sound names and their abbreviations that were used in “Performative Timbre” and represented in the *perceptual timbre maps*. The videos in the introduction of the RC Exposition, *Media Examples A1*, also show how these sounds are produced.

Bl	Stone ball rolling sideways on strings
BlKy	Chord cluster played on keys with balls resonating on hitch pins
Ch	Scraping along bass string with chopstick
Ch2	Striking chopstick in between two strings in fast motion producing a tremolo
EbBl	EBow placed on string with balls resonating on hitch pins
Fk	Fork stuck in between strings vibrating high register
Fk2	Fork stuck in between strings vibrating low register
Fk3	Fork stuck in between strings and same string plucked with fingers
FkBlKy	Fork stuck in between strings; trill played on respective keys with one hand while sliding stone ball along same strings with other hand
Ha	Bass string stopped with one hand, harmonic plucked with other hand
Ha2	String mid register stopped with one hand, harmonic plucked with other hand
Ha3	Strumming strings mid register
Ha4	Plucking strings at hitch pins with hand

HaKy	Tapping and bending bass string with one hand and pressing respective key with other hand
HaRn	Longitudinal bowing along single bass string with rosined fingers
HaRn2	Longitudinal bowing along multiple bass strings with rosined fingers
Mg	Column magnet sliding along metal frame
Mg2	Striking the metal frame with a column magnet
Mg3	Column magnet vibrating on string
Mg4	Striking metal frame with round magnet
Mg5	Round magnet tapping and releasing string
Mg6	Round magnet thrown on strings
Mg7	Cube magnet thrown on strings
MgKy	Column magnet placed on string and played with respective key
MgKy2	Multiple round magnets placed on string and played with respective key
MgKy3	Round magnet placed on string and played with respective key mid register
MgKy4	Round magnet placed on string and played with respective key high register
MgKy5	Round magnet placed on string and played with respective key low-mid register in front of dampers
MgKy6	Round magnet placed on string and played with respective key high register no pedal
MgKy7	Rubber coated magnet placed on string and played with respective key low-mid register
MgKy8	Small cube magnet placed on string and played with the respective key
MgBwBl	Holding and moving magnetic bowl with metal balls rolling inside it
MtBl	Striking bass strings with mallet with balls resonating on hitch pins

Ny	Bowing bass string with nylon tied to string
Ny2	Nylon bowing several strings mid register
Ny3	Nylon bowing several strings mid register with high harmonics
Sk	Multiple thick bamboo skewers stuck between strings bowed with hand
Sk2	Multiple thin bamboo skewers stuck between strings bowed with hand
Sk3	Single thick bamboo skewer stuck between strings bowed with hand
Sk4	Single thin bamboo skewer stuck between strings bowed with hand
Sk5	Single thin bamboo skewer stuck between strings bowed with hand and bent
Sk6	Multiple thin bamboo skewers stuck between strings vibrating and striking each other
SkBl	Skewer stuck between strings, bowed with one hand and rolling stone ball sideways over same string with other hand
SkBl2	Single thin bamboo skewer stuck between strings bowed with hand with balls resonating on hitch pins
SkKy	Single thin bamboo skewer stuck between strings played on respective key
SkSBw	Single thin bamboo skewer stuck between strings bowed with hand and small metal bowl resonating on same string
SkMt	Single thick bamboo skewer stuck between strings struck with mallet
Sl	Bowing across bass strings with plate made of slate
Sl2	Bowing across bass strings with plate made of slate no pedal
W	Whisk scraped along hitch pins

## 5.4 The Perceptual Timbre Maps

The four sets of data, which were the outcome of various comparisons of the similarity of sounds with respect to objects, playing method, gesture, and timbre, are represented in four *perceptual timbre maps*, named the *Object Timbre Map*, the *Action Timbre Map*, the *Gesture Timbre Map*, and the *Sonic Timbre Map*.

It was not always possible to show the labels of each sound in the maps below, especially where the dots are closely clustered. Again, it is essential to listen to the sounds, which are available in the perceptual timbre maps in the Research Catalogue exposition, *Media Examples F1-4*. In the respective videos accompanying them, the 3D maps slowly turn, so that different angles and groupings, and all the labels, are made visible.

The first two timbre maps, the *Object Timbre Map* and the *Action Timbre Map*, could superficially appear to be a rhetorical exercise. Given that I had already grouped and named the sounds, why go through the listening study, each time comparing 1,225 sounds and additionally representing them in maps? The process of listening and reflecting on the sounds and how and with what material they are produced, changed how I think and feel about them in a substantial way. The labeling and grouping was created and adjusted prior, during, and after undertaking the study. The time it took to listen and reflect forced me to focus on the minute details of the sounds' production process. It contributed additional parameters and highlighted performance aspects through the "rating rules" that I chose. These rules are discussed below, both in terms of objects and playing methods.

### 5.4.1 The Object Timbre Map

The *Object Timbre Map* represents the 50 sounds that I compared according to the question (posed in chapter 4.5.1):

*How similar are the sounds to each other, in terms of the objects used to produce them?*

Objects, and the potentials that they offer up, are discussed in detail in chapter 3. In this chapter, I discuss and map their relational qualities in connection to each other, to gesture, and to playing methods. In this, objects are viewed as interactive agents in timbre orchestration.

Quite early on in the listening and similarity rating process, I decided to apply a set of rating rules for further differentiation. These rules were part of my approach of mapping and detailing relational qualities of objects, playing techniques, gestures, and timbre. They also make the listening and rating process more transparent for readers of this thesis, and they constitute a logical continuation of my approach to vocabulary and technique as intimate, dynamic processes between performer and instrument.

1. I differentiated between sounds in terms of *how* an object was used, even if I was comparing two objects of the same sort. In the example of a magnet vibrating on a string being compared to a magnet striking the metal frame, both sounds are produced using a magnet, yet in very different ways. They will still appear as being close to one another in the timbre space, but not as close as two sounds that are made using a magnet in the same way. The focus of this first rule lies on unfolding the potential contribution made by the materiality of the same object, rather than its mechanical, action-based use.

2. I differentiated between sounds in terms of whether I had used one single object, or whether I had used several objects in combination to produce the sound. I tried to be as consistent as possible in the measuring process, rating sounds from 0 (no similarity) to 1 (very similar), and ensuring that that sounds which were produced using the same object were rated as similar to a degree of 0.5 or above. For example, a sound produced using a bamboo skewer and a stone ball should, according to this rule, be rated as being similar to a degree of at least 0.5 in relation to a sound that was produced using a mallet and a stone ball.
3. I differentiated between objects within the same object group in order to reflect their different timbres, look, feel, and sonic use. There are many different kinds and shapes of magnets, nylon string, balls, skewers, etc., and I wanted to reflect the differences within each of these categories through the similarity rating. This meant that, for example, two sounds produced using column-shaped magnets should be rated as being more similar than two sounds that were produced using a cube-shaped magnet and a rubber-coated magnet respectively.

The application of these three rules in combination resulted in quite a complex rating system, requiring that a range of details about each sound and object be meticulously accounted for in the study. This process in turn helped me to reflect on their materiality, their *objectness*, and the nuanced way in which I perform with these objects.

Figure 8 shows the result of this process of rating sounds in terms of their object similarity in accordance with the rules set out above. Sounds produced using the same object appear closer to each other in this figure, so, in the case of a fork, whilst Fk and Fk2 are sounds that are both produced by a fork vibrating in-between strings, Fk3 is a sound that results from the same object being used differently



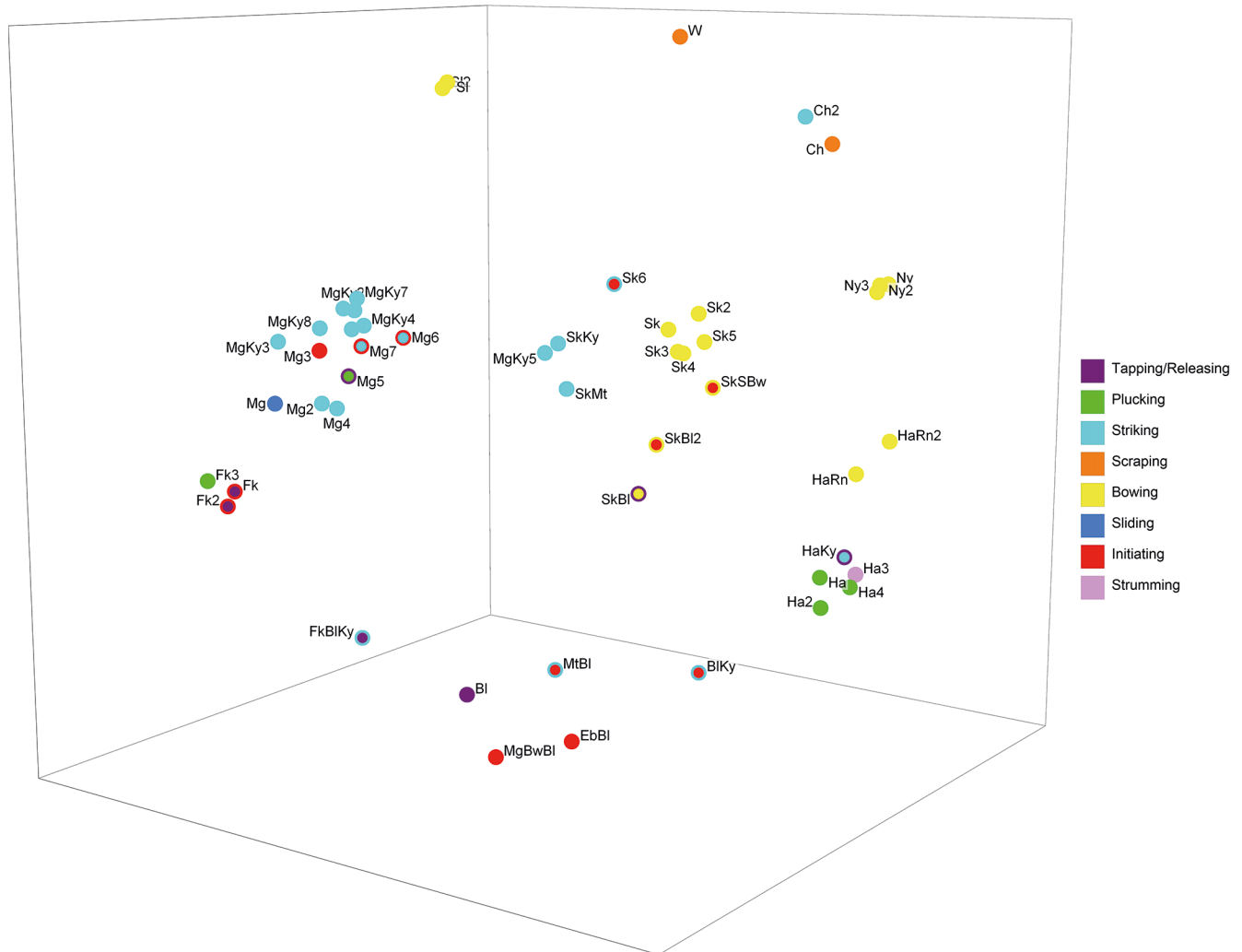


Figure 8: *The Object Timbre Map* shows the perceived (dis)similarity of sounds in terms of the objects that were used to produce them. Sounds that were produced using the same object are represented as being closer to one another in space. Sounds were also differentiated between in terms of the way in which the objects were used, which also affected the distance between sounds. The color labels the sounds according to playing methods.

(the string is plucked) and hence it is a little further away. FkBlKy uses three different objects (fork, ball, and keys), so it is represented even further away in space than Fk3 to Fk and Fk2. The same principles are visible when looking at the cluster of sounds produced by the use of skewers: Sk6 is further from the other “skewer” sounds in space because unlike the rest of the sounds in this group it is not produced through bowing. Instead, in producing sound Sk6, the skewers vibrate and hit against each other.

One interesting “mistake” can be observed in relation to MgKy5, which describes a sound made by a round magnet that is placed on a string in the low-mid register and played on the respective key. In the map, it appears to be very close to a group of sounds using skewers. I must have “confused” or perceived the sound of this magnet resonating with another sound, SkMt, which is the result of a skewer sitting in between the strings in the low register and being struck with a mallet. Comparing the sounds according to the objects used to produce them, MgKy5 should have been recognized and grouped closer to the other sounds involving magnets.

In the *mind map* that I created prior to the listening study (see chapter 3.4), I connected sounds which are produced using the same objects using a line, resulting in their placement on the screen or paper to be more or less arbitrary. This was a visual mapping, not a perceptual comparison. At times, this method resulted in objects that are connected (with lines) being placed far apart from each other, making it a bit difficult to trace the connections at first glance. In general, the *object timbre map* is much more differentiated and complex, as a result of the listening and reflection on the objects’ materiality and their musical and structural capacity as described above.

## 5.4.2 The Action Timbre Map

The *Action Timbre Map* represents the 50 sounds that I compared according to the question (posed in chapter 4.5.2):

*How similar are the sounds to each other, in terms of the playing methods used to produce them?*

The labeling or categorizing of playing methods that I describe in chapter 5.2 evolved from reflections on technique that I engaged in prior to the study. These labels were adjusted during the analysis process. “Playing method” is understood as being distinct from the gesture used to produce a sound, even though there are overlaps. The category of *striking*, for example, is used to describe the action of pressing down the keys of the piano, as the hammers are “striking” the strings. I likewise used it to describe the action of a chopstick placed between two strings of the piano and *striking* them, producing a tremolo. I group both sounds under *striking*—even though the gestures or movements used to produce these two sounds are very different to each other.

Furthermore, the perceived intention in playing method and in gesture is quite different: a playing method suggests a mindset and a driving force, which is often not visually apparent or traceable and already implies a timbral choice. This is different from the intention expressed through a gesture, which plays out in a physical, bodily way and is distinct from the timbre it produces. In performance, it is important to note, multiple intentions and mindsets often exist simultaneously.

One very common way of talking about and creating timbre focuses on *how a sound is produced* rather than *what it sounds like*, and in many musical cultures much more detailed as well as poetic ways of de-

scribing playing methods have been developed and are still in use.<sup>51</sup> This is another reason why I wanted to take the manifold aspects of playing methods into account, in acknowledgement of the important part that they play in timbre orchestration.

In the similarity rating process, I differentiated between sounds within a given group of actions using the following rules:

1. Since there are many different approaches within a given playing method—e.g., within *bowing*, one can bow longitudinally (along the string), vertically (with strings or skewers attached to strings), and horizontally (meaning moving across the strings)—sounds produced by an action that was performed in the exact same way should be rated as more “similar”.
2. I differentiated between sounds produced by means of one playing method and sounds produced through multiple playing methods used in combination. The latter is represented in the graph by using multiple colors for a single sound, which is the case for more than a quarter (13) of the 50 sounds used.
3. I likewise felt that it made a difference whether a playing method consisted of a primary action or whether it caused a secondary action of setting other objects or strings in motion. For example, whilst *bowing* a skewer might constitute a primary action, doing so with stone balls that subsequently resonated on the hitch pins brings about a secondary action. Hence, two sounds that both

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51) In “Spectral World Musics,” the proceedings of the Istanbul Spectral Music Conference in 2003, Joshua Fineberg mentions that “... in qin music they have all these descriptions or poetic terms for 15 or 20 ways of plucking the string according to the timbre you’re supposed to get. They’re things like heavenly bells, etc., but they mean something specific.” Ethnomusicologist Cornelia Fales comments that “in all the research I’ve done... all of the musicians using timbre specifically, with or without notation, talk about it in terms of what you do to get it, not in terms of the sound itself... how you pluck the string, not the sound you’re waiting for” (Murail et al. 2003, 7-8).

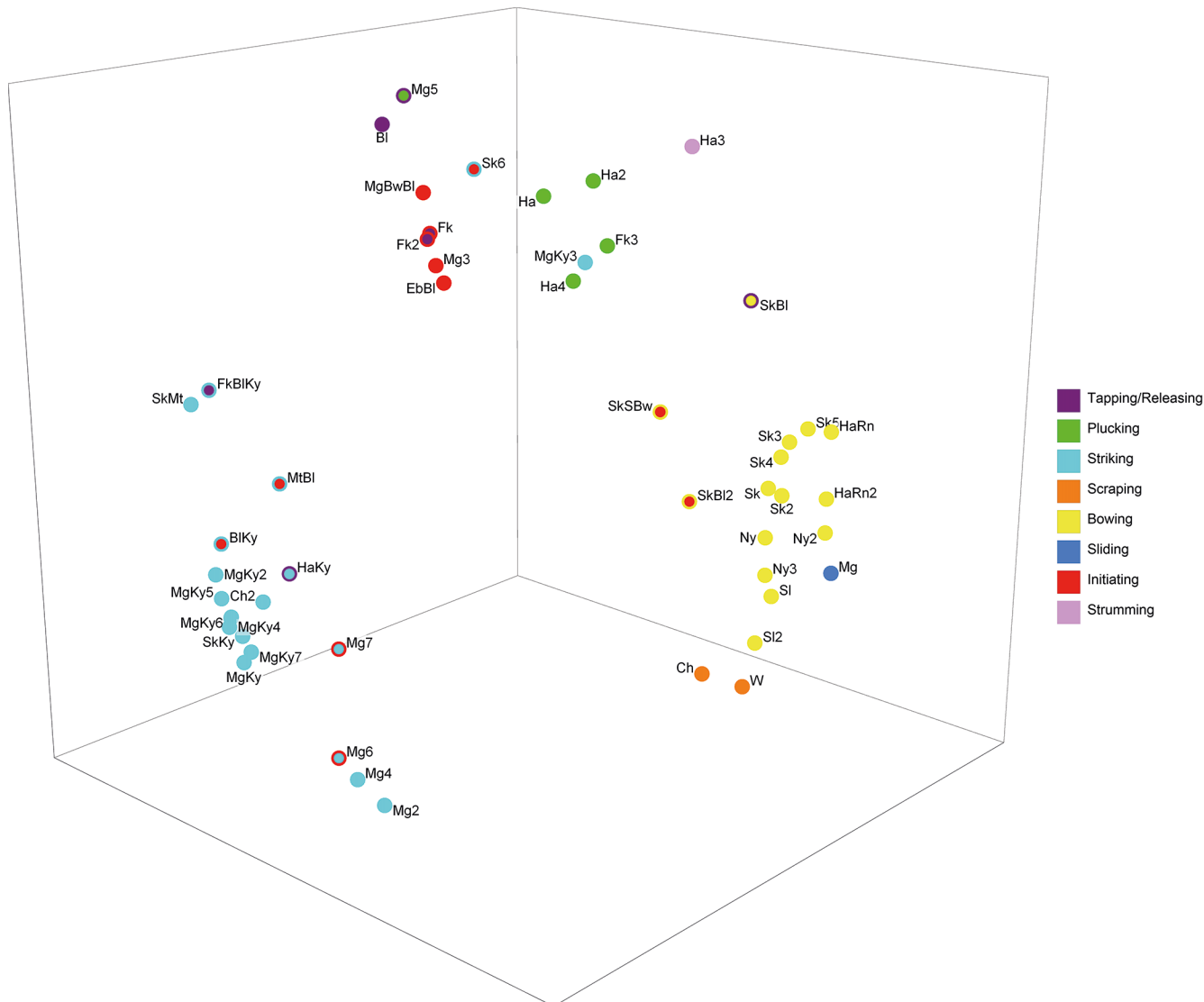


Figure 9: *The Action Timbre Map* shows the perceived (dis)similarity of sounds in terms of the playing method used to produce them. The clusters of sounds are quite consistent with the colors, as both represent the different playing methods. Sounds produced by means of multiple playing methods (represented with two colors) are further away from these groupings.

used only primary actions should be rated as being more similar than two sounds where one used primary and the other primary and secondary actions.

An obvious feature of Figure 9 is that the same colors are clustered, reflecting the clustering of the same kinds of playing methods. The most apparent clusters or groupings are the *bowing* and *striking* methods, followed by the *initiating* cluster, which involves fewer sounds. The *bowing* playing method includes sounds using nylon, skewers, rosined fingers, and slate, and these sounds are tightly grouped. Subtle differences in the proximity of sounds are, however, apparent; for instance, SkBl is represented as being relatively close to the *bowing* group, but since it involves two playing methods, *bowing* and *tapping/releasing*, it is positioned a little further away. Further, the majority of sounds belonging to the *striking* group are in fact produced in combination with the keys. The sounds that are produced through *striking* in combination with another method, like FkBlKy (*striking* and *sliding*), are further away from the *striking* cluster, and sounds like Mg2 and Mg4 (magnets striking the metal frame) are even further away. I note that Mg6 and Mg7 (two different types of magnets that are thrown on the strings) are positioned more or less in-between the *striking* and *initiating* groups, as they are the result of both of these methods. The *initiating* playing method group of sounds is heavily clustered. This group describes sounds which are set in motion (and which thus often vibrate on the strings in various ways): this group includes sounds made using EBows, forks, or magnets, but also Sk6 (skewers vibrating and striking each other), where the initiating method dominated in my perception of the sound. The position of *tapping/releasing* is interesting: sounds of this type are scattered throughout the graphic space. The reason for this is that, except for one sound (Bl, a ball rolling sideways on the strings), all other sounds include additional playing methods and are positioned closer to whichever method was perceived more dominant. Again, one “mistake” can be observed, as I perceived

MgKy3 (a magnet placed on the string and struck with the respective key) to be sound Fk3 (a fork stuck between two strings and the strings being plucked), confusing *plucking* and *striking*, which I perceived as being very close or the same.

When comparing the *Action Timbre Map* to the mind map that I drew earlier in the doctoral research (see chapter 3.4), I find many similarities. In the mind map, sounds made with the same playing method are grouped quite closely, as is mostly the case in the *Action Timbre Map* as well, and the playing methods are mostly the same ones (the mind map further includes *stroking*). However, in the *Action Timbre Map*, sounds entailing *tapping/releasing* are not grouped close together. That is because they often entail more than one playing method and I further grouped them according to which method was perceived as dominant. In the *mind map*, sounds are connected to up to four different playing methods, e.g., *strumming* a chord on the strings is connected to *scraping*, *stroking*, *strumming*, and *plucking*. Furthermore, fewer sounds (38 of the total 50), but partly different ones are represented in the mind map, not all of which are included in the 50 sounds investigated through the study. I also grouped some playing methods hierarchically in the mind map, i.e., deciding that *plucking* contains subsets of *tapping/releasing* and *strumming*, and methods involving fewer sounds were drawn at a smaller scale.

In the *Action Timbre Map*, I decided to limit the different playing methods to just eight, as too many subcategories would have made a comparison of the 50 sounds arbitrary. I think both maps still have their value. However, the *Action Timbre Map* is more precise and detailed than the previous mind map.

### 5.4.3 The Gesture Timbre Map

The *Gesture Timbre Map* represents the 50 sounds that I compared according to the question (posed in chapter 4.5.3):

*How similar are the sounds to each other, in terms of the physical gestures used to produce them?*

This map displays a much more scattered image of the sounds, as I perceived a greater variety of individual and unique gestures, with fewer clusters and groupings.

As described in chapter 4, rating the similarity of sounds in terms of gesture has to take into account detailed thought processes, perceptual parameters, and performance aspects. A complex set of rules was necessary, and these rules explain the distributed nature of the sounds in the *Gesture Timbre Map*. As such, in rating similarity between sounds, I tried to differentiate between sounds by taking into account the following parameters:

1. the velocity and pace of the performed movement
2. the direction and overall duration of the performed movement
3. whether the movement was performed with one or both hands
4. whether the pedal was additionally pressed with my foot or not
5. whether I was standing or sitting
6. how much effort, force, or weight was used to perform the sound
7. how much space the movement took up
8. where in the instrument the sound was produced—in the low, mid, or high register, which determined whether I was leaning left, right, or far into the strings or close to the tuning pins



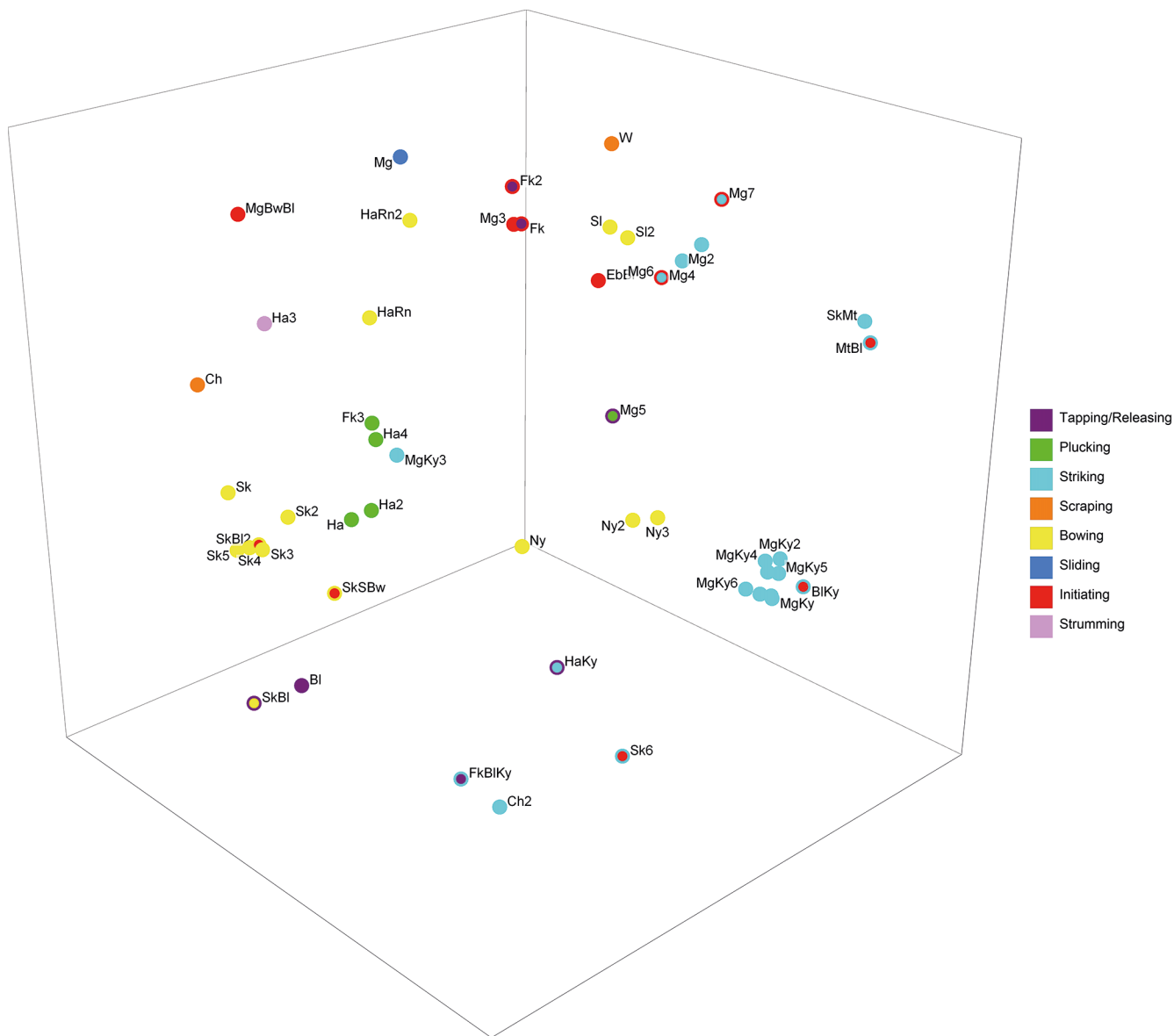


Figure 10: The **Gesture Timbre Map** shows the perceived (dis)similarity of sounds in terms of the physical gestures used to produce them. The sounds are highly scattered, pointing to a vast variety of largely independent gestures. Few groupings can be observed regarding playing methods (striking and plucking), which are represented in the color allocated to each sound.

Given how complex the rating system became when all these parameters were taken into account, I tried to be as consistent as possible. I did not calculate or measure the sounds in any way when applying these rules, but rather kept all these aspects in mind when listening and comparing.

Again, memory played a big part in this listening study, as a comparison of two sounds that also takes into account these complex qualities of movements had to be remembered and applied equally to the next sound pair. The rich, heightened awareness of gesture and movement in my performance that resulted from this particular study went beyond my expectations.

Interestingly, little clustering is evident in this map with respect to the objects used to produce the sound or the playing methods employed. The few playing method clusters which are apparent include the set of sounds produced by pressing down a key, which are of course very similar in gesture, as well as the sounds produced through *bowing* skewers. *Plucking* sounds are represented as being proximate in space, as these involve a similar movement as well as setting forks or magnets placed on/in-between strings into vibration. Furthermore, here, the same “mistake” occurs that was noted previously in the *Action Timbre Map*—the sounds Mgky3 with Fk3 were confused with one another. Clearly, pressing down a key (Mgky3) or plucking a string (Fk3) are gesturally different movements, but I did not recognize how the sounds were produced. However, I did not perceive or confuse these particular sounds in the *Object Timbre Map*, which proves how each comparison and attention to the different aspects of timbre orchestration created and facilitated different listening modes.

Interestingly, sounds which are very different in timbre are at times perceived to be very close in gesture. This applies to sound Ha3 (strumming the strings) and Ch (scraping along the bass string with a chopstick). Here, the tempo, duration, and also the physical intention behind the gestures are quite similar. Yet, the timbre of the

sounds—a chord strummed with distinct perceivable pitches versus a noisy and relatively loud sound—are very different. The same can be said for SkMt (a skewer stuck between a string and struck by a mallet) and MtBl (a mallet striking the bass strings with balls resonating on the hitch pins). These sounds were perceived as being very close in terms of gesture, as both involve a mallet striking in a downward motion. However, one results in a single, muted, low pitch (SkMt), the other in a deep rumbling sound of much longer duration, with a distorted noise accompanying it (MtBl).

Timbre and gesture are interdependent, and their relationship is complex—imagining a sound and imagining a movement seems to involve manifold, quite distinct intentions, which can complement each other or coexist as parallel notions. The study in general and the *Gesture Timbre Map* in particular also revealed how timbre orchestration can at times be an action that is dissociated from sound. This can be seen as one of the main outcomes of this study. I explore this gesture-timbre relationship in detail in relation to *Accretion* in chapter 8, where I discuss gestural approaches to instrumental performance and the use of gestures and movement as independent agents within timbre orchestration.

#### 5.4.4 The Sonic Timbre Map

The *Sonic Timbre Map* represents the 50 sounds that I compared according to the question (posed in chapter 4.5.3):

*How similar are the sounds to each other, in terms of their timbre?*

The sounds appear scattered in the spatial graph, with only a few groupings being apparent. The clusters of sounds that do exist partly contain sounds made with the same playing techniques or ob-

jects—e.g., Fk, Fk2 and Mg3 (magnets and forks vibrating on and in between strings) or Ha2, Ha4, and Fk3 (all sounds produced through plucking strings). Likewise, I perceived HaRn2 (bowing multiple strings with rosined fingers) to have a similar friction and noise to the sustained bowing sound as Sl and Sl2 (bowing the bass strings with a plate made of slate).

Another group consists of: MgKy, MgKy4, Mgky5, Mgky7 (all magnets positioned on the strings and played on the key); HaKy (tapping/releasing a bass string and playing the respective key); and SkMt (striking a skewer stuck between the strings with a mallet). Here, the playing technique is mostly the same—*striking*—but different objects are involved. Since I was comparing the timbre of the sounds, it is also interesting to observe that the sounds in this group were perceived as being similar despite having a very broad range of pitches, covering several octaves.

One cluster of sounds was also surprising to me at first: BlKy, Ha3, Mg5, SkBl2, Sk, Sk3, and Sk4. The timbre appears to have a broad frequency and dynamic range across the seven sounds. Further, this group contains different objects (balls, magnets, skewers) as well as playing techniques (striking, strumming, bowing). Yet, two of the sounds involve balls resonating and vibrating on the hitch pins (BlKy, SkBl2). They have a distorting sound effect, which I perceived as being similar to the fluctuations in pitch of the strummed chord (Ha3), as well as the magnet plucking and releasing the string and pitch bending it (Mg5). Likewise, the friction and rich timbre of the multiple and single bowed skewers seems to have a fluctuating pitch quality (Sk, Sk3, Sk4). The variety in dynamics of this grouping is the interesting part—I noticed that I perceived these sounds as being close in timbre because of the distinct quality they show in the decay phase: a resonance and fluctuation in pitch, which is quite subtle, has a noisy attribute and is dynamically soft. The attack to initiate some of these sounds (BlKy, Ha3, SkBl2) is quite present and much louder compared to the rest of the sounds in this group. Furthermore, the *intention*

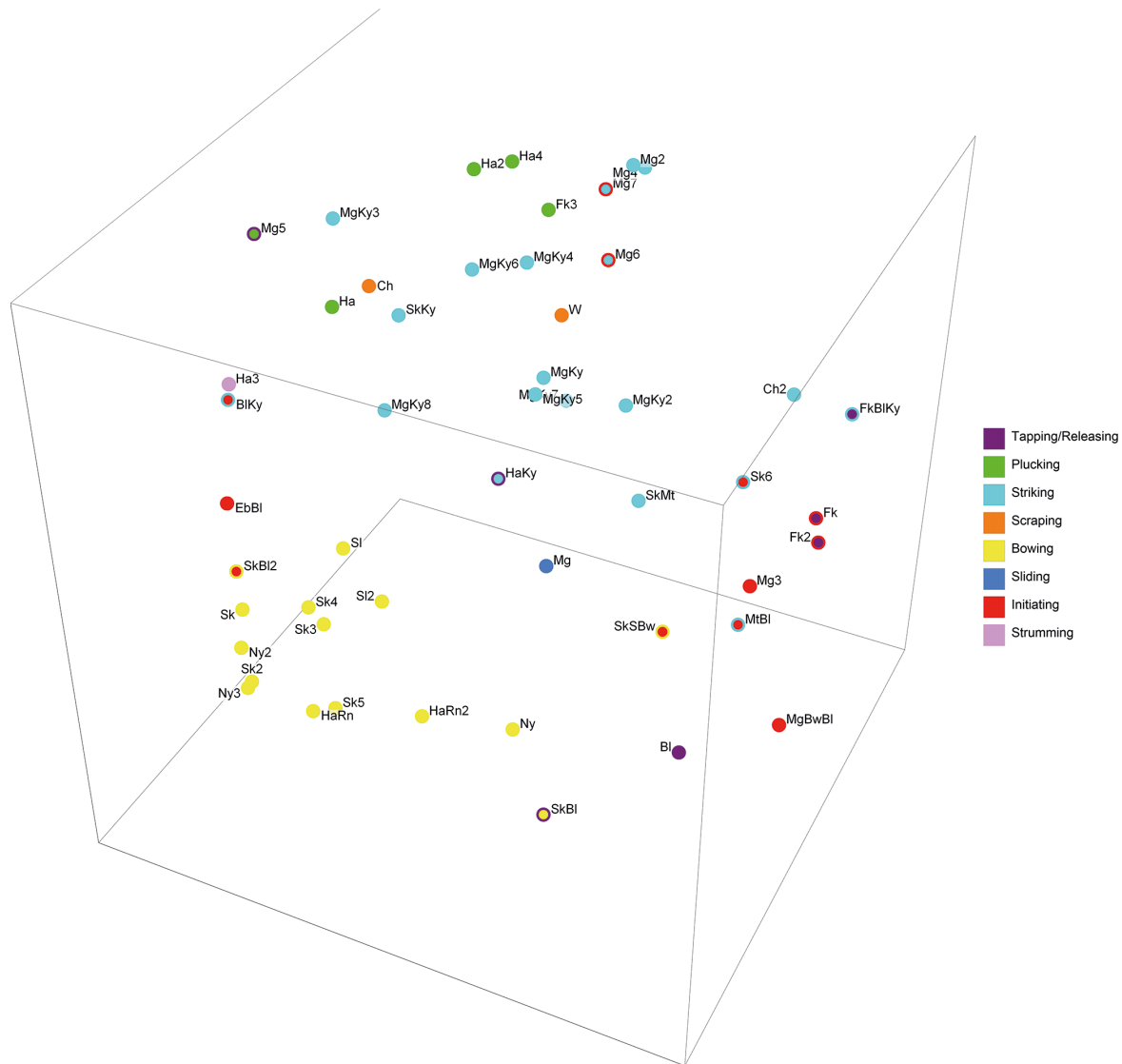


Figure 11: The **Sonic Timbre Map** shows the perceived (dis)similarity of sounds in terms their timbre. The sounds appear quite scattered and are only partly grouped according to playing methods or objects, often combining different techniques

behind performing these sounds is what groups them together and what made me perceive them as similar: the subtle and quiet sound of the balls resonating requires physical effort, so that they vibrate on the hitch pins. This results in a relatively loud and present attack of the sound. Likewise, the chord strum on the strings needs to be of a certain volume, so that the pitch fluctuation in the decay phase can be perceived. This is similar to the sound quality of Mg5, SkBl2, Sk, Sk3, and Sk4, which are physically performed in a more effortless way, but with the same intention of creating this subtle vibration and fluctuation in pitch in its decaying resonance. Here, I am sculpting the sound and its time structure directly and continuously “at my fingertips,” rather than through initiating a forceful attack to achieve a similar result, almost as a secondary action in the sound’s decay.

Whilst in the *Action Timbre Map*, I differentiated between primary and secondary actions in an attempt to take all of the aspects and details of playing methods into account, in the *Sonic Timbre Map*, this distinction does not seem to be a deciding factor in my perception of timbre, where I rely on and embrace all performance aspects in timbre orchestration. In fact, focusing my attention whilst listening on the decaying rather than the attack part of the timbre in this particular group is something I did not anticipate prior to seeing it represented in the map. At other times, for instance in relation to sounds Sk2, SK5, EbBl, and HaRn, the pitch and duration were the dominant connecting features of a cluster of sounds, even though playing techniques (bowing and initiating) and objects (skewers, EBow) varied. All sounds in this cluster are sustained and seem to have a similar pace as well as duration.

Another interesting observation in relation to this comparison of timbre is that none of the “mistakes” from the previous three comparisons show up in the Sonic Timbre Map: there is no confusion of playing techniques or objects and the sounds which were confused previously are also not perceived as being close in timbre.

The different listening modes created by each of the four comparative maps focused my attention on different aspects of timbre orchestration, and of the four, I think I approached the timbre comparison in a more intuitive listening mode, focusing less on trying to identify specific material or physical aspects.

## 5.5 Conclusion

Creating and studying the timbre maps almost half a year after the listening comparisons, and thereby revisiting listening modes and approaches and reflecting on the decisions and perceptual ratings that I had made, contributed a range of insights and new knowledge to this doctoral research into timbre orchestration. These *perceptual timbre maps* gave me an overview of all 50 sounds and of how I had rated their relation to each other; this was something that I did not remember in such detail and of course could not have reflected upon without having translated the listening comparisons into maps. Comparing them to the mind maps made prior to the study, they provide and reveal more complex and detailed timbral thinking and creation.

Many of the ideas and theoretical frameworks which I describe in the Atlas of Key Terms and Concepts at chapter 1.4 were defined and confirmed through the “Performative Timbre” study described in chapter 4 and articulated through the “Catalogue of Shapes and Motion” described in this chapter, and the time that I spent observing, analyzing, and reflecting on the *perceptual timbre maps* that I had produced.

I define timbre orchestration as the composition and attentive re-organization of the active agents present in a performance situation. The agents include the material, the space, and the body, and span from the micro-structures embedded in a single sound and the way that it transitions to the macro-structures of entire compositions in

live performance. Undertaking the study and making the maps required the meticulous dissection of my timbre vocabulary: I now understand that the mapping, comparing, and connecting of sounds both deepened and intensified my compositional thinking. Studying how and why I perceived certain sounds as similar revealed an intentionality within timbre orchestration. Intentionality effects all the stages of a sound's performance and implies a structural, forward thinking; I imagine a sound, an object, or a movement, which in itself suggests a multiplicity of transitional possibilities in music making. Intentionality is intrinsically connected to and part of timbre orchestration. All of the perceptual performance aspects and qualities that are represented in the maps (*object timbre*, *action timbre*, and *gesture timbre*) reveal this kind of intentional thinking: they are guiding factors in creating trajectories while I perform.

The act of undertaking the study made me aware, and even created, a range of complex listening modes, each with their own selective attention and focus requirements: the specificities of these listening modes can, I believe, explain the choices that I make in combining and transitioning timbres.

It is interesting to me that even though I performed, recorded, selected, and listened to the same 50 sounds a great number of times, memory, which played such a major part in the "Performative Timbre" study and the "Catalogue," remains a constant learning process and is context dependent. Memory took on various forms in the work discussed in these two chapters (chapter 4 and 5): these forms were sonic, gestural, and haptic, and together they articulated a form of *timbral memory*, which contributes to creating and understanding contexts, and in this plays a major role in structural compositional thinking.

Making the maps confirmed that timbre can in fact be defined through the objects and materials that shape it; at the same time they also



reveal the importance of the mindsets that are embedded in playing methods and the ways that movements and gestures are used as part of timbre-creating processes.

The *Action Timbre Map* diagrams a number of varied and detailed perceptions of different playing method combinations that I was not aware of prior to the study, while the *Object Timbre Map* goes deeply into the “objectness” of each material, as well as its use and how that use influences my performance with it. The *Gesture Timbre Map* shows complex and interdependent relationships between timbre and gesture, and a vast variety of unique performance gestures I was not conscious of. In making and reflecting upon this map, I have further realized that timbre orchestration involves thinking and performing in gestures, sometimes independent and apart from, or additional to, sound. The concluding *Sonic Timbre Map* combines and relates multiple performance qualities of timbre orchestration. As I point out above, I was not trying to identify one particular gestural or material aspect of sound production, but rather to listen to and perceive sounds as a sonic energy, and a combination of various qualities. At times, the groups that became apparent through the maps suggest the possibility of categorizing timbre in terms of objects, gestures, or playing methods. However, as I have discussed, the intentionality behind performing and creating one distinct sonic quality can override or combine all those qualities. What making the *Sonic Timbre Map* revealed in particular is how sound and its capacities, structure, and internal movements could be magnified through the method pursued in the study and the catalogue. The results have influenced my timbral thinking and orchestrating deeply.

Through differentiating and observing the qualities and the potential embedded in objects, playing methods, and gestures, I am able to unfold multisensory timbre experiences, which make the creation and orchestration process a richer and more engaged one. As an outcome and a general aim of the present research, I have been looking for ways to stimulate and extend a performer’s imagination, some-

thing that I believe I have located in my unfolding of the complexities involved in creating with timbre.

The mapping described in this chapter, as well as the experiments with amplification and recording in previous chapters, required the combining of processes that are intuitive and cognitive, immediate and trained, bodily and mentally grounded. The outcomes from these explorations serve as a basis for the development of my extended understanding of timbre. They have also fed back into my artistic practice, and as such the following chapters apply timbre orchestration to larger compositional structures and broaden its spatial parameters through the artistic works *Memory Pieces*, "Piano Mapping," and *Accretion*.





# Intermission I: Is It Still Magical?

## Notes on Audio Papers and Verbal Notation

This intermission offers a moment of reflection and a change in the pace of the text, for the reader. It opens the part of this thesis composed of the artistic works created during this research: *Memory Piece*, "Piano Mapping," *Accretion*, and two audio papers.

During the course of my research, I have composed and performed with two audio papers, "Transmitting a Listening" (Mayas, 2017), and "A Fuchsia-Colored Awning" (Mayas, 2019), both of which can be watched as live performances and listened to as stereo versions in the RC as *Media Examples C1-C6*.

I found the format of an audio paper inspiring and close to my own artistic practice, as my main medium is sound. Both audio works are carefully composed musical pieces, and at the same time focus on topics of my research and translate them into artistic reflections between sound and language. Rather than separating a presentation or my writing from my research and performance practice, they gave me the opportunity to create a sound-based research piece in which I could perform. The listener becomes intimately part of the actual performing and working process while it is in progress. The audio papers are both presented as multichannel pieces, in which I perform using a quadraphonic setup (this setup is discussed in chapter 2).

In the first audio paper, "Transmitting a Listening," I mix: recordings of my own voice reading text, which is taken from the article of the same name (Mayas, 2017); the voices of other artists, including John Cage, David Bowie, and Pauline Oliveros; pre-recorded sound material from various iterations of *Memory Piece* (see chapter 6); and a live piano performance. The paper provides an introduction to my relationship to the piano, the role that objects play in relation to it,

and how I use amplification and multispeaker setups to create immersive listening experiences. It engages with different philosophies and attitudes around listening, and introduces *Memory Piece* as a way to explore spatial listening and memory as compositional approaches.

“A Fuchsia-Colored Awning” (Mayas 2019) explores the qualities and function of sound, memory and materiality within the practice of musical improvisation, from the viewpoint of musicians of different generations and backgrounds. Within the dialogical nature of the piece, musicians Andrea Parkins, Tony Buck, Mazen Kerbaj, and the author discuss questions around structuring a composition in real-time and the thought processes and different systems and categories of sounds and techniques that they have developed to facilitate their own individual articulations of timbre orchestration and modes of listening. Quotes from Cecil Taylor contribute a series of reflections on improvisation as an artistic practice and a way of life.

The piece investigates the need to organize sonic experiences, providing an account of the multilayered qualities of memory, which is described as a connecting force in structuring and composing with sound as well as a reflective and transformative tool in music making. Further, the piece looks at relationships between sound and objects as material agents and the role that they play in musical thinking and creation. The pre-recorded sounds consist of various *Memory Pieces* as well as sounds taken from the sound catalogue created through the “Performative Timbre” study in chapters 4 and 5.

In this Intermission, I attempt a verbal notation of both of the audio papers. It is not an exact or complete transcription or document, nor is it a score; it is not chronological either and the reader can start almost anywhere in the text. “Is It Still Magical?” captures the audio papers, which can otherwise only be experienced in the Research Catalogue, and turns them into poetic reflections on objects, memory, timbre, and improvisation. The way it is composed on paper and within this thesis reflects the rhythms, spaces, and gestures that con-

stitute the text's sonic counterpart. It is an invitation to the reader to pause, read, listen, and enjoy.

## IS IT STILL MAGICAL?

I have an idea for sound I feel like starting with.<sup>52</sup>

I start with one thing, whatever led to that decision, I don't know.

Sometimes I have an idea that's much more than a sound—maybe it's a whole world I want to propose to begin with.

Maybe how I'm feeling at the time  
or I've just seen that instrument, it's sitting there.

Usually it's just a sound.

Or maybe I have an overarching map  
of moving from one area to another?

...and one sound follows another

Be that as it may, I start at some point  
And then one sound follows another.

Maybe one scratch is enough?

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52) If not otherwise indicated text taken from interviews made by the author with Andrea Parkins, Tony Buck, and Mazen Kerbaj, in June, 2018.



What follows that point to the next and into the next—

I really feel            is a response to listening to what I'm doing—  
from listening to each sound            after the other sound            after the other sound  
and then thinking about            how the sound I'm making            could move  
to somewhere else            and then one thing leads to another.

It's not only a sonic experience it's also an experience of thought and thought is so connected to memory.

When listening, there is a constant interplay with the perception of the moment,  
compared with remembered experience.

Listening, or the interpretation of sound waves, then, is subject to time delays.

Sometimes, what is heard is interpreted anywhere  
from milliseconds            to many years later            or never.<sup>53</sup>

I think memory is a good and bad thing for improvisers.

And then of course there are the accidents that happen,  
that you go, aha, that's great, I'm gonna do more of that

...Something I didn't anticipate...

The surprises...?

The surprises are always there.

Ideally, I'd love to be able to put myself at risk each time I improvise  
but it's not that easy.

And putting yourself at risk is not...

Yeah, it's not a guarantee of success.

Putting yourself at risk might be a very shitty concert also, of course.

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53) Talk by Pauline Oliveros (2015).

The other thing I would say is that if you feel safe in the area that you're working in,  
you're not working in the right area.

Always go a little further into the water than you feel you're capable of being in.

Go a little bit out of your depth,  
and when you don't feel that your feet are quite touching the bottom,  
you're just about in the right place to do something exciting.<sup>54</sup>

There is a real elision between the emotional  
and the intellectual, you know, what you think...  
and what you're doing... and that's the interesting thing about improvisation—  
it's all of those  
things happening at once.

It seems to me what music is... is everything that you do.<sup>55</sup>

The relationships between the gesture and the object and the sound  
are not separable.

I like this idea of listening to the sound without seeing how it's produced.

Thinking of it as like this big 'port de bras,' you know,  
almost like in dance where you are really opening the arms slowly  
and it's kind of an invitation to the room.

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54) This text comes from a recorded interview with David Bowie (2017).

55) Cecil Taylor (1981).

Marcel Duchamp for instance began thinking of music as a being not a time art but a space art... which means different sounds coming from different places and lasting producing a sculpture which is sonorous and which remains.<sup>56</sup>

So, to read or dance... you know... to converse... is all a part of the making of music.

So that, you know, when one walks down the street and one looks, and if there is a fuchsia-colored awning sticking out on the 30th floor one says, oh wow...!

To me what it is, is everything one does.<sup>57</sup>

Always remember that the reason you initially started working is that there was something inside yourself that you felt that if you could manifest it in some way you would understand more about yourself and how you coexist with the rest of society.

I think it's very useful to have sound categories

or an awareness of different ways to play that are at your disposal building blocks to construct something with.

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56) Interview with John Cage (2007).

57) Cecil Taylor (1981).

It's very difficult to define my sounds... or to give them names...  
sometimes I try to notate, I'm totally self-taught,  
so, I don't have any notation system.

It's like an organizing method in my mind  
as to how I will use what instrument  
and blend it with what other instrument  
and when and how to play it.

Sometimes when I want to notate,  
I put Rrrrrrrrr for this sound I would do with the tube, or peeeeeeeee for a very high-  
pitched sound.

I write them in letters like onomatopoeias.  
This probably comes also from my visual arts and comics practice.

So, I use samples...

one is tagadagatagadaga... one is peeeeeeeee...

and I do organize them on the computer,  
so I have something that says drones  
and something that says voices.

One is vrrrrrt. So, it's really trying to reproduce the sound that is inside.

Certainly, sounds that I imagine that groove and move through time in that way.

I would think of the sounds I make—only as sounds.

Sounds that ...to me shimmer

Peeeeeeeeee, like this almost sine-wave kind of sound.

Instruments made out of wood

Sounds that are... objects.

Instruments made out of metals...

Rrrrrrrrrrr

Instruments with stretched skins

Instruments that are struck.

All of these different types of materials produce a different quality of sound  
and a different timbre and I think of that a lot while I'm playing.  
So that, in a sense, is the materiality of what the instruments are.

I do not think 'staccato' I do not think ... these are words  
that are totally far from music for me. It's words.

Language is really important to me; I love language and I like playing with it.

The system to group these sounds is by preparation somehow.

As a way to structure your music, would you say?

As a way to think my music somehow.

Do you think, in a way, the innocence of these sounds, or let's say, your very intuitive approach  
or something, gets lost—does anything get lost when you categorize sounds like that?  
Is it still magical, in a way, when you play?

This magic gig—so not the okay gig, not the good gig—but this magic gig,  
that we all know because it happens sometimes with us—  
and you go out, and you know, and the audience knows,  
and everybody knows—it was like really something else.

Maybe you make that sound and you go, you know, I like that.  
I'll do it again.  
I will do it again.....and then you've made a pattern.

I have the feeling that sound is acting. And I love the activity of sound.<sup>58</sup>

I'm quite interested in where a musical statement  
moves from being a collection of individual statements  
into a texture?

You start to see that there is a bit of sense that's made, there is a kind of syntax that is implied.

Where does melody become a texture?  
Where does a series of percussive hits become a texture?

Maybe it's about the pattern being interesting  
or maybe it's about contrast or a continuation or a limit or an expansion  
making those decisions in real time that's improvisation—that's composing in real time.

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58) John Cage (2007).

So, I don't think having categories of ways of playing or instruments  
that I have at my disposal takes away from any sense of magic  
that I might have before or after having thought about them,  
how I'm going to use them or what they represent to me.

You cannot train to do it—it's really magical.  
Somehow, and as I said unfortunately or fortunately,  
we can't do it all the time.

You see all of art as a potential harvesting area

and you busy yourself about getting as much of it as you can

and using it whenever the situation allows you to do so.<sup>59</sup>

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59) Cecil Taylor (1981).









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## Chapter 6: Memory Piece

### 6.1 Space Performed; Space Remembered

*Memory Piece* is a series of compositions for amplified piano and four-channel playback. Through this work, I engage with timbral memory by superimposing recorded and live performances, and also discuss the changed relationship to space and timbre within my performance. The composing process translates musical and physical gestures into movements between speakers and in space, while the performing with layers of time, space, and material enhances and amplifies the act of listening itself. *Memory Piece* has a key role in this thesis, as it involved many of the complexities connected to playing, including changing spatial arrangements, recordings, composition and improvisation, and listening, as well as addressing the role of memory in performance.

As a result of experimenting with multispeaker settings in a variety of different locations—in Berlin (at *the venues ausland*, *Vivaldi Saal*, my living room), Gothenburg, and Los Angeles, (during a residency at Villa Aurora)—and documenting the process, I ended up with lots of recordings. Going through and listening to these recordings, I wondered if I could use them somehow additionally to aurally analyze my playing in different circumstances and spaces. Could I analyze, or rather observe, my performance from inside another performance? I thought of these recordings of improvised piano pieces as “sonic diaries,” playbacks which I could listen to and simultaneously perform with in a given setup. This led to the idea of *Memory Piece*. In such a work, I use segments of these recordings and reorganize them into a sparse composition of past sound events and spaces. This composition is then used as a playback to improvise with in a new multispeaker piano performance. The speakers project the sound of the

live amplified piano as well as the pre-recorded sounds. The playback is regarded as a memory of space, sound, and gesture: it is a *timbral memory* of a specific experience. Here, memory is used generatively, to produce new ideas and material, both in the composition of the playback and the live performance.

The title bears reference to Alvin Lucier's *Memory Space* (Lucier, 1970),<sup>60</sup> In Lucier's score, players may use different devices to memorize the sound situations of outside environments, e.g., written notations or tape recordings. Later, they are asked to interpret and perform those sound situations in an inside space, but without audibly mixing recorded with recreated sounds.

In contrast to Lucier's piece, I prefer to superimpose recorded and live performance and to make audible the process of interacting with a similar situation—an amplified and virtually enlarged piano in a room, a “piano map” as described in chapter 2—in a different environment. Likewise, *Memory Piece* is not so much about my perception and memory of a particular space at a given time, but what *performing* within that space sounds like, and how it aligns and interacts with present performances.

This working method per se is not new and artists and musicians have employed similar ideas and approaches to overlapping recorded and live performances. Composer, violinist, and researcher Aleks Kolkowski, for example, explores early recording and reproduction techniques such as the wax cylinder phonograph in his project “Pho-

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60) “*Memory Space*, for any number of singers and players of acoustic instruments.

Go to outside environments (urban, rural, hostile, benign) and record by any means (memory, written notations, tape recordings) the sound situations of those environments. Returning to an inside performance space any time later, re-create, solely by means of your voices and instruments and with the aid of your memory devices (with additions, deletions, improvisation, interpretation) those outside sound situations. When using tape recorders as memory devices, wear headphones to avoid an audible mix of the recorded sounds with the re-created ones” (Lucier & Douglas, 1980).



nographies,” which he began in 2002 (Phonographies 2019). As part of this project, various musicians recorded a live performance with the phonograph and later on, in a second set of the concert, performed with that recording, through a “mechanical-acoustic process that uses styli, diaphragms, and horns to both record and reproduce sound” (Kolkowski 2010, n.p.). Kolkowski describes the result as: “a recorded impression rather than a virtual copy, and an impression of something seemingly produced over a century ago, such is the instantaneous transformation of these contemporary recordings into illusionary historical artefacts” (ibid).

The “Phonographies” are a study into the qualities and possibilities of this first stable recording and reproduction medium of acoustically inscribing sound, and the recordings are “a listening experience closer to faded memory” (ibid). Archiving material sound objects and playing with the “fragility and faintness” that the recordings offer, together with and in contrast to live acoustic performance, constitute the main interests in this project.

In a different approach to working with pre-recorded and live performances, musicians Biliana Voutchkova and Michael Thieke investigate pre-structured and improvised material in their project “Blurred Music” (Voutchkova and Thieke 2018). Here, recordings of the duo played through speakers are almost identically duplicated in live performance, while most parts of the performance are still improvised with their acoustic instruments. Their work is described in the following terms:

Virtually identical fragments of the live performance synchronize simultaneously with the playback, unavoidably giving rise to blur in the temporal dimension, in the rhythmic, timbral, and motivic variations, and in the microtonal interpretation of individual pitches. (elsewhere music 2018)

While the playback is not continuous, it is also at a level just below the live and acoustic performance of clarinet and violin, at times hardly noticeable, so that the blurring of recorded and live performance is perceived rather like an expansion of acoustic space.

In contrast to both projects described above, in *Memory Piece*, I focus on the overlapping of two (or more) similar situations: an amplified piano in a multispeaker setup, which is projected into different spaces. I attempt to level the volume of the live amplified piano as close as possible to the volume of the playback, hence playing with the audience's perception of past and present sounds as well as my own.

Through this work, I expose myself to the changes in my own playing: I hear myself responding to a piano map from another room and situation, projected into the present space. I respond to it, while simultaneously playing with a new piano map, adding manifold sonic and perceptual layers, superimposing piano maps and memories, juxtaposing them, interacting with them. The use of pre-recorded sound inherently alters the way we listen. Whilst I play, I notice how closely the sounds overlap; sometimes I cannot tell whether it is the playback or the sound from my own live playing coming through the speakers. The sound of a string being plucked could be pre-recorded or live or both at the same time. I recognize and remember gestures and articulation and notice that at first I tend to intuitively play at a similar pace or with a similar rhythm, either as a response or simultaneously.

In order to exist and unfold and be perceived, every sound and every musical layer occupies its own time; our perception of the sound changes when it is repeated, either live or through a recording, and remembered. With the structural use of timbre and silence, I have sought to reorganize and overlap these different layers of time and space, and to moderate between immediacy and distance, present and past. Repetition of material, as well as endured silences, are ways to create a mindset that encourages listening in a detailed way. This connects to the way that memory and repetition are used in the

“Performative Timbre” project, which I discuss at chapter 4.6, where transitional and structural qualities of sounds are amplified through endured repetition, which creates a fluid sense of time, a timelessness.

A recording is of course much more than a reproduction of a concert situation and represents a reality of its own: from “the record as a copy of the concert” to “the concert as a copy of the record” (Van Eck 2017, 43). This is something that I quite literally enjoyed playing with in this work, where the realities of live and recorded performances blur. Denis Smalley also talks about “the interdependence of the composed space (the space as composed on to recorded media), and the listening space (the space in which the composed space is heard)” (Smalley 1997, 122). Hence, the same recording or playback will always differ depending on the listening space it is perceived in.

The way that I record a performance changes with the occasion. Sometimes I wear binaural microphones<sup>61</sup> in my ears while I perform, in order to have a very personal and almost autobiographical impression of the performance. Alternatively, I might ask someone else to wear binaural microphones and slowly walk around in the space during the performance, to experience differing proximity to the speakers and to capture different spatial perspectives.

The recording and listening that occurred in the production of *Memory Piece* required an approach to a subjective and intimate capture and translation of a listening, something which I used in the recordings and playback, and which I understand in retrospect to constitute a compositional approach. When working on subsequent versions of *Memory Piece*, I have used recordings of the same microphones used for amplification, or work with quadraphonic microphones set up in the middle of the room. Often, I have used a combination of multiple recording documents of the same performance in the compo-

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61) Namely, Soundman OKM II headphones.

sition of the playback. I have then composed with multiple versions of the same sound, recorded with different microphones, and varied between these different levels of presence, from a spacious, roomy, and ambient sonic experience to a very close, dry, and direct setting. I appreciate the different perspectives that the various recording techniques provide, because they also reflect the practicalities of different performance situations. The recording turns from a documentation into an interpretation of space and events, an autobiographical reportage.

In the process of composing and improvising with different instances of *Memory Piece*, I have also noticed that my sonic memory of a space is often a static one—almost just an impression, or an idea of what a space sounded like, what I liked or disliked about performing in it. For me, it has not been a dynamic memory of an event in time. The compositional process of working with the playback helps me to remember, interact and observe the memory of a space and my performance within it in a more immediate and creative way.

The spatial simultaneity of multiple recordings and live amplification, often featuring similar material, gives me the chance to consciously listen to space. In addition to its function as an enhancement of sounds, it is therefore also a separate, highly dynamic spatial experience, which I explore as part of a situated act of improvising, composing, and performing.

Space is further transformed in our memory of it, and in the attempt to document it. The recording process artificially adds space and “colors” sounds through the devices that are used; the microphones, the preamps in the sound card, the computer, the software, and artificial space are all added in the mixing and mastering process, the loudspeakers and their specific resonances and the final listening space itself all translate, change, and influence the way we perceive sound and space.

Recording technology also splits musical space temporarily, spatially, socially, and artistically (Blessner & Salter 2009, 133). A recording is

never an “authentic” representation of space, but it can serve as reference to a source, a moment, or another place; it can evoke the experience in a listener “of being in places other than the place where the music is performed” (Macedo 2015, 246). Especially when recording space with a range of devices that are located at different proximities to the sound source, I try to capture specific sonic situations, which are authentic to the circumstances at the time, even if they are only one perspective of many.

## 6.2 Listening Modes and Memory as Improvisational Methods

*Memory Piece* became a research method, initiated through an attempt to document, track, and transform (past) performances. It forms an integral part of my research in that through it I investigate listening and memory in improvisational processes as part of timbre orchestration, the overall aim of the doctoral research (see chapter 1). Similar to the processes described in relation to the *Performative Timbre* study, the composing and performing process connected to *Memory piece* created different listening modes. While chapter 4 discusses modes of listening in relation to object, gesture, playing method, and timbre in detail, *Memory Piece* created a multilayered listening process that focused on spatial and temporal aspects, and used the possibilities that recording, amplification, and spatialization facilitate. In this project, I experienced space through performing in and with it, as well as through adapting my listening to different modes, to focus on past and present, amplified and acoustic sound events. The recording and playback used in the piece turns into more than a document of a process—it becomes a memory of a space and my performance within it, encouraging and mediating listening and the

comparison of perceptions of “the same work” under different listening conditions and contexts.

Listening to the subtle differences, which the overlapping of many recorded and amplified versions of the same sound provide, not only enabled a timbral and spatial exploration but also let me dive into the act of listening itself. In his critical history of listening, Peter Szendy writes about this responsibility or awareness of the listener, emphasizing how listening cannot happen without the desire of *others to listen to the (specific) way we listen* (Szendy in Nancy 2008, 142). He suggests that the wish to share the uniqueness of that experience is part of the act itself. “Listening to oneself listening” might be difficult to realize, let alone articulate, but I feel the urge and responsibility to try it, as part of a reflective performing practice, which is one of the motivations behind *Memory Piece* (ibid.). David Borgo likewise talks about active and engaged listening as part of free improvised music in *Sync or Swarm, Improvising Music in a Complex Age* and points to the “acknowledgement that the infinite variety of sound around us requires a human and social space for interaction and selection... It is in listening that music is created, and listening is never free of memory” (Borgo 2005, 88). Listening itself also implies a deeply social act of giving attention to one another, of sharing a moment together, and in a performance situation involving improvisation, both performer and audience engage with an unknown outcome, balancing expectations and memories. Bill Viola speaks about memory as “the residing place of life experience, the collection that reveals and/or fabricates order and meaning” (Butcher and Melrose 2005, 73). As much as memory can structure our experience and perception of music, it can also create too much awareness or consciousness about decisions in improvisation, and hinder the performer from going into unknown areas, taking risks, and being surprised, which is a beautiful and crucial part of improvisation in order to create new experiences and truly react to the moment. The “fabrication” that Viola speaks about also points to the many ways that sound is interpreted, remembered, and respond-

ed to, at times causing “misunderstandings” between performers, where sound events will be remembered differently or not at all, spinning a myriad of possible decisions and narratives. At times, possible responses to sounds during a performance are also “stored” in the performer’s memory until the right moment presents itself to place them—and as the music progresses, this can sometimes weigh down the ability to react spontaneously to ever-changing circumstances. Likewise, a certain openness is required from both performer and listener, to be able to perceive and accept new sound experiences—never free of memory, but perhaps aware of the role that memory plays and the weight that it takes on in our aesthetic judgement.

### 6.3 Performances and Variations

There are many different versions of *Memory Piece*, and the recordings and playback material are still constantly evolving; consequently, I am confronted with new sound environments and my performance within them. I try and record my performances of *Memory Piece* whenever possible and turn those recordings into a new playback and piece. I am then presented with even more layers of time and material. In all the pieces and their variations, I extract and compose with short musical gestures and articulations using parts of recordings of past performances, and combine and reassemble these fragments in order to position them in the new context of the playback piece. I choose short sound events and textures as a way to make enough space for live improvisation, which enters into dialogue with the composed playback. As mentioned before, I also play with different recorded versions of the same sound, as shadows or hues of timbre I explore in *Memory Piece*.

So far, I have performed different versions of the piece in Zürich, Gothenburg, Los Angeles, Saratoga, Stockholm, Melbourne, and Ber-

lin. I have performed solo in Lilla salen (here referred to as “the 29.4 speaker dome”) at Kungliga Musikhögskolan Stockholm (KMH), adapted the composition and work process to the duo ensemble Spill (Tony Buck on drums/percussion and Magda Mayas on piano/clavinet) and composed a version for clavinet and four speakers. Audio or video recordings of these performances can be accessed as *Media Examples B1-B9* in the RC.

### The Speaker Dome

The speaker dome at KMH, with its 29.4 speakers naturally facilitated a more enhanced and complete immersion and diffusion of sound, in a very controlled way.<sup>62</sup> Since the audience and I were literally surrounded by the dense speaker setup from almost all directions, yet very close to the acoustic sound source placed directly in the middle of the dome, the blend of live and playback sound was almost seamless. However, here, just as in many other listening circumstances where I commonly deal with 4-8 speakers, I do not consider any particular position in the space to be the “sweet spot.”<sup>63</sup> I certainly do not feel that I am in an “ideal” position being in the middle of the room and immersed inside the piano with my head—i.e., I cannot always experience a blend of amplified and acoustic sound, unless I move away from the instrument a little, initiate a sound and lean backwards and into the room. Every listening and every spatial position are exposed to constant change as sound moves, and this facilitates and affords details that no other listening spot will provide in that moment. Whilst the physical closeness to the instrument and the timbres that I am sculpting is of course necessary and provides a very intimate acoustic

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62) 29 speakers are arranged in the room, hanging in a sound dome, with four additional floor speakers.

63) A so-called “sweet spot” refers to a focal point between two or more speakers, where all wave fronts of a sound arrive simultaneously. It is also more loosely referred to an ideal listening position in an acoustic space.



listening experience for other purposes (e.g., observing movement from speaker to speaker or acoustic/amplified blend as described above), it is not ideal. I feel that thinking of “sweet spots” in a space is to a certain extent already prescribing how one should listen, which can be preemptive and limiting, particularly in the context of improvised music. Furthermore, the advantage/disadvantage of a listening position is also highly dependent on the kind of music that is being performed and listened to in the space, as well as the specific preferences and habits of each listener, which poses different requirements and listening modes. Of course, in the performance of *Memory Piece* there are obvious spatial positions which will give a very limited experience of the music—e.g., standing/sitting in very close proximity to just one speaker—which I try to avoid through chair positioning, etc., in the setup. I have also at times encouraged the audience to move around the space quietly during the performance, to perceive and listen in a variety of ways. Despite the fact that the speaker dome provided an immersive listening experience, which in itself I felt was ideal for the purpose of the piece, there was not one listening spot that was preferable to another. I discuss ideas around listening positions and “sweet spots” further in chapter 7.3.

### **Spill: Stereo**

Spill is the duo of Tony Buck, drums and percussion, and Magda Mayas, piano and clavinet, founded in 2003. While I have worked with different *Memory Pieces* since early 2016, we decided to try and adapt this idea to our duo. While on an artists’ residency at Villa Aurora in Los Angeles, USA, we composed a multichannel playback made out of past performances and played live with it, the drums and piano again in the middle of the room, with four speakers in each corner of the room. We then performed a second version at Gothenburg University in October 2016, additionally using Tony’s custom-made acoustic mechanical drum machines, which circulate at different speeds and

in directions, scraping along and hitting various other percussion objects lying on the floor while they turn. Positioned in different spots of the performance space, they added to the acoustic spatialization and turned the concert into a live installation piece, which we interacted with and performed within.

We decided to use this *Memory Piece* playback later on in 2017 and recorded a live version with it in the studio. This recording turned into the piece “Magnetic Island” on the LP *Stereo*, which was released in November 2018 on Corvo Records Berlin. The result creates a music with a sense of space and depth and an internal logic, as sounds move from the fore to the background, sweeping across the stereo image in a teeming world of action and reaction, interwoven timbres and fluid resonance. The transformation of a multichannel environment, by means of another layer of acoustic and amplified instruments that interacts within it, in a stereo LP medium, required imagining, thinking and creating a different, separate work. It is not simply a fold-down of multichannel to stereo, nor is it a document of a performance or installation. We used the tools available to us and which the medium provided in order to capture the complex movements and multidimensional experience of space, to imagine and generate something else with it. Practically, it probably comes down to playing with reverb, volume, spatial panning, and positioning in the mixing process, however the thought process was one of further developing the ideas that a live playing situation provided, in the virtual space of a recording, which was then to be recreated and reproduced in yet another listening space. Each step of this work process created a separate work and required a separate imagining of and listening to sound, which I found incredibly stimulating and productive, and which will also feed back into future performances.

## Memory Piece C—For Clavinet

The Hohner clavinet/pianet is a vintage electroacoustic keyboard with strings, metal chimes, and pickups. I composed this iteration of *Memory Piece* for the “Labor Sonor” concert series in Berlin in May 2018. It was performed with a slightly different speaker setup, since the instrument has only very soft acoustic sound properties it was amplified through a guitar amp positioned behind me. So, the mix of playback and live sound was not as seamless as in the other versions of *Memory Piece*, where the piano was amplified through the same speakers as the playback. The four speakers were set up in a big semi-circle around the clavinet, providing more of a rather broad stereo image than a surround-sound approach. The reason for this was the size and layout of the relatively small room, and because of the way the clavinet needed to be amplified.

I found working with the playback posed a different challenge in terms of spatialization and blending of timbres; the different sound projection systems evoked a very intriguing play with the similarities and differences and subtle changes. The material for the recording/playback consisted of a previous clavinet performance that was amplified through a guitar amp in a rather large hall, which was projected through four speakers into the tiny theatre space. Simultaneously, the live clavinet was projected through another guitar amp. The spatial composition of the piece became much more a question of adjusting instrument and speaker volume levels, as the audience experienced sounds as being further away or closer to them, rather than surrounding them. Another part of the composition consisted of orchestrating in my live performance the same subtly changing timbral qualities of the sound material used in the playback, which then likewise created the impression of spatial movement.

Rather than focusing on directionality and the immersion of sound, or on acoustic and amplified blending, as in the piano version of *Memory Piece*, the clavinet version engaged much more with similar sound material, which morphed and shifted and was at times duplicated and

at times absent, in order to enhance the varying timbral qualities that are inherent to speakers and amplifier.

## 6.4 Composing with Timbral Memory

The process of imagining and composing a multichannel piece for me means imagining sounds and their movement in space as a structural part of the composition. Pauline Oliveros describes this imagining process as her appropriation of the term *auralizing*: “mentally modeling sound by remembering or by creating sound” (Oliveros 2011, 163).<sup>64</sup> I work with spatial composition intuitively, taking into consideration my live interaction with the playback, my position in the performance space, as well as giving sounds enough time to unfold and move from speaker to speaker at a similar pace to that of a corresponding movement performed on the piano. I think the way that I compose spatially is in fact quite connected to how I use my body in performance; the loudspeakers, just like the piano, function as an extension of my body. This connects to the gestural aspect of timbre orchestration that I explored in the “Performative Timbre” project, where movement was identified as an interactive agent in composing with timbre. Here, I apply it to bigger compositional structures and add a spatial component to timbre orchestration.

*Memory Piece* represents an attempt to bring to the surface an inherently internal process of improvising, one of continuously *remembering and listening* to what has just been played and creating a response to it. This is a matter of engaging with the act of listening—to the tiniest timbral details and changes in the different recording techniques, speakers, and the projection in space that they provide,

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64) “Auralization” also refers to a technique used within room acoustics and architectural design to record, simulate, model, and represent specific spatial-acoustic conditions (see Kleiner et al. 1993).

as well as in how they blend with live acoustic sound. This performing with layers of time, space, and material enhances and amplifies the listening itself—both my own and that of the audience.

Don Ihde talks about the “timefulness” of sound (Ihde 1976, 82) and the idea that *sound reveals time* (ibid, 102). The act of revealing time becomes a complex and intensive process when past and present events, as well as composed and improvised sound, are interwoven with one another as in the performances described above. This experiencing of time through sound, however, is not a closed or finite process which ends when the performance is over. Experiences and memories are rather built and stored and are in a state of continuous transition. The performance thus becomes an act of sharing and creating sound, but also sound memory. This again connects to the “Performative Timbre” study, where, in continuously remembering the 50 sounds in new contexts, sound memory was experienced as a learning process. In this work, *timbral memory* resonates and is integrated into the performance and composition process.

This process of working with multichannel compositions further emphasized the importance of spatializing sounds that were performed live and evoked a desire for a more refined and controlled spatial response and vocabulary when I perform. I wanted to integrate the spatial parameters into the improvisational processes within my performance, and find a way to extend my engagement with microphones and speakers (something I describe in chapter 2), thereby making space an equal compositional component and part of a timbral orchestration. This eventually led to my collaboration with Sukanadar Kartadinata, with whom I developed a custom-built spatialization tool, which I have mentioned earlier and discuss in detail in chapter 7.



## Chapter 7: Piano Mapping

### 7.1 Interactions with Instruments and Space

“Piano Mapping” is an approach to spatial composition in my performance, by means of a mapping and unfolding of space and sound relationships and a *choreographing of timbre* in space. In the context of this approach, by spatial composition I am referring to an act of organizing, directing, and moving sound in space through an active engagement with speakers and microphones, which I view as additional instruments, during a performance. In this, I use a custom-built spatialization device, which allows me to decide where a sound happens and when and how, during this event, I can shape its timbral qualities.

“Piano Mapping” becomes another combined object-action performance approach to explore the complexities of situated timbre. The project constitutes an important part of the research in the complex listening modes that I was able to create in using it, as well as the way in which it encourages listening through a multiplicity of spatial perspectives and modes as opposed to defining “sweet spots” in space.

I have discussed the way I work with sound spatialization in chapters 2 and 6, where I refer to amplification and the positioning of loudspeakers and microphones in space. Through specific microphone-speaker configurations—what I term *piano maps*—the piano is magnified, projected, and mapped in space. The idea to virtually extend the piano in a multispeaker setup came from a wish to immerse the audience as equal listeners and participants inside the piano. I had previously engaged with fixed, multichannel compositions and the movement of sounds between loudspeakers in work on *Memory Piece* and the audio papers. That led to a desire for more refined spatial composition possibilities and an interest in integrating the concept of *piano maps* into improvisational processes: to emphasize the active and multiple

nature of *mapping* the piano in space, in a way that moves, transforms and even “warps” space while I perform, thereby engaging with the spatial aspects of timbre creation.

Working and interacting with loudspeakers and microphones has a long history and such work comprises a vast topic within artistic practice. Providing an overview of that history would exceed the scope and purpose of this research. *Between Air and Electricity: Microphones and Loudspeakers as Musical Instruments* by Cathy van Eck gives an introduction to and historical overview of the topic and milestone electronic and electroacoustic works, which extends right up to those produced by today's practitioners (van Eck 2017). Van Eck uses the theoretical approach of “movement, material, and space” (ibid., 83) in addressing interactions with loudspeakers and microphones, where loudspeakers and microphones become “audible as sound-producing objects by either moving them, attaching objects to their diaphragm, or positioning them in space” (ibid., 146). In contrast, in my practice and this research, I explore relationships with similar elements, however, I apply a different emphasis: I use the concept of movement/body, material, and space in relation to *an extended understanding of timbre* in instrumental performance, rather than in relation to amplification/diffusion technology. In the “Piano Mapping” project, I specifically explore practices relating to *the spatial composition and choreographing* of timbre through an interaction with loudspeakers and microphones.

It can be useful to highlight the several examples of artists' work by way of introduction to the project. Here, I am specifically interested in artists who use amplification with acoustic instruments and spatialization as a way to disperse, diffuse, and direct sound, in ways which change instrumental playing techniques and lead to various direct interactions with space as an additional compositional element. As such, below I provide a short overview of the work of Anthea Caddy



and Judith Hamann, and Liz Allbee and Reinhold Friedl in separate collaborations with Sukandar Kartadinata.

Trumpet player, music instrument builder, and improviser Liz Allbee extended her instrument into a *quadraphonic trumpet* in collaboration with Sukandar Kartadinata.<sup>65</sup> Through this extension, a total of 4 bells with attached microphones were connected to the valves of the trumpet, routed to 4 different speakers. This makes it possible for Allbee to shift the speaker assignment as well as the crossfade time using a control box and the valves themselves. She describes this as a reconfiguring of “the routing, signal flow, architectural, sonic, and creative possibilities of the instrument” and a move by which the performer and instrument become an “electro-acoustic spatialized hybrid creature machine.”<sup>66</sup> This integration of sound spatialization techniques into the instrument itself, the redesigning of an acoustic instrument to create and control sound in space, is compelling, especially since the trumpet is a very directional sound distributor and the extension into the quadraphonic trumpet is indeed multiplying sonic and spatial compositional possibilities.

The piano is of course not a directional sound distributor and Allbee’s approach differs from mine. Rather than redesigning and adding to the acoustic capacities of the instrument, I enlarge the instrument through its amplification into an immersive listening space, thereby placing the audience inside the piano and reconfiguring possible performance components while I perform.

Adopting a different approach, Australian cellists Anthea Caddy and Judith Hamann systematically explore ways of amplifying their acoustic instruments by means of microphones and pickups. In *Cello II*, they experimented with the positioning of loudspeakers as well

65) **Sukandar Kartadinata** (re)constructs instruments and develops custom solutions for musicians between virtual and physical domains (<http://www.glui.de/wp/>).

66) **Liz Allbee** is a trumpet player, music instrument builder, and improviser (<http://lizallbee.net/quadraphonic-trumpet/>).

as their instruments in space; and they are now working exclusively with multiple subwoofers, focusing on minute changes of frequencies, overtones, and sub and difference tones. Hamann describes the work in the following terms:

While the material is generated by two cellos, the result is a kind of meta-instrument, where the two instruments combine into one sound field through amplification. This also intentionally covers, masks, the sound of the cellos themselves; their acoustic directionality is blanketed by the amplitude and thickness of the single send to four speakers (Hamann 2018, 61).

Here, amplification functions as a tool to source sonic material and structure it into a durational spatial sound experience, mostly performed in complete darkness and focusing on the interaction between the acoustic instruments, their amplification, and space. "It is meant to be a listening piece," the musicians note, "rather than focusing on the gesture specific to the cello" (Musica Electronica 2018).

This differs somewhat from my own working method and approach to spatial composition as an extension of instrumental gesture. Van Eck speaks about the changed relationships between the musician's body, the gesture, and the resulting sound through the use of loudspeakers and microphones as part of new compositional strategies (van Eck 2017, 59). The possibility to make small musical and physical gestures audible, as well as to extend a gesture performed inside the piano and translate it to a gestural movement between speakers in space, is something that I actively use in the "Piano Mapping" approach.

The *Neo Bechstein Project*, the product of a collaboration between pianist Reinhold Friedl and Sukandar Kartadinata, employs a different spatial compositional approach. The Neo-Bechstein is an electric grand piano built in the late 1920s. The piano doesn't have a

soundboard and as a result its acoustic output is very soft, and it also features 18 humbucker pickups, each covering five strings. The instrument's original mono-wiring was transformed, for this project, into an 18-channel setup so that each pickup could be amplified and processed separately through a "dynamic spatialization system with an array of loudspeakers to emphasize the transparency gained from the re-wiring" (Kartadinata 2018).

Interestingly, the live spatialization is controlled by Kartadinata and not by the pianist, separating the task of the instrumental performance from its sonic composition in space and resulting in an artistic collaboration process. On the one hand, this facilitates a more elaborate and perhaps detailed way of working with spatialization, but on the other hand the act of separating these tasks requires a translating of musical information into spatially corresponding distribution and movements, and vice versa, in a manner that is complementing, contrasting, or in parallel, and this in turn influences and changes the performing and listening experience for both artists, as well as the listening experience of the audience.

In contrast, in my research, I am particularly interested in how I can interact with space as an instrumental performer and how this changes my timbral and gestural response and my relationship to instrument and objects. In this, I seek to relate timbral performance to space, movement, and material, as part of the development of an extended understanding of timbre. Outsourcing the task of spatial composition would inhibit my embodied experience and insights gained from this direct interaction, as well as hinder the further development and extension of my practice.

## 7.2 The Thinking and Building of a New Instrument

As mentioned in chapter 1, the impulse to engage with spatio-sonic movement in my practice probably emerged from the nature of the grand piano itself: it is a massive, static, and immobile instrument, which usually remains in one fixed position. Having begun to interact with microphones and speakers (as described above), I wanted to expand my performance through improvising with piano maps, which would allow me to decide where a sound comes from and when, and to use this as a compositional element, a score, perhaps, or “a means of delineating musical structure” (Smalley 1997, 122). Apart from mapping the piano, choosing between different maps and moving them live in space, I also wanted to be able to choose and interact with one microphone at a time and, e.g., engage with how a guitar pickup versus the DPA condenser microphones would change the timbral quality of the same sound, an interaction that I describe in chapter 2.

In this, I was interested in what would happen if, for example, I were to set a magnet into vibration on a piano string, which was amplified by a nearby condenser microphone in order to produce a very natural but enhanced sonic image of the acoustic sound, and then to mute the microphone and switch to the mobile guitar pickup in order to physically and sonically zoom in and out of the very direct and dry sound, playing with the bass frequencies that the magnet produces and which I could enhance with the pickup. This kind of play was not possible in the previous setup, where all microphones were active at all times and their routing to specific speakers was fixed.

In March 2017, I began collaborating with Sukandar Kartadinata. We started a conversation around my musical ideas, what I wanted to be able to achieve in a live performance, and how I wanted to expand my practice in terms of spatial composition and the practical and technical implications and possibilities of building a new tool or instrument

which would fulfil this function. However, the process of constructing a technically rather simple device for live spatialization took a long time, partly because I was looking for a solution which would allow me to bypass having a laptop on stage, which I would need to engage with. The reason for that was the distraction this would entail, physically and mentally, and the fact that I would constantly be exposed to the risk of the computer failing. Of course, there are manifold discussions around technology and failure, some of which incorporate and encourage this element in the creative composition and music making process. Practically speaking, a fixed hardware tool which is designed to fulfill *one* task, e.g., run one particular software, is a safer option and will have a lower risk of failing and of not fulfilling this particular task. Furthermore, a new tool as part of my work setup implied new functions, which I needed to learn and incorporate into my performance—mentally as well as gesturally, logistically, and structurally. Just as much as a tool facilitates creativity and stimulates ideas, it also requires attention and time to incorporate it into a setup and to develop and learn techniques and vocabulary specific to it.

The process of finding the right tool to work with—and collaborating with an instrument builder and programmer in order to do so—was conceptually new for me. It was partly challenging, because it naturally meant working at a slower pace and required a lot of research, and I was required to articulate musical and compositional aims in ways that could be translated into technical terms, ideas and possibilities. However, it was simultaneously incredibly stimulating and inspired many ideas: these turned into a number of new compositional concepts and possibilities, which I describe below. This process meant, for instance, finding a compact and dedicated computer, compatible with my soundcard/interface, to use as the connection between microphones and speakers. The computer had to fit and be integrated into a relatively small hardware box, as I wanted the *piano mapping* device to be placed inside the piano among my other objects and preparations. Otherwise, I would not be able to execute

fast decisions in an improvisational context, and it would interrupt the embodied approach to the instrument and objects. Furthermore, it would need to fulfill a number of requirements, including high-quality converters, processing power, and low latency in live performance.

Initially, Sukandar Kartadinata suggested to experiment and start this work process with a simple setup, so that I could find out how improvising with this new tool felt during a performance, what it lacked and what should be added or changed, etc. The first setup consisted of a Max patch on my laptop, which Kartadinata made.<sup>67</sup> I constructed a few speaker-microphone-configurations with the laptop prior to the performance. To control the resulting piano maps (at the time, I used nine different maps), I used a simple numeric pad placed inside the piano. We decided to work with a relatively low number of preset piano maps for the reason that I would have to memorize each of them due to the lack of visual feedback, as I did not use a laptop on stage when performing, for reasons explained above.

I first tested this setup in my studio in Berlin, which was followed by a week-long working period with sound engineer Stig Gunnar Ringen in May 2017, which I describe in chapter 2. A video of the first concert performed with this early version of the “Piano Mapping” approach is available via the Research Catalogue, as *Media Example G1*. Remembering the different piano maps turned out to be quite easy and I felt that it did not disrupt the performance and creative process very much. However, as is common when first trying out a new instrument, I needed to learn not to overuse it, just because this function was available to me. Eventually, I wanted “Piano Mapping” to become just that: another instrument to be integrated into my performance, and a way to engage with the spatial aspects of timbre orchestration. A tool, in other words, for timbral choreography.

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67) Max Msp is a visual software commonly used by artists, educators, and researchers working with audio and visual media, and physical computing.

In July 2018, Sukandar Kartadinata finished building the version of a device that is part of my current setup: a small hardware box containing a computer (Lattepanda),<sup>68</sup> which now runs the Max patch, and which I can access via my laptop prior to a performance through a closed network to create the presets and piano maps that I want to use in a particular space. Furthermore, the device has three different modes of operation and a range of additional functions that proved to be useful during the experimentation process. These include:

1. a preset mode with nine different configurations/piano maps
2. a joystick mode with which I can pick out one specific microphone and move sounds between speakers
3. a “play-back” mode of up to three sound files, which I can start, pause and stop and which gives me the possibility to play with multichannel compositions such as the audio papers or versions of *Memory Piece*.
4. a crossfade feature to seamlessly move between different piano map presets, which I can turn on or off with a small switch

At the moment, the Max patch and my soundcard have eight inputs and outputs, meaning I can use up to eight different channels and microphones during a performance. The laptop is only needed to provide me with visual feedback prior to the performance and to carry out actions like moving sound files between computers, etc. The device is positioned inside the piano next to my preparations and objects and is now integrated into my performance setup and is accessible at any time as another instrument and object that I improvise with.

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68) Other computers we tested were either not compatible with the interface I was using (e.g., Raspberry Pi) or provided low sound quality due to the converters used (e.g., Bela).



Figure 12: Piano mapping device

Two years into the process, I still work with only nine speaker and microphone presets, as I find it gives enough variation in addition to the other functions of the device. Memorizing specific *piano maps* and how they sound in space was an interesting process. It connected to and extended how I worked with timbral memory in the creation of *Memory Piece*, where the perception of spaces and sound was at the center. In "Piano Mapping," this turns into a dynamic and flexible compositional process.

This new instrument facilitates creative approaches, which I can further expand as I come up with new ideas and new functions to be integrated while I am performing with it. It was very important to me not to be distracted with technical possibilities that I did not need, and thus that the tool be designed in a way that is both user-friend-



ly and haptically satisfying. These aims have been achieved—it feels natural to me to move sounds across space from speaker to speaker with a joystick. I also had to learn how to operate the device physically and ergonomically while performing, and I repeatedly tested exactly where it should be placed within my object setup inside the piano so that I could easily access it while playing. Pressing a button to access another piano map, moving it with the crossfade or joystick: all of this needs to be practiced so that it becomes physically automatic and eventually part of my technique as a gestural or muscle memory. These are new physical-spatial relationships that I am exploring, in practicing how a small gesture, which is barely visible, can be enlarged and move through space. Earlier in this doctoral research, I learned to adjust my performance by means of one of the many possibilities that amplification offers, in order to make audible dynamically soft sounds and gestures while using less physical effort. Here, the inside piano performance is extended not only dynamically but also spatially, in that physical gestures performed on the device translate into spatial movements. This extends the agency of the piano, allowing it to function within a hybrid compositional context and through an extended understanding of timbre, interacting with gesture, space, and objects.

### 7.3 Warping Space as Unfolding

Playing with the piano mapping tool, I try to virtually emulate the piano's architecture in some of the presets; these map the instrument's layout and different registers in space in a manner that positions the piano as a "sonic sculpture" (a term I introduce in chapter 2). Alternately, in other presets, I take the piano and its enlarged sonic architecture apart by, for instance, moving the bass or treble of the piano from the rear to the front of the performance space, which creates a somewhat unsettling effect. Connecting the piano's registers to differ-

ent positions in space and then changing that position plays with our perception of the instrument's physical properties.

The greatest audible contrast between the different setups is created by using one kind of microphone exclusively, as well as switching between amplified and acoustic sound. The switch to an acoustic setting, after having listened to and “accepted” the virtually enlarged piano map that fills the space, creates a naturally softer, but also less reverberant, very intimate setting that requires a different listening attention and performance again. It is challenging to give the audience and myself enough time to get used to a specific setting or a “listening” so that it is accepted as the “aural reality” in our spatial perception and memory. As Blesser and Salter remind us, “Because experiencing sound involves time and because spatial acoustics are difficult to record, auditory memory plays a large role in acquiring the ability to hear space” (Blesser & Salter 2009, 17).

The play between our spatial perception and our remembering of sonic spatial movements is an important aspect in the creating and improvising process, and also something that is explored directly by *Memory Piece* as a compositional approach and a way of creating complex listening modes. However, as “Piano Mapping” uses live spatialization, it requires a different approach to time, in that space becomes yet another component in the structure of the piece which I can improvise with. Spatial differences are converted into temporal differences when we move through space (ibid.)—listening to space then becomes a process. Through the work with the piano mapping tool, I learned how to memorize spatial-sonic experiences and to be aware of them. I can then use these memories of timbral choreographies to construct a narrative within a performance.

Sound artist and composer Gordon Monahan talks about the sculptural component of music:

It's not obvious because sound is invisible, but sound is physical at the same time and it embodies space... There are characteristics to the space that shape the sound we listen to ... so that leads to the idea that you can extend that to the point where you can make sculptures out of sound, or sculptures that make sound. (Monohan 2015)

This connects to my desire to project the architecture of the piano into space, thereby approaching the instrument as a *sonic sculpture*. This idea is intensified through the "Piano Mapping" project, where I work with the act of *warping* space through the different piano maps, creating sound sculptures in addition to the acoustic materiality of the sounding piano and the complex listening modes that result from this. This act of warping space deepens the spatial listening process, emphasizing or disturbing it, and thereby enables the audience to encounter a more immediate plasticity of sound. I have been experimenting with having the audiences either sitting around the piano or moving through the space during the performance and allowing the spatial listening experience to unfold. Such experiments position the audience's subjectivity and agency as part of the reception of the sound, in addition to my own subjectivity and agency as a performer.

The virtual piano maps have become a playful compositional tool for me. Whilst the timbral changes that are achieved through moving or switching maps are often quite subtle, as the microphones positioned at the different registers are directional, but of course pick up other sounds and the room as well, they are still clearly audible. This leads to a heightened attention and listening when I perform, creating an awareness in relation to these spatial timbral movements and how I choreograph them, which has direct implications on my performance: a repetition of a sound or a variation of it can be performed by re-configuring it spatially, or by switching microphones which pick up and modify its timbral envelope, adding a spatiotimbral vocabulary to the performance. In this way, timbral orchestration can literally be expe-

rienced through its spatial movement. Furthermore, it allows me to move a sound during different stages of its existence—e.g., moving the reverb or “remains” of a sound after it is produced through space, or while it is in progress, unfolding, creates a completely new listening experience and compositional tool for me.

“Piano Mapping” requires a different pace in listening—one must leave room for the perception of these timbral spatial changes—and I am amazed how one idea, one sound, can be temporally and structurally extended and recomposed through this new spatial listening capacity. Listening to space through timbral variation and movement is a process. As timbre and my vocabulary are extended, I find myself reducing the sonic material and rather diving into minute changes in dynamics, movement, rhythm, and timbre. It is important to give each aspect of timbre orchestration time to be perceived, as to avoid the risk of being reduced to mere effects, rather than being musically placed within a performance. Here again, memory and the repetition of material heighten the listener’s attention and change how time is perceived, something that I experienced in the “Performative Timbre” study and subsequently used compositionally in *Memory Piece*. “Piano Mapping” further highlights the interdependencies of timbre, space, and time.

Blesser states that there is no universal definition of an ideal listening space (Blesser & Salter 2009, 147), while electronic composer Eliane Radigue speaks of “anti-acoustics” (Schütze 2011) and attempts to create a listening situation where sound is dispersed through the concert space in a way that it creates a *sound bath*, whereby the “same sonic information is coming from all directions” (van Eck 2017, 135). These arguments support my thoughts on abandoning the idea of “sweet spots” in listening spaces (see chapter 6). In contrast, I want to encourage a variety of ways to experience music in space; this drive towards multiplicity, which is imbedded in the immediate creation, adjustment, and sculpting of sound in improvisation, is confirmed by

the *piano mapping* project. Rather than diffusing sound in such a way that the same information can be experienced everywhere in space, I encourage the idea of being exposed to a multiplicity of listening modes, with differing details in regards to timbral information, directionality, diffusion, and movement, so that the orchestration of timbre becomes something the listeners and I can additionally experience through the choreographing of sound.

I performed with the piano mapping device in Gothenburg in October 2017 and December 2018, performing with two different multi-channel audio papers, as well as in the Audio Paper Symposium in Malmö

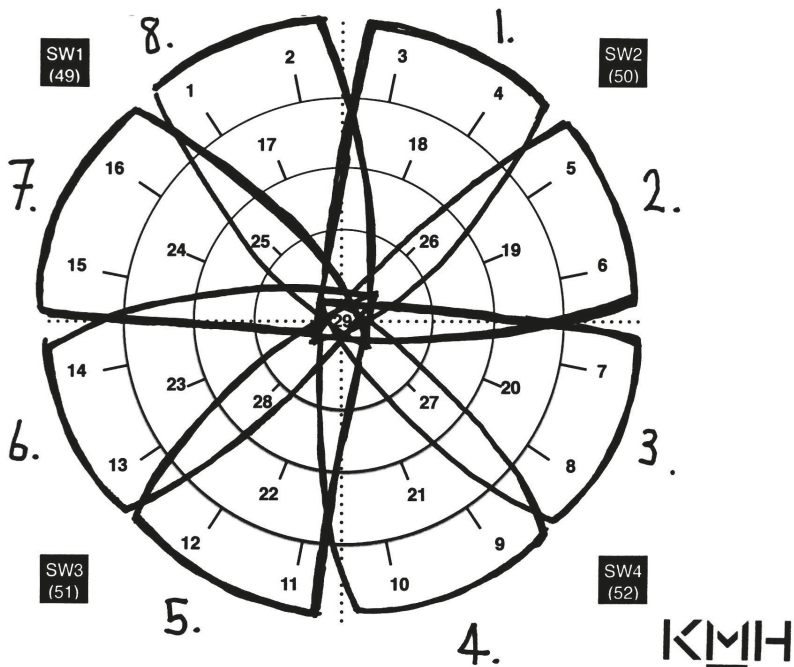


Figure 13: 29.4 sound dome speaker layout at KMH's Lilla Salen, with eight channel arrangement

in December 2018. Video excerpts of some of these performances are available as *Media Example G2* and *Media Example C6*.

In March 2019, I tested “Piano Mapping” in the 29.4 speaker dome at Kungliga Musikhögskolan (KMH) in Stockholm, as part of the project European Art Science Technology Network for Digital Creativity (EASTN-DC). I divided the speakers into eight groups (see Fig. 13, below), to match my current set up. This time I did not use any additional prerecorded multichannel pieces, as I wanted to perceive the shifting of the piano maps in a transparent way.

As this was my second time performing in the speaker dome, I was familiar with the immersive sound, with the piano in the middle of the space and the closeness of the seated audience around me. I amplified the piano with four DPA cardioid condenser microphones, mapping the registers, as well as the guitar pickup and AKG contact microphone which are part of my setup (see chapter 2). The act of piano mapping served to enhance the space and the listening experience, and as a way of providing different spatial perspectives. Smalley states that “spatial perception is inextricably bound up with spectromorphological content” (Smalley 1997, 122), and in this performance such content was further amplified, as the different microphones brought out and translated a variety of sound qualities that I could then harness, direct, and move. I particularly enjoyed the horizontal and vertical mapping and movement of sound facilitated by the speaker dome, which created a unique listening space. Due to the number of speakers and the way the sound enveloped the listener, these movements were not always “traceable”: at times, the sound source and spatial position were not easy to identify, as is mostly the case in a quadraphonic speaker setup. This further added to the complexity of the listening experience.



*Figure 14: Performance at KMH speaker dome, Lilla Salen, March 2019*

## 7.4 Conclusions: Choreographing Timbre

Performing with the spatialization device is still new to me, two years after beginning the process of thinking, building, and collaborating with Sukandar Kartadinata. It is a continuous learning process, as performing with it creates new ideas, and it needs to be practiced in many different contexts and spaces. Through this process of performing and testing the piano mapping tool, a spatial parameter is added or refined in my vocabulary, leading to the development of new gestures and techniques which need to be learned and incorporated into my practice; this process reconfigures my physical relationship to the instrument.

My initial thinking on and composing of multichannel pieces, and my initial work with speakers and microphones, has been intensified through the “Piano Mapping” project and its integration into improvisational processes as a spatial extension and translation of physical and musical gestures; a timbral choreography. “Piano Mapping” further created and confirmed the idea of a multiplicity of listening modes as part of an improvisational performance practice.

I realized that by using the piano mapping approach in my performances, I spend more time with one particular sound, engaging with its details and its spatial and timbral changes and giving myself and the audience enough time to experience them—in a way, my playing in such circumstances is more durational, and more reduced. There is of course also a practical reason for this: the device requires attention and physical engagement, and if I move sounds spatially with the joystick with one hand, I can only do so much with the other hand.

Hence, playing with the piano mapping tool seems to refine and influence the temporal aspects in my performances and the resulting compositional structures; through exploring the different stages of a sound *spatially*, I naturally also extend it *temporally*.

Performances that integrate piano mapping expand the complexity of interactive agents at work in timbre orchestration. As a result, timbre orchestration is revealed to constitute a continuous reconfiguration of gesture, material, and space and through this, a stimulation of imaginative processes that deepens performer-instrument relationships.







## Intermission II: On Choreography Across Disciplines

### A Conversation About Movement, Memory, and Improvisation Between Magda Mayas and Toby Kassell<sup>69</sup>

**Magda:** So, when I perform, I don't think about what it looks like, I actually feel very comfortable with my body on stage unless, you know, I'm in pain because of some awkward position or something like that. And during these studies, people started pointing out that it is so visual and so gestural what I do and asking: why don't I focus on that? Because one aspect of my research is space and how I relate to it. And then one thing led to another, and I thought: well, how *do* I actually relate to space with my body?

**Toby:** I mean, I think from my side anyway, as a dancer and choreographer, who is traditionally supposed to be concerned with what the body looks like, I have actually been trying for the past 10 years or so to get away from that. And what's very interesting about the aspect of your work and what you do, is that the movement that is created in your work is coincidental, it's a means to an end, so to speak.

And it happens to be aesthetically interesting. The aesthetics aren't primary—what you do is primary and what it creates physically is secondary. But by bringing attention to what it creates, it adds another layer to be considered. That, I think, is important. Anyway, I have this idea that most art forms have something that connects them all. And that thing is composition, so as far as choreography goes, choreogra-

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69) This is an edited and shortened version of a transcribed conversation, recorded in August, 2018. Toby Kassell is a choreographer and dancer working extensively with sound and producing original pieces, currently employed at the Gothenburg Opera.

phy nowadays for me is more a compositional act than it is a choreographic act. In the sense that it is about organizing things in space. And I think what you're doing with your work is also organizing things in space. You happen to be organizing sound, and also organizing your body, because it is your body that is producing the sound. So, those things for me come very close to the way I choreograph with dance.

**Magda:** It certainly overlaps, but I only realized that in our work together. I'm organizing sound and of course sound can also be sculptural in a way, because it is projected into a space and it travels and develops, and you have this whole concern with the position of the listener, and I'm the performer as well as the listener, with my head inside the piano, so... sound becomes that. But the step—when you said, well, if you're interested in space and body and sound, why don't you multiply the pianos?—that was really... it opened up so many things. But it also made me second guess some of the things I do... whether I really think about sound first, movement second... or if it's not separable, or if it is indeed sometimes the other way around.

**Toby:** I think they go hand in hand, personally. And that's interesting, also the way it happens. It's not a movement that's produced to be poetic or to make an aesthetical association—it's a movement produced to make a sound. And when you look at that in a new way, it becomes something else, without trying, and that's very beautiful, to my mind.

...I'm quite interested in reducing things to a point where virtuosity isn't about the extremes of the body, it's about how many different layers of tasks can be produced by the performer or the ensemble. So, it doesn't necessarily end up aesthetically, visually, virtuoso, but the way in which the choreography manifests is through another type of virtuosity. Very much like you are working with music with different layers and you're doing one thing and having another thing on the top

and then remembering yet another thing—and through these layers, the work is produced. And for me, that's a very high-end virtuosity. Not the same as, for example, running a super-fast scale on a piano or pulling your leg up around your ear and turning around 10 times. Those things, I think, are comparable.

**Magda:** Totally. Just as you started, I wanted to ask you what virtuosity means to you? Because we still have this old-fashioned traditional view of virtuosity in music.

**Toby:** I was trained as a classical dancer at a high-end school and I'm short—so in the classical world, that means the only way for me to survive is to be virtuoso. So, I worked with physical virtuosity for quite a long time, before I started to, I don't know, not really understand it anymore. I wanted to find more purpose and meaning and thought behind why I'm doing what I'm doing. The more I got into investigating that, the more the flips and tricks started to slowly disappear, because they weren't necessary or because they weren't produced by the things that I was interested in, so to speak. I don't know how that was for you because you are also virtuosically trained, no?

**Magda:** It's a very dominant characteristic of classical music and both my parents are professional classical musicians, so I kind of grew up with that and went to competitions and stuff like that. It very quickly became clear that that's not really what I want to do, and then improvisation became the main thing that I wanted to do... and jazz. In jazz you also have this aspect of virtuosity, of course.

I was questioning that a lot when I started developing playing inside the piano, and as things became more and more refined, I think it just became more about having an idea, whatever that idea is, and executing it really well. You know, being able to be clear with what you want to transmit. And it doesn't matter whether that is throwing a magnet on the strings of the piano or playing a scale really fast. It

can be anything, as long as it's executed as close to your original idea as possible.

**Toby:** I mean, the good thing about having a virtuosic training or background is, that you can use those things if you need to. But it seems to be about finding the right time and the right place to do it. It doesn't often show up in my practice, but then again, I didn't study improvisation, I'm classically trained, so I had no improvisation background at all. I started doing my own investigations of improvisation because... as a means to an end. When I became a contemporary dancer, I realized that nearly all the creations I was in, the choreographers were asking to improvise with ideas and I couldn't do it, I was petrified. So, because I was afraid of it, I decided to try and understand it. I did a workshop with a guy called Michael Schumacher, who was an original Forsyth dancer,<sup>70</sup> with some super basic tools that were basically related to music. The first thing that sparked me off was the idea of A-B-A, being able to return to something and repeat it. Very, very simple. And after that workshop, I met a couple of musicians from Gothenburg (Johan Jutterström and Linda Oláh) and we started to get together and talk and improvise, like once or twice a week. ... And that's kind of been my education, my practical education towards improvisation. So, I'm actually coming from a more musical approach to improvisation than I am a dance approach.

**Magda:** That's really interesting.

**Toby:** I think about things structurally, where the way in for dance is usually generating interesting dance material. It's not always about how to structure it within a spontaneous piece.

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70) William Forsythe (\*1949) is an American dancer and choreographer. He is known internationally for his work with the Ballet Frankfurt (1984–2004) and The Forsythe Company (2005–2015).

**Magda:** When you say “dance material,” that means separate segments, movements?

**Toby:** It means dancing and looking good, and yeah, spontaneously creating choreography on your own body. So not necessarily putting it into a context.

**Magda:** Right.

**Toby:** So therefore, if you’re a good improviser, it is quite often that you can produce stuff that choreographers are attracted to and the choreographer will put it in a frame. So, I think, I have a slightly unconventional approach as a dancer towards improvisation and that affects my choreography very much, and that means it’s opened the possibility for me to work with you, for example. That’s my background, basically. I developed some basic exercises based on spatial composition and I’ve become very, very aware of the sounds that bodies make in space, whether it’s walking or just your lips moving, friction on the body, friction on the floor. These kinds of things all start to become important elements of my idea of dance improvisation.

**Magda:** So, this is the fourth workshop, or working phase, that we are doing together over the course of 2018. I was thinking back to the first time that we met, and we were talking about what interests we have. I wanted to be more conscious about what I do physically, when I play... I was interested in the whole gestural aspect of it. I was very surprised and challenged when you first of all started taking things apart, separating the sound from the gesture, and then really almost immediately started working with memory in a very systematic and yes, challenging way... It was very difficult for me to try and remember a gesture and the length of it, the exactness of it, without having the sound. I’ve never done that before, so that was really eye-opening for me.

**Toby:** Those are tasks that I have developed and that I use with dancers. So, people do that with dance material and you have an improvised duet, that will then be fragmented and you have to perform the same duet as a solo and remember the qualities that were created from, e.g., someone dropping that arm, or the weight of a body on top of them, or these things. And then, maybe they will have to repeat something else that they have created at another point and they'll layer it on, so that the material becomes something completely new. What I really enjoy doing is creating so many tasks that it becomes nearly physically impossible to remember everything precisely, and when that happens, new things are created, but not randomly, they are created through making mistakes. And these kinds of failures, if you like, of trying to achieve something exactly how it was, produces new material that is in direct relationship to the other material, and can also be memorized and repeated, possibly. So, it's very recognizable and it makes sense... I think that's kind of fascinating. And there's also this intense concentration and struggle that's going on while it's being produced. That's also incredibly mesmerizing, to watch someone doing that. So, they're not even performing anymore, they are living an experience. I find that intriguing.

**Magda:** That kind of task can be used when you are learning how to improvise in a musical context: that you play a piece and you have to focus on one or two ideas, and then see where that goes, or you'd be asked to say what the first or second or third thing you played was, repeating it, etc. But for me, one of the challenges of working with you was really to separate sound from movement and that made me learn a lot, because you suddenly create an awareness of a movement you make. ... And it's funny, I think with music it is the same, exercises you do, they don't necessarily have to mean something immediately, sometimes they have an effect much later on and it suddenly sinks in and I feel it did that.



In the third workshop, we already had three pianos because you came up with that idea.

**Toby:** Yes, last time we had three pianos. We also talked about how to have the pianos as entities in themselves, so that the piano is still playing when you're not standing, not physically present... So that you could kind of play a duet or a trio with yourself, acoustically, without it being looped and being digital.

**Magda:** And then of course the options multiplied, performing something at one piano and remembering it and going to the next one and somehow referencing it and so forth. You said something, which I thought was really nice: "Memory becomes a physical thing." You can actually look at the piano, during the performance, and it is an embodied memory.

**Toby:** And we also have residue in the space—you use objects that actually leave traces behind, so you transform the space through making a sound with a particular material—when it's over, the material remains as a transformation of the physical space. That's something that has happened and worked.

**Magda:** We talked about what to do when moving in between pianos—those could be transitional pieces in themselves. Thinking of it as a task: not walking in some funny way to the next instrument, but my task is to get from A to B in a "sounding" way.

**Toby:** The danger with the three pianos is that you play a piece and then it stops, you move to another piano, you play another piece, and then it's all very clear what you're doing. I think the way you've managed to solve that, is to see it as one piece holistically, one tone connects to the next piano. So, everything, the three pianos, are part of one piece, not three separate pieces that are layered. Even though

the idea of those layerings is still there, the sound is holistic and that's pretty impressive.

**Magda:** During my studies I worked with the piano in the middle of the space with the audience around it, which is great, but here I get to move, which I've never done and to try out three different instruments—three different spatial positions in the room.

**Toby:** I think the danger with projects like this is it can become gimmicky, full of novelties, you know. Trying to think about how on earth a pianist would travel through the space. First thing that comes to mind is a piano that has wheels. Push her around. But it feels a bit like circus, doesn't it? That would also make a noise on the floor. Is that relevant to the work? Etc. So, the solution with three static pianos and you moving in between them, but actually having the sound constantly connected, works; for me, it works.

**Magda:** That might also be because I am extending already existing playing methods, sometimes the gestures connecting the pianos are just bigger, the fishing line I use to bow the piano strings with is longer, things like that. Then there are other things that I added, like EBows or vibrators or things that resonate—we just spread them all over the instruments so you have one resonating sound-body.

**Toby:** One thing that is important to say is that I came into the collaboration with the intent of focusing on what you already do, finding ways and strategies to select things that I know and I have worked with, that are relevant to what you do specifically. I haven't just thrown things in from a dance discipline. I have really tried to pick out the things that would work best for you in your project and within your frame of sound and technique and performance ideas. So, the ideas that I put in, I feel, are more influencing things rather than dictating

things, because your things are already so established. It's also not a dance piece, it's a musical concert.

**Magda:** Is it going into a performative area?

**Toby:** It's going into a performance area, but it's definitely not a dance piece.

**Magda:** No.

**Toby:** It's very much a concert performance. It has elements of theater, it has elements of visual art in it as a result of my input, but it is something else and it is still very, very far away from what I usually do.

**Magda:** It's also good to question what this piece is and how it could develop. You've thrown so many ideas into the process that really shaped the piece, and I feel I'm in a very different position than I usually am. Of course, I feel comfortable playing music, but for me, to move at all on stage—it's completely new for me to even separate the gesture from the sound, and to a certain extent it's uncomfortable. I had to get used to the idea. Learning how to produce sound from a different physical position and actually move and lie on the floor and stand up again—all those things, that's why it's absolutely a collaboration for me. These are all completely new elements, which not only shape the piece in a spatial way, they also shape it timewise—it structures the timing of things. Remember, the last time we spoke, I questioned why I was walking from one piano to the other while performing gestures in the air with my hands—what's the reason behind it? I needed to understand the logic behind it, even though as a performer, it might be aesthetically pleasing, but what's the meaning of it? And you said, well one thing is, you're changing the timing of the movement. And that clicked, because of course, the movement, whether or not I produce a sound with it, dictates the timing and structure of a piece.

**Toby:** See, that's very important for me. I was trying to say before that the aesthetics are present, but they're only there because of aspects of time or aspects of performing a particular task that has a certain purpose, that has a certain effect holistically on everything. It's not just to look good. If it looks good, that's great, but it's not really primary.

**Magda:** The whole process made me really think differently about material, about movement, gestures, space, and how to compose a piece in space with movement, which is very different from composing and structuring a piece in space just with sound.

**Toby:** The things that I've contributed are some choreographic principles that I have developed by myself, but they are sparse compared to the immense amount of information that they are being applied to... It's the first time that I've been able to have any of my ideas apply to something that doesn't involve dance, and to see it functioning, it's great, because I feel that those particular principles now aren't dance principles, they are something else. Something that breaks down the differences, the spaces between different art forms. I'm really interested in searching for these things, that can be applied to different situations and different artists working with different disciplines.

**Magda:** Totally. I think that was also one reason why I asked you to collaborate, because I don't want to approach this only from a musician's perspective, especially not if it is about movement and body. That's why I really value your view on it and your expertise when it comes to that... I also really liked your idea of gestures as reminders, as traces of what happened structurally, also visible to the audience of course, and, once again, making memory a physical thing... It makes me feel much more comfortable and embodied; with it I can really relate going through musical thoughts in my head and translating them or performing them silently through gestures. Let's talk a bit about memory... I think we noticed immediately that

that's an area where we overlap, because in the first year of my studies I created works called *Memory Piece*, where I basically record performances and then play them back, in a sparse form, simultaneously with a live performance—overlapping sounds and partly trying to exactly copy them, or play a counterpoint or just create something that would make it sound distorted or slightly shifted, to point out similarities and differences. Playing with memory as a structural thing. You mentioned that you were actually very interested in exactly that, in other works that you have developed.

**Toby:** Absolutely. The beginning of any choreographic process that I step into, I give memory games to the dancers involved. They have to improvise something, to leave it, repeat it, and they have to keep generating material, start repeating something that someone else has to recognize again; you know, the structures are built up from these games. I like to think of these things as playful. But yeah, more and more I find this memory thing really intriguing and useful and I know that it exists in the music discipline anyway, so to apply that to dance is really interesting.

**Magda:** It seems that you go into it in a really extensive and elaborate way. From a musical perspective, when you improvise, it means you need to have a simultaneous—split—attention, to listen to and notice what other musicians are referencing or developing and repeating and finding where you can fit in... One last thing about this piece and how it developed and approaches space—what I really like is that it's from a technical point of view so analogue and so simple. When beforehand I have spent so much time on amplifying the piano, working with microphones and speakers, now these three pianos function as acoustic amplifiers, which they always have been anyway, of course, but with multiplying the instruments I am projecting the sounds and myself into the space from various positions, in a very simple way.

This also came from collaborating with you and it's a contrast to how I have been working to date.

**Toby:** The idea of three pianos is there, because that is most in correlation with what you've been doing with recording yourself and playing together with yourself. I did a dance piece years ago, Solo for Multiple Self... There's something about that, that kind of multiplication of self, also the way we think, at least the way I think, we can often have multiple layers of thoughts in time which can be very, very noisy and to be able to separate them in some sort of coherent fashion is important, otherwise we would go mad. And this is a good exercise of that, for example, taking one idea and fragmenting it to a point where it's more understandable, I suppose.

**Magda:** You said earlier, one thing that combines all art forms is composition.

**Toby:** Yes, composition and composition of space.

**Magda:** At least that's where we overlap, for sure.

**Toby:** Yes, you've also tackled composing the room in the sense of making strong decisions about where to place the public, or where the public should be sitting in order to experience the piece... There is a circle of chairs in the center surrounded by the pianos and chairs outside the perimeter of the pianos. So, there are two different ways to hear the piece. And of course, that means when you are performing, you are actually surrounded by people, you are in the middle of the audience. I think that's a really important aspect, because as much as the audience or the public is immersed in listening to the work physically as well as aurally, you are also immersed in the room itself. So, you are not on some

sort of platform performing to a crowd of observers. Everybody is somehow involved in a different way.

**Magda:** Yes, especially because there is no center; there are three sound sources, so to speak, but not really, there are sounding transitions in-between them as well. We are utilizing the entire space and the audience is sitting in between. Can you say something about your thoughts in general, about spatial composition? Not only with the audience and where you place them, but could you articulate how you work with space?

**Toby:** Spatial composition is very important to me nowadays and I try experimenting with it a lot—we have talked about these memory games and I have some exercises that are spatial memory games that I use at the beginning of processes. Spatial composition, it sounds really fancy, but all of us use it every day. It's just understanding the organization of things within a space. And it's unlimited, it's very subjective to how you feel, what your aesthetics are and what your needs are in that particular piece of, whatever it is.

**Magda:** Sure, but it's so different with sound, because it is invisible. And of course, spatialization in music usually means: how does my (acoustic) instrument project directionally, spatially? Where do I place the speakers and where do I position the audience? *How do I direct the sound?* But if you don't use amplification, and we don't in this piece, then it's really complex, especially with the piano, it goes in all sorts of directions. Then you have the room to deal with, the walls and the ceiling, the materials they are made out of, so the sound bounces around and transforms and develops, so that's a science in itself. It is sculptural, but it is not visible... So far, it was very basic for me—I open the piano and I make the opening of the lid point towards where the audience is sitting. Or I take the lid off entirely, which mostly means the sound has less immediate reflection from the lid and

disperses. If I amplify the instrument, then I have many more choices. But now the options are really multiplied, not only because we have three instruments, but because I can play one instrument from the position of the other, or from elsewhere in the space. So, that's really a different kind of spatial composition, which I haven't tried before.

**Toby:** I listened to you playing through the piece a few times now, and I've sat in different positions. I must say, sitting in the center of the room is a very different experience from sitting outside of the circle of pianos. They are both really pleasing, but one is... if you close your eyes... sometimes I'm not sure where you are or where the sound is actually coming from, because of what you said, the way the sound projects and reflects and bounces off the walls. When you are right in the center of it, it is very disorientating, which I find very pleasant. That's a very different sensation from when you are outside the periphery, which is also very pleasant. I think it's very good to have these two different perspectives available to the public, because they will have different experiences watching or listening or experiencing the same piece.







*The elements of space and time are represented together in movement,  
sound cannot occur without movement.*

Marian T. Dura (2006, 31)

## Chapter 8: Accretion

### 8.1 Entanglements—Composing in Space

In this chapter, I provide an account of the work process used in a collaboration with choreographer Toby Kassell, which lead to the development of *Accretion*, a piece for three pianos and a pianist. That account allows me to explore the broader question of gestural and physical approaches to instrumental performance and timbre orchestration. This is a conversation that connects to my previous investigation of gestural aspects in the “Performative Timbre” study (see chapters 4 and 5), as well as earlier comments on instrumental techniques and relationships, where I articulate the importance of gesture within timbre orchestration (see chapter 2). In *Accretion*, I extend musical and physical gestural approaches into larger frameworks of spatial composition and choreography. Further, I connect these physical approaches to new listening modes, which are created within the compositional process of the piece. Finally, I also relate them to memory, a recurring theme within this thesis.

In Chapter 7, I discuss “Piano Mapping” as an approach of spatial composition with sound, that uses loudspeakers and microphones—it is, I argue, a spatial extension and translation of physical and musical gestures, whereby small gestures and sounds inside the piano are translated into movements between multiple speakers and enlarged *piano maps* are projected into space. *Accretion* is in many ways an inversion of this process, as I work with acoustic grand pianos and instead extend my gestures and movements—in this, spatial composition becomes an organizing principle not only of sound in space, but also of instruments, my body, and movements in space. Through the positioning of multiple instruments, I project *myself* into the space and invent new playing techniques to explore physical aspects of timbre orchestration and choreography. Movement connects me to

the instrument, and the instrument to space and to the listeners and then back to me in a split second. I want to address this entanglement of sound, material, body, and space in my listening and performance experience not in an attempt to disentangle it, but rather in order to reorganize it and relink its components, with the ultimate aim of emphasizing the complexity of the entanglements that are at work in timbre orchestration.

## 8.2 Gestural Approaches in Instrumental Performance

Sometimes when I improvise it is not clear to me what arrives first: the idea of performing a movement or the idea of a sound. One inspires and triggers the other.

*The author's practice journal entry, November 7, 2016*

*At one instance during the performance I caught myself placing one hand flat on the strings of the piano, resting in silence, as if feeling someone's feverish forehead.*

Listening through the body, the skin, or the bones through *haptic hearing* has been the subject of much research and of work undertaken across a range of different disciplines, from neuroscience to sound art—see, for example, Kaffe Matthews' *Music for Bodies* (Matthews 2019) or Laurie Anderson's 1978 *Handphone Table* (see Ammer 2018).

For me, embodied listening is an inherent part of music making and performing—imagining a sound means imagining *performing* a sound, imagining it on a sensual and physical level, the tactile experience of touching a key or feeling a string vibrate when I pluck it, feeling a

sound, as well as hearing it, from movement to sound, one object at a time, one gesture at a time.

Playing inside the piano is physically demanding, as I note in chapter 2, due to its size and the strain of leaning over and into the instrument. I learned to adapt and change positions for short moments to remain flexible and to keep the back pain and muscle stiffness in check, changing the muscle groups I put the most weight and stress on. At times, I will stand up straight, or use the left foot on the sustain pedal instead of the right, I will sit down for moments and engage with the keyboard, or simply pause—all of these physical aspects influence, and at times even dictate, the musical choices that I make. There is also something to be said about performing in an uncomfortable or physically challenging position: pushing the limits of what my body is capable of, how far my arms can reach out; the sounds and music produced in such a mindset are different. In acknowledging this I am not promoting the idea of suffering or a purposefully painful performance attitude, but rather simply point out the influence of the body's limits and capabilities on the structure and aesthetic of a performance.

David Sudnow speaks about an embodied cognition, whereby the complex physical movements involved in learning an instrument, which are generalizable beyond the situation they are applied to, become an “ever-present potential” in the performer’s body:

And when fingers in particular learn piano spaces in particular, much more is in fact being learned about than fingers, this keyboard, these sizes. A music-making body is being fashioned. (Sudnow 1993, 153).

In the description of *Accretion* that follows, I will focus on the potentiality of the body in sculpting timbre and my relationship to space. There are also practical aspects at work in how sound is choreographed, which I will cover: the limit of what I can do with one hand while the other is occupied with playing; what is tangible and approachable

in that moment; what seems *physically* logical after a gesture is performed, and how this suggests what follows. It might seem like a rather sober aesthetic decision, but I find there is beauty in letting the body define and decide the shape and aesthetic of the music. The movement of a gesture, its pace and duration, define the temporal structure of a piece and my musical thinking as such; music, in this view, becomes a deeply sensorial act of experiencing time through and with the body.

Gesture has become an important topic for musicological and artistic studies of instrumental performance, in recent years. This research has investigated its expressive potential, its influence on musical structure, and its potential to act as a source for new compositional approaches. Godøy and Leman define gestures in the context of a musical performance as “movements made by performers to control the musical instrument... or express the activity of listening... they go along with the articulation of the musical idea or meaning” (Godøy & Leman 2010, 5). Godøy further speaks of “gestural-sonorous objects” (Godøy 2006, 149), an extension of Schaeffer’s concept and terminology, which views the gestures that are associated with sonorous objects as being part of the explorative process, and on this basis proposes a taxonomy of musical gestures.

Like Godøy, I am also interested in the role and potentiality of gestures in musical performance, however the exploration of gesture in my practice goes beyond the “control of the musical instrument” described above and involves highly expanded bodily gestures related to instrument, materiality, and space, which connect to an extended understanding of timbre. I have not attempted to find a terminology for the gestures involved and developed through my instrumental playing but have rather sought to understand their influence on timbre orchestration. I am trying to understand this influence through the creation of new listening modes, which are derived from a multiplicity of physical spatial perspectives and the development of new playing techniques and material, which extends gestures to “spatial

timbral cells” to be used as building blocks in the construction of timbre choreography.

Throughout the coming description of my own work process in collaboration with Toby Kassell, I want to differentiate between a range of different gestural approaches in music making and research, which are relevant to my own inquiry and work process. I will only briefly mention musical gesture research through technological means; whilst I acknowledge that this constitutes an important and constantly developing field, the approach that this field takes to gesture differs significantly from the approach that I employ in *Accretion*.

Researchers such as Godøy have used video and motion capture technologies as means to analyze musical gestures. Many artists have also begun to rely on the ever-expanding field of gesture-controlled technologies in the creation of music, employing new methods to change, control, and compose musical structures, often using custom-made solutions as in the case of composer and vocal artist Alex Nowitz' *Strophonium*: a digital, gesture-controlled wireless instrument, which measures the movements and gestures of the performer with various sensors and allows the performer to dynamically control rhythm, timbre, and pitch (Nowitz 2019). Likewise, pianist Sarah Nicolls has been combining piano and live electronics, using different sensor techniques on the keyboard, as well as inside the instrument, in the attempt to:

create a circular system where the piano feeds the processing and in return, the processing feeds the pianist's physical gesture—by allowing the processed sounds to be manipulated by the pianist, for example through the use of sensors. (Nicolls 2009, 203)

In both examples, musical and physical gestures play a major part in the generation and structuring of musical material. This can also be said for my own work in *Accretion*, where whilst physical gestures

structure the piece musically and spatially, I do not employ live electronics.

### Instruments as Sculptures

The placement of instruments in the performance space, and the positioning of the objects, tools, and materials that will be used in the performance within or next to the instrument, is a decision about timing—these placement decisions can facilitate a quick succession and seamless transition between sonic events, or can consciously incorporate the movement, effort, and time involved in reaching an instrument or object, by placing it further away.

Pianist Thelonious Monk frequently stood up, or danced and walked around the piano, during his solos or while listening to other musicians in the band playing, perhaps as a form of physical expressivity, as a result structuring the piece physically and temporally (Monk 2011).

Drummer and improviser Tony Buck places extra percussion, other small instruments and mallets, purposefully on the floor around the drumkit. He explains that:

I prefer to do this rather than placing instruments on a small table or stand where they would be easily reached, perhaps because, for that simple fact—*easily reached*.... Having things neatly set out on tables in front of you seems like a well-arranged desk workstation, where there is tidy and neat accessibility, paradoxically creating a distance from the materiality of the objects and a certain detached coldness in their use... I sometimes think of the kit as a 3-dimensional sound sculpture, to be accessed in many and various ways. Having extra bits and pieces scattered around me on the floor encourages this mode of thinking for me. To reach them is to engage with this unwieldy machine and collection of sound sources with a certain amount of abstraction and at the same



time help me make decisions that aren't simply based on the most convenient, learnt or practiced habits. (conversation with the author 2019)

In a similar notion, the crash cymbal of the drum set that drummer John Stanier uses in the band *Battles* is elevated to a height of six feet, so that he has to stand up to reach it. He explains this decision in the following terms:

I didn't want any cymbals but the hi-hats at first. Then I was like, 'Okay, I'll use *one*,' but I didn't want it near me because I'd use it too much. So, I set it high so I'd have to work to get to it. I wanted it to be *significant*; I use it as a marker. It's like a master reset button when I go to the cymbal. Plus, it looks cool. (Brennan 2019)

Generally, I have tried to have all objects, materials, and instruments as close as possible and within reach inside the piano when I perform. This is perhaps due to the layout and size of the instrument—a large, extended physical and sonic sculpture, which likewise calls for extended movements and fast physical transitions as described above. Tony Buck's description of the 3-dimensionality of the drumkit also relates to the architecture of the piano, which I view as a physical and sonic sculpture that I map in space (something I discuss in chapters 2, 6, and 7). Only recently, and particularly through the work with Toby Kassel on *Accretion*, have I started to play with this dominant feature of the grand piano—its immobility and size—through moving myself and engaging in extending playing techniques and gestures in space.

### 8.3 Activating and Transforming Space

The attempt to encourage movements which break performance habits or inspire new techniques through a specific setup or the placement of instruments—which Tony Buck and John Stanier articulate

above—can also be extended to decisions to play instruments from distributed locations throughout the performance space. Sometimes, remote controls can be used to achieve this—e.g., in the case of Tony Buck’s multiple acoustic-mechanical drum machines that are set in motion through pedals, which we used in a performance of *Memory Piece* (see chapter 6). Here, a small motion with the foot activates sound and larger movements from various turning percussion instruments that are positioned elsewhere in space, creating a physical and sounding environment or landscape in which to perform.

In Mauricio Kagel’s composition *Zwei-Mann-Orchester* (Kagel 2011), two performers are positioned at fixed seats at each end of a podium, facing each other. These performers operate a large number of instruments, that are distributed around them and in the middle of the podium, by pulling strings or manipulating various constructions that are designed to set the instruments in motion and render them playable. The way that an instrument is used allows it to be turned into multiple instruments, as it triggers and excites other movements or vibrations, resulting in multiple soundings. Here, the score indicates meticulous descriptions not only of musical material, but also of the gestures and rhythms with which to perform it. The setup of the instruments and the movements and playing techniques developed *through* this setup and composition are generative and in constant interplay with the musical material of the score. Kagel’s *instrumental theatre* often mixes elements of theatre, action, and music (this is the case in “Staatstheater,” for example), however:

there is no division between theatrical action and music performance. This is the general principal of the instrumental theatre: music does not accompany action but *is* the action... sound producing gesture and sound produced are to be seen as one integral music theatrical action which has acoustic and visual components (Heile 2006, 40).

While I don't focus on visual elements or theatrical actions in my work, I likewise see movements and gestures as generative, form-bearing elements and as part of a concert performance. Walking across a stage or within a performance space from one instrument to another, e.g., when I perform with the grand piano and the clavinet or with several pianos as in *Accretion*, creates time and also silence and space within a musical composition. During a solo performance at the Letra Tone Festival in Berlin in March 2019, where I interpreted a graphic score by Daniela Burger, I decided to perform as if moving spatially within the score, from the clavinet to the grand piano, consciously placing the instruments further apart and creating sounding transitions between them. I translated the shapes and colors of the graphic score into physical movements and timbres of the two instruments and developed playing techniques connecting them spatially and sonically, for instance, through a sounding feedback, created through placing a magnet on the string of the clavinet, which resonated while I stood up and walked towards the grand piano, playing on its strings and then walking back again, while bowing the string of the grand piano with a long nylon thread that reached all the way back to the clavinet. The movement and gesture inherent in these new playing techniques is as much part of the music being created, if not at times the dominating and structure giving element itself.

Catharina Dyrssen speaks about compositional approaches in architecture and music, and in artistic research in general, as “a constantly evolving, interactive, and relational structure and the form and meaning of spatial-material-conceptual-cognitive aspects” (Dyrssen 2017, 182). This “spatial and musical thinking-making” (ibid.) is something that I can literally see unfolding when playing and moving between instruments in the performances described above. Here, the spatial and sonic movements and gestures create the shape of the piece, a continuous and immediately perceptible timbre choreography.

Another approach to spatial composition extends instruments to the size of the room, transforming spaces or landscapes and turning them into instruments as well. Here, adaptations of string instruments or repurposed long wires of different materials have a long history in music performance, which often traverses into areas of sound installation and sound art pieces.

Dutch visual/sound artist and composer Paul Panhuysen built over 250 “long string” installations and sound sculptures. At times, these consist of piano strings stretched out and installed in various spaces, played with rosined hands moving along the strings, with performances often being notated including choreographies, “drawing attention to the perception of our environment and the ways in which its parameters are detected, transformed and analysed by our senses, simultaneously engaging both seeing and hearing” (Agosto Foundation 2019).

Likewise bridging installation and concert performance, Ellen Fullman has been developing variations of the “Long String Instrument” for over 30 years, in an exploration of the acoustics of large resonant spaces. In both examples, the whole space is sonically and physically activated, through materials that divide, structure, and inhabit it, physically extending the instrument to the size of the space. The performers likewise structure the space while moving through it, continuously playing and sounding the instrument with specifically developed and refined playing techniques, as part and inside of the instrument itself.

In *Accretion*, I likewise extended the instruments spatially and sonically, however my approach differed from Fullman’s, in that the instruments were not fixed in their shape, but rather continuously reconfigured through my movements and the physical and sounding materials used, which afforded a flexible improvisational performance.

Spatial explorations with pianos, where the instruments are multiplied and positioned throughout the space, include pieces by composer Horatiu Radulescu using *sound icons*, whereby up to 17 pianos

are laid on their sides, allowing their strings to be plucked, bowed, and struck (Livingstone 2017 and Gilmore 2003).

Pianist and composer Jaques Demierre goes even further in multiplying instruments. Demierre created a conceptual piece where 31 pianos, including grand pianos, upright pianos, and toy pianos were positioned throughout a performance space (Demierre 2019). The piece consists of varying gestural instructions of playing glissandi on the keyboard, a gesture of sweeping one or both hands wearing gloves in different choreographed movements up and down the keyboard, conducted by the composer, walking through the space and in between the pianos. The piece not only spatializes the acoustic sound, but it also multiplies the performed gesture in manifold variations, which adds a strong visual element. In both examples, variations of in essence one or two gestures—bowing the strings of the piano with nylon thread and plucking the strings, or performing a glissando on the keyboard—constitute the material which structures the entire composition. Here, musical and physical gesture are one, and inseparable. In *Accretion*, I like to play with the occasional separation of gesture and sound, which I feel amplifies the potential that is contained in each component. I further extend gestures by inventing new playing techniques which I discuss below.

## 8.4 Between Memory and Movement— A Work (in) Process

In 2017, I started working with Toby Kassell, a choreographer and dancer working extensively with sound and producing original pieces, who is currently employed at the Gothenburg Opera. I wanted to shift my perspective in relation to instrumental performance, from a strictly sound-based view to one that focuses on inherent body movements and physical relationships. I was interested in Toby's approach

to structuring a piece, his way of working with memory, space, and time from a choreographer's and dancer's perspective. How does working with movement patterns as building blocks in composing with the body relate to how I work with sound and how does his approach to space resemble to or differ from mine?

I was particularly interested in the transitions, whereby a single sound becomes a texture or phrase or part of a larger frame and syntax, and how I could extend the way I use my body to create structure within a musical performance. I wanted to be aware of the role that gestures and movements play in my performance and how memory could be activated as a compositional tool. Given that my performance at the piano often reflects a certain physical effort and a balancing of aesthetic choices between what is possible and what is comfortable, I was also interested in Toby's insights regarding performing movements in uncomfortable or physically challenging positions and how that changes the artistic outcome and meaning of a gesture (see chapter 2 and Intermission II). Based on these thoughts, Toby developed different tasks and exercises which we expanded on in collaboration:

*Perform a short piece at the piano. Improvise for a few minutes. Repeat the piece as precisely as you can and memorize it.*

*This is piece No. 1.*

*Now, repeat it once more, but without performing any sounds, but just the movements.*

A silent choreography of the piece, sound gestures in the air.

*First, perform at the piano.*

*Pick up the objects you used or just use your hands.*

*Then move away from the instrument, perform the piece again in empty space, in the air around you, as if at the piano.*

How much space does the piano take up in the room? How much does my body take up? What is the gestural space that I occupy when I move at the piano? How far to the left do I reach over with my arm to pluck a bass string? I am losing my balance, with my right foot lifted, imagining holding the sustaining pedal. I am trying to remember the exact physical and spatial details of the piano, its layout, and relying on what my body remembers. I do not experience the same resistance, force, or weight with my body, as I do when performing gestures on the instrument; the movements are transformed and become references to sounds. Is all the effort and force I usually move with necessary? Can my movements be ergonomically improved or do they carry another meaning or function I am not yet aware of?

*Play a second piece and memorize it in sound and gesture.*

*Repeat piece No. 2 and now reference piece No.1, either in gesture or in sound. At the piano or away from it. Memorize that new piece, as piece No. 3.*

*Play piece No. 3, and reference piece No. 2 in sound and piece No. 1 in gesture.*

*What is the second sound you performed in piece No. 3? What is the last gesture you referenced in piece No.2?*

Reperforming a piece, and removing the sound from it, or rather, emphasizing the movement which causes it and is so deeply intertwined with its meaning, is foreign to me. It feels mannered or affected at first, I am exaggerating gestures, my body is suddenly the focus and my reference to time and space shifts completely. I am imagining and remembering the sounds I played and trying to recall how long each sound and silence lasted. I don't have any acoustic cues, I am performing ghost movements, working with the physical residue of the piece.

Usually, when I perform, I listen to the sounds I play, how they project and sustain and decay, I react and decide on the next sound to follow, based on my listening. There is an interplay of transitions between sounds and silence and a timing which is connected to that. Here, I am forced to rely upon, and *listen* to, my movements.

After some time, I start to relate to gestures as a trigger, each with its association to, and memory of, a sound. Through disconnecting the movement from the sound, I expose the time and structural force a gesture implies and the dynamic and emotional output and intention that is embedded in the way it is performed.

Composer and performer Jerry Hunt spoke of “sounding signatures” of the movements he performed, facilitating “a liquid sense of movement” between gesture and sound. He describes this in the following terms:

...in terms of gesture, I like the signing of sounds, for performance particularly. I don't really think of myself as doing so much as performance art—it's just a concert with the signing of the sounds in a variety of ways. It's like maybe a color added to the surface of the sounds... which is received visually... to my mind, it makes the rhythm structure of what interests me clearer. It makes the intent I think become more direct and more immediate... (Amirkhanian 1980).

I can relate to this description of gesture adding “color” to a sound. It is compatible with my extended understanding of timbre. I see gesture as a way to express a particular aspect of timbre, as the movement is naturally part of the sound-producing process. While Hunt might use additional gestures to define an intentionality imbedded in the sounds, I use the movements inherent to my playing but removed from sound and from the instrument; these movements are transported elsewhere in space and time. Gestures become part of the orchestrating process in that they build transitions between sounds,



which are not always sounding but can be perceived as *acting silences* and as part of the sonic experience.

In the research project and performance “Sounded Gestures and Enacted sounds,” pianist Catherine Laws and composer William Brooks explore composition as a choreography, “in which the intimate relation between the physical and the sonic is embedded” (Laws and Brooks 2019). In the performance *Disjointed* with piano and percussion, additional instruments are hung from a pole above the piano and percussion setup. Both instrumentalists perform actions and gestures which are at times silent, at times extended and sounding, directed at each other or away from each other, exploring interactions and intentions and “correlations and divergences between gestural and sound content” (ibid.). This exploration of the intentions and qualities embedded in gesture and sound is something that I relate to in *Accretion* as well. I do not, however, use gestures in an interactive, dialogical way but rather to investigate their spatial and timbral content in performance in an improvisational approach. I explore gestures as reminders of sounds, at times abstracted from their original sound producing movement, reduced and performed in varying tempi. I also move in the entire performance space, rather than remaining at the instrument.

Inside piano performer Andrea Neumann has been working with various approaches to music and gesture in in her work since many years, in music theatre performances as well as her solo work or with ensembles. Her piece *Letratone Nr 9* is a solo for inside piano, mixer, tape, and movements, wherein gestures take on yet another function in the structuring of the piece: in the beginning of the piece, she approaches the instrument holding a brush commonly used for playing on a drumkit in each hand, performing a movement resembling a square in the air (Neumann 2017). She brushes the frame of the instrument and the table it sits on, moving on to the strings, and finally reaching the mixing desk, brushing it silently, performing the same choreographed gesture. Here, the movement performed de-

fines the musical material and overall structure of the piece, at times sounding, at times silent. Gesture and sound play equal roles in the performance, but the movement is highlighted through its repetition. Further on in the piece, Neumann additionally uses playback projected through speakers, and, standing next to her instrument, has synchronized the sounds with gestures and movements she performs with her whole body, which seemingly appear to trigger the sounds. In a similar approach with an ensemble during a workshop, each of the five performers move away from their instruments at times, performing choreographed gestures in the air, which again give the impression that these gestures are the cause of the sounds of their instruments projected through speakers. Neumann describes this work process as having created

awareness of the movements necessary for the production of sound and for daily communication. The process involved the analysis and selection of their gestures and its transposition to the performance context, in synchronization with sounds composed during the workshop, as if those movements were the cause of the pre-recorded sounds. (Neumann 2011)

The invention of new gestures, independent from the original movements which created the sounds, adds a captivating layer to the performance, as does the overlapping of past and present sounds which are seemingly triggered by live performed gestures. The gestures gain musical meaning and leave space for associations.

In the work with Toby, gestures likewise take on the role of structuring a piece and choreographing it in space. However, a key difference exists in that they fulfill the purpose of pointing to what *has been* or what *could be* sounding. This is a memory that comes back in another form, embodying sound: a physical manifestation of it. Gestures are taken from their original function of performing a sound, and abstracted as autonomous, transitional parts. Furthermore, in *Accretion*

I use movements through the performance space as sounding extensions within a spatial composition, mapping the space through a timbral choreography.

According to Toby, rather than thinking in strict metrical measures, dancers commonly use the term “body time” to describe time in relation to their own body moving. Body time offers an approach to spatial composition, to the organizing of bodies in space, that I find very interesting, particularly in regards to my work process described above, whereby gestures act as reminders and memories of past (or future) sound events, but also as ways to structure time and to experience the temporal dimension of timbre. The body time concept used in choreography or dance is extended through a sonic component, performing sound within a body-time-space-continuum: How far can my arm reach into the strings? The shape, weight, and layout of the instrument and objects, the instrument space, the tempo of my movements, the time it takes to stretch out my arm to pluck a string all determine and shape the sounds that I play. This is in direct relation to the gestural parameter I applied in my listening comparisons in the “Performative Timbre” study, yet now it is embedded in a compositional framework. The length of a nylon string threaded through the piano strings and the length of my arm decide *when* I change direction as I am bowing a chord. A gesture of bowing a bamboo skewer stuck between the strings of the piano is repeated silently, made visible to the audience, resounding in their imagination, perhaps.

*Imagine the piano is as big as the room. How would you perform the piece now?*

*Change your spatial perspective: lie on your back on the floor of the studio and imagine that the piano is in the air, floating above you.*

I am reaching up to touch the piano and play it. I am struggling, lifting my body weight. It is disorienting, I lose any sense of a physiologi-

cal relationship with the instrument and a simple movement—e.g., pressing down a key—suddenly becomes very difficult to imagine.

*What if you had 3 or 5 or 10 pianos in a room, at different positions in space, each representing and triggering different memories of sound and movement.*

*How would that open up and change your performance?*



Figure 15: Setup, *Accretion*, Lindgrensalen, Gothenburg University, August 2018

## 8.5 Performing *Accretion*—For 3 Pianos and a Pianist

*Accretion* grew out of the collaborative process with Toby Kassell. Three pianos are placed in different positions in the performance space, with the audience sitting in between and around the instru-

ments. In this piece, no amplification is involved. This again is an inversion of “Piano Mapping,” where the piano was placed in the middle of the room and the audience around it—here, the audience is framed by the instruments.

The focus of the piece lies in playing with the repetition and variation of material, referencing pieces on one piano, which were previously performed on another one, and thus accumulating different layers of material and memory, which are further multiplied by the 3 instruments. Hence the title, *Accretion*. I am playing inside the pianos, moving in-between them, transitioning the sound of one instrument to the next and at times perform the resonance of all three sounding bodies simultaneously.

Small vibrating engines (vibrators) and EBows are placed inside the pianos operated from elsewhere in the space through remote controls. The development of new playing techniques and material plays a major part in the spatial composing of body and instrument. Initially, I considered using piano strings or similar wire as sounding extensions between instruments, however they proved to be rather difficult and time consuming to install or attach to the pianos. I needed to find material and techniques which are adaptable and flexible so that the element of improvisation would still be contained in the setup and piece. Some examples of techniques include: rosined fishing line or plant stretch tie, attached to one or several strings of the piano, 5-10 meters in length, which I bow as I move from one instrument to the other; a thin chain, threaded in between strings, which is also about 10 meters long, depending on the space and distance between instruments; magnets, which are thrown and resonate on the strings of the piano moving away from or approaching the instrument. I press the sustain pedal of all 3 instruments down with big wooden clothes pegs, so that the strings can permanently resonate. At times, I might lie on my back on the floor and push myself through the space while still playing the piano, or perform silent gestures, listening to this *gesture timbre* and how the physical residue of a sound sounds.

The resonating objects and material described above form a sonic and physical connection between the pianos, acoustically transforming the performance space and leaving physical traces; a spatial composition emerges and unfolds, creating different spatial and aural perspectives.

By placing the three grand pianos far away from each other, framing the audience and the performance space, I am putting myself in a situation I haven't been in before. I am "forced" to move, I make performing challenging for myself and this means finding physical transitions, solutions, and connections between instruments and in space. I move through space, I divide it, define its borders, and how I relate to it; I engage in a sonic dialogue with instruments, space and body. These are aspects which likewise become spatial experiences for the audience, as they perceive sound coming from different sources positioned across the space, at times simultaneous and immersive, at times removed and distant. As the audience is seated in the middle of the space and around the grand pianos, we all share the same space. This allows me to experience sound in the room together with the audience, while simultaneously performing.

However, I consider *Accretion* to be a musical concert performance, in the sense that sound is the dominating characteristic and a compositional force in creating the piece. Movement does not have a purpose in itself—it fulfils the function of getting from one spatial position within the musical performance to the next. Body movement and gestures are choreographed and at times separated from the sound they produce, but they are not a theatrical element: they function as reminders of what has happened, of musical structure, and they change the physical, temporal, and aural perspective in experiencing sound and space. They are a visualized musical thinking.

In 2003, pianist Cor Fuhler composed a trio for pianist, dancer, and grand piano, commissioned by the Holland Dance Festival for dancer



Figure 16: Performance of *Accretion*, September 2018, Lindgrensalen Gothenburg University

Michael Schumacher, called *Triple Dutch* (Fuhler 2003). In this piece, the grand piano is moved through the performance space by the pianist, changing the spatial relationships to be used by the dancer “as anchor for his actions” (Fuhler 2016a, 2). The instrument is approached from different angles via the inside, the keyboard and through creating an “auto sound” on the instrument (ibid.) without the necessary presence of the pianist (Fuhler works with self-built electromagnetic devices, radios, vibrators, etc.). Fuhler says the composition addressed

...the use of tactile intimacy versus detached spectatorship as musical parameter...moving away from the expectation of ‘soloist with musical accompaniment’ to a more holistic relationship...In this way we were able to give the piano an equal role in the performance and engage in a discourse. (ibid.)

The changed spatial and aural perspectives in Fuhler’s composition, as well as the physical approach to the instrument and space are in

some ways similar to *Accretion*. However, major differences exist in the conceptual and philosophical approach of the two works: instead of moving the instruments to different spots in the performance space, as in *Triple Dutch*, in *Accretion* I am the one moving between different spatial positions through the multiplication of instruments, creating timbral transitions between instruments with my body through inventing new performance techniques. Rather than a trio for pianist, dancer, and piano, the collaboration with Toby Kassell led to a solo, where the performer embodies and moves between performance elements. In a review of *Accretion*, Andrew Choate observes:

...the pianist is the one choreographed. No dancers—professional or otherwise—take the stage...The collaboration happens simultaneously in and with one body... When the body is referred to as an instrument, it amplifies the connotations of the body itself as a medium between worlds—an instrument of communication between the personal and the impersonal, between the human and the not-human... in *Accretion* the focus is on multiple mediums at once, and how to navigate both spatially and sonically. (Choate 2019)

For me, this describes the essence of timbre orchestration in a performance context: moving between multiple media—space, body, instrument—with the borders between each component blurring into a hybrid compositional approach in creating with timbre.

## 8.6 Afterthoughts

Through the work with Toby, and the development of *Accretion* in particular, I gained more awareness of space, movement, and body in my performance. This has had an influence on creating and composing with timbre and on my perception of time as such: temporal rela-



tionships change when body movement is involved, and so does the listening experience.

The experience of space as an embodied listening process adds another dimension to my practice, which I have incorporated into my performances outside of this piece, as I describe above in relation to the solo concert at the Letra Tone Festival in Berlin. It further opened the way to other collaborations, e.g., in dance, and enabled a different physical approach to the instrument and performance as such. In a collaboration with the Sasha Waltz Dance Company and musicians Morten J. Olsen and Sabine Ercklentz at Radialsystem, Berlin, in April 2018, the gestures I performed at the piano were picked up, repeated, and transformed by dancers, which then triggered further action and movement on my side, incorporating movement into the performance as a compositional strategy. This physical performance attitude would not have been possible prior to the collaborative work with Toby Kassell.

In chapter 1, I proposed that “orchestrating and choreographing timbre” can be defined through acts of creating micro and macro structures with sound, instruments, body, and space. For me, the focus of such work lies in exploring the *in-between-spaces* in a spatial and sonic composition, which I am confronted with in *Accretion: space* literally and *space* musically.

Further, the strategy of mapping, which I have employed in all of the projects undertaken as part of my doctoral research, forms a second area of focus here as well. In *Accretion*, I experience and map space physically, visually, and aurally.

Separating different performance elements leads to their reassembly and the intentional reversal of processes. In “Performative Timbre,” I detailed and separated gesture, objects, and sound mentally, through different listening modes, while in *Accretion* I separate and reassemble these elements physically. I had to invent movements and playing techniques and “amplify” gesture through separating



Figure 17: Performance *Dialoge Wirbel* (2018), Sasha Waltz & Guests and the author, at Radialsystem Berlin, April 2018

the sound from it. This “opened up possibilities for movements to be about sonics and for sonics to be about movements while always insisting that every gesture and every tone be autonomously meaningful” (Choate 2019).

*Accretion* turns into an embodied performance experience. It intensifies and continuously renegotiates space-body-object relationships in composing with timbre.

Dyrssen talks about the “narrative and associative aspects related to verbal language” that bodily or musical gestures can imply (Dyrssen 2017, 180) and further quotes Anders Hultqvist, who refers to musical gestures as having “cognitive association areas where information from several senses is merged, forming complexities or ‘images of totality’ (Hultqvist 2013, 67). For me, gestures by themselves also serve as moments of reflection, ways to experience time and space physically, and to let that experience inform the compositional process of a piece. Gestures provide a more tangible experience of sound, space, and time for the audience. I exploit the potentiality of gesture and movement within a concert performance in giving it autonomy to function as a connecting, transitional part.

Working with memory in sound, space, and movement, timbral memory, forms a connection to all the projects developed during my research into timbral improvisational processes. I have explored the generative and structural use of memory in *Memory Piece*. Here, the overlapping of past and present spatial and sonic layers creates the composition and evokes different perceptions of sound events and environments. “Piano Mapping” explores spatial memory through listening to sonic movements in a multichannel live spatialization. In *Accretion*, memory takes on a physical form, embodied through the instruments or through my gestures. This physical act of enacting and reacting to memory is something that I find is both particularly intimate and simultaneously highly accessible for an audience; it’s both sonically and visually traceable, and my movement through a shared performance space further enhances this experience.

I can see *Accretion* developing further into different directions: as an installation concert performance with even more pianos, performed over a longer durational period, with audiences moving within the space. Further, I also see a possibility to incorporate *Memory Piece* as an additional sparse sound installation in the room, and the gestures taking on the role of *sounding* and *reenacting* pre-recorded sounds as well as being reminders of the live performed sound. An extension of

*Accretion* could also involve more performers; instrumentalists as well as dancers, adding actors and instruments as multiple, interdependent body-time-space performers.





## Chapter 9: Coda

### Memory Resonating

There is no listening without memory (Borgo 2005, 88). In the way that I listen and create sounding responses, I also create sound memories. Experiencing time through sound turns the performance into an open-ended process, where experiences and memories are built and stored and placed continuously in a state of transition. Oliveros points to our interpretation of sounds which encompass a time delay, reaching from “milliseconds, to many years later, or never” (Oliveros 2015). Memory then turns into a subjective filter, filtering experiences and the way future events are perceived, which can redefine a situation, enunciate it, and enhance certain aspects of it. Hence, for me, memory functions as a reflective and transformative tool in music making and beyond, it forms a concern that seeps into my artistic practice.

The projects and research into timbre undertaken through this doctoral research highlight the multiple and complex roles that memory plays in contemporary improvisational practice. I have introduced the term *timbral memory* in order to describe how I use memory strategically in relation to an extended understanding of timbre, namely: as a means to gain knowledge about improvisational processes, to create material, movements, spaces, and transitions; as a generative tool in composing multichannel performances, such as *Memory Piece* and the audio papers; through gestures and movements as reminders of past and future sound events; as a means to structure time in *Accretion*; and through the memory embedded in objects and the memory of spatial sonic experiences in “Piano Mapping.”

Memory possesses capacities and implications in and for artistic practice that reach way beyond its instrumentalization in compositional structures. Memory brings about an awareness of our own be-

havior and responses to a musical context and to our immediate spatial and cultural environment alike, as human and non-human agents, through our reflection about past (sound) events and performance situations.

## Changes

It was writing the Chapter Summary that is set out in chapter 1.8 that I settled on the central issue of this thesis: the exploration of timbre and its orchestration from a performer's perspective. This constitutes the heart of my research.

In these closing paragraphs of the thesis, I would like to discuss how the projects and questions that I asked through this research changed the way that I perform and think about timbre, music, and improvising. I would also like to address the thoughts and sensations that performing this research has left me with.

This research grew out of the need to explore the affordances of timbre, and a desire to renew and situate timbre in accordance with a contemporary, site-specific, improvisational practice.

In pursuit of an extended understanding of timbre, I have articulated a position that views space, material, and movement/body, and the relations between these elements, as non-hierarchical and non-separable interactive agents in improvisational music performance. This understanding lies at the core of a "timbral approach," which demands the navigation of multiple media beyond the sonic—this approach radiated throughout my research and is present in all of the projects which make up this thesis. From a performer's perspective, I have been able to define the act of orchestrating timbre as *an attentive reorganization of active agents*, by means of the creation of musical structures at micro and macro levels, through the spatial, temporal, physical, and mental sculpting and transitioning of timbre, within a variety of compositional frameworks. Through the projects



and approaches detailed here, I have unfolded myriad details and complexities which are part of performing timbre in improvisational music.

It has also been important to unfold a relevant research methodology that combines diverse modes to explore timbre as situated complexities. The methods and approaches that were applied in this practice-based research were systematic, analytical, and artistic and included viewpoints that were articulated through dialogues and interviews with other practitioners. These methods, the knowledge gained through them, arose through and are intertwined with performances and composed works, whereby I: placed the audience inside the piano, using amplification techniques and speaker setups; undertook systematic mappings of vocabulary and technique; experienced and employed timbral memory; and developed timbral choreographies and gestural approaches to spatial composition. These approaches were linked by a desire to enhance and intensify the experience that a performance has to offer.

Despite being systematic, the artistic approaches employed were not didactic. I did not construct a quantifiable categorization or a terminology of timbre. The artistic works and the timbre orchestration used in their creation were not *explained* and thereby reduced—rather, the complexity of timbral processes were *unfolded*. I explored and extended timbre within my practice and exposed it as a dynamic energy in performance, which exists in a continuous state of transition. Indicating that a categorization and labeling of improvisation and composition would be too rigid, I instead embraced the closely intertwined and overlapping nature of these approaches in music making, viewing them as emerging through musical interaction and thus as perpetually repositioning the performer.

Subjective and systematic mappings were used as a strategy to articulate and define active agents in timbre orchestration: the *piano maps*

were created as ways to explore and compose timbre spatially, while *mind maps* were used as a mental structuring of my sound vocabulary. The *perceptual timbre maps* were used to meticulously dissect my timbre vocabulary in detail, to perceptually magnify each sound and its capacities, structure, and internal movements, through all stages of its existence. The mapping, comparing, and connecting of sounds deepened and intensified my compositional thinking, and revealed an intentionality which is intrinsically connected to timbre orchestration. I introduced the terms *object timbre*, *action timbre*, and *gesture timbre* as active agents and guiding factors in creating transitions while I perform, and as complements to *sonic timbre*.

In this thesis, I further opposed the notion of generalizable, reproducible and transferrable (extended) techniques, instead offering detailed and intimate approaches to technique and material.

In the “Performative Timbre” study, I defined technique and vocabulary as tools and material in improvised music making which have to be idiosyncratic, multisensory, and continuously reinvented. I have extensively discussed the qualities and the potential embedded in objects and instruments, playing methods, and gestures throughout the thesis in relation to their role in timbre orchestration, relying on both my own recollections and insights and the perspectives of other practitioners.

By offering a multitude of aural and spatial perspectives, the projects that make up this research created diverse listening and performance modes. In “Piano Mapping,” spatio-timbral relationships were expanded and deepened by means of live spatialization. I discuss the way in which I experienced loudspeakers and the piano as extensions of my own body and how *warping* space has a narrative function in relation to how I listen and perceive. I introduced the term *timbre choreography* to describe acts of organizing and composing of sound, instruments, and bodies in space. Through *Accretion*, I explored gestural and physical approaches as ways to activate and compose timbre spatially.

The projects combined intuitive and cognitive, immediate and trained, bodily and mentally grounded processes, and served as a basis for the development of my extended understanding and use of timbre. At times, the process of developing methods were my main aim, at other times the focus was on the artistic work being created, which in itself embodied the heightened awareness of timbre that I was seeking, showing how timbre can act as a dynamic energy in improvisational performance. The works themselves also took on multiple shapes and became as hybrid as the methods employed to create them, leaving room for imaginative reinventions—timbre maps and piano maps could be turned into scores, audio papers into verbal notations, and *Memory Pieces* were able to take on multiple forms in a series of timbral compositions and variations.

The orchestration and choreography of timbre becomes an open and hybrid compositional approach, which can be applied to various improvisational contexts, implying an engagement and reconfiguration of the dynamic relationships that form a given context. These multisensory timbre experiences fed back into my artistic practice and generated ways to stimulate and extend a performer's imagination by unfolding the complexities involved in creating with timbre. For me, this unfolding constitutes a powerful and exciting way of understanding and using the potential afforded by instrument-body-space interactions.

The dynamic improvisation and connections that I have observed and experienced throughout this research into timbre orchestration brought about an awareness about the choices that I make when I perform. This awareness starts with a deeper engagement with sound-creating processes and extends to choices about audience seating, the creation of listening spaces, as well as including space and movement more actively in my performances.

Tristan Murail's description of sound as "a field of forces" (Murail 2005, 122), an idea that I encountered many years ago, has acted as both

an inspiration and a concrete starting point in this research. As I developed and performed the projects described in this thesis, I started seeing connections and interactions between timbre, movement, material, and space, as well as links between the physical, the aural, and the visual in my work. I realized that I experience the orchestrating of timbre as an organization of energies: a transitioning of energy from one timbral state or form to another. This insight extends my competence as a performer, leading to a more multisensory, diverse, and detailed approach to performance. It has changed my relationship to instruments, space, and my body as a performer and multiplied the possible creative responses available within a given performance situation, providing, ultimately, an enhanced timbral listening experience for myself as a performer and the audience.

Together, these approaches and projects have led to a more complex and engaged way of listening and performing through site-specific improvisational practice, which sets the performer in dynamic relation to a complex and constantly changing environment within the performance and outside of it.

I believe that timbre orchestration in improvisational music could be extended and applied to take into account several performers, enabling further collective interactions or collaborations across the disciplines and offering exciting and dynamic possibilities for new work. This realization has increased my interpretation skills, and allowed me to recognize and react to other musicians and approaches within a group, enhancing skills of language comprehension within improvisational music. As I point out in chapter 8, I also see potential in areas that bridge installation and concert performance, with durational performances extending both spatial and temporal parameters.

The research has been a really fun way of learning about and going deeper into improvisational structures, for myself and hopefully for other practitioners through reading and experiencing this thesis.

I see vast pedagogical value in disseminating and developing these methodologies further, for students, other practitioners, researchers, and teachers alike. The recognition and organization of timbre as an extended concept in improvisational music offers an alternative approach and constitutes a valuable addition to existing methodologies. Rather than teaching existing models for composing and improvising with sound, it encourages practitioners and students to develop and extend their own idiosyncratic (sound) vocabulary and techniques. Improvisation studies profit from broader methodological as well as interdisciplinary strategies and I am excited to contribute to this field through the present research and by way of future extensions of this work.

As part of critical improvisation studies, this research has the potential to connect artistic research in music, which is often viewed and treated as a self-contained discipline, with broader artistic fields, to inspire discussions, creation and education, and to reach broader audiences. This thesis offers practitioners as well as listeners across disciplines a method by which they might approach (sound) material and engage with it in a focused, detailed, and performative way, thereby unfolding its relational properties. The projects that I envisage as benefiting from my research include collaborations using its tools and methods across different artistic fields that are related to improvisation, projects employing detailed methods of approaching technique and vocabulary through strategies of mapping and cataloguing, and work that is dedicated to the creation of listening modes, which can be translated as or applied to a detailing of qualities and perspectives in the perception of art practice.

Most importantly, perhaps, this research into orchestrating, transitioning, and performing sound has increased my joy in playing music and performing, something that I hope to transmit to others through this work.



## Summary in Swedish:

### Att orkestrera klang

#### Processer av klang och minne i improvisatoriskt pianospel

Forskningen i den här doktorsavhandlingen undersöker *orkestrering av klang* (the orchestration of timbre) från utövarens perspektiv som sätt att utveckla improvisatoriska processer med utgångspunkt i min egen praktik som pianist inom improviserad musik, där prepareringar och objekt används som utvidgning av instrumentet.

Med klang menas ofta ett rent ljudande (soniskt) fenomen men jag menar att det inte är i linje med nutida platsspecifik improvisatorisk praktik, där föränderliga spatiala omständigheter inverkar på lyssningsupplevelsen. Inte heller tar det hänsyn till affordance och agens – situationsspecifika kapaciteter, aktiva resurser, potentialer och sätt att verka – hos instrumentet och de använda objekten eller genom utövarens rörelser och gester.

Klang fascinerar mig genom den mångfald av parametrar och erfarenheter den bär med sig av frekvens och dynamik upplevd över tid och spatialt. Forskningen växte fram ur behovet att utforska klangens inneboende möjligheter och att utvidga och placera den i sammanhang av min egen praktik som utövande pianist. Jag vill nå en djupare förståelse för den kompositoriska och relationella potential som finns inbäddad i klang och hur den kontextualiseras i framföranden av improviserad musik genom klanglig orkestrering. Genom forskningen vill jag hävda en rad aspekter som går utöver det rent soniska – som till exempel föränderliga rumsliga omständigheter, instrumentens och objektens affordance och agens samt utövarens rörelser och gestik. Allt detta inverkar på framställningen och lyssningsupplevelsen och behöver beaktas för att förstå och arbeta med klang.

I avhandlingen introducerar, undersöker och argumenterar jag för en vidgad och situerad förståelse av klang relaterad till material, rum, kropp och minne, som erkänner komplexiteten och tar med dess po-

tentialer att bidra till ett etiskt förankrat engagemang med den situerade kontexten. Jag ser de materiella, spatiala, kroppsliga och mentala relationerna som icke-hierarkiska, icke delbara och i ständig omvandling och som hela tiden kräver att omformas utan att reduceras eller förenklas. Detta klangliga tillvägagångssätt, som navigerar genom sina mångfaldiga media och modus bortom det ljudande (soniska), präglar hela min forskning. Ur utövarens perspektiv definierar jag orkestrering av klang som en uppmärksam omorganisering av aktiva agenter, energier och skapandet av musikaliska strukturer på mikro- och makronivå genom att skulptera och transitera (förflytta) klang – rumsligt, tidsmässigt, fysisk och mentalt – inom en variation av kompositoriska ramverk.

### Orkestrering av klang

Begreppet *orkestrering av klang* eller *klanglig orkestrering* inom den skapande processen i improviserad musik har övertygande potential som, vad jag känner till, inte har fått mycket uppmärksamhet. Tristan Murail beskriver ljud som ett "fält av krafter" (field of forces, Murail 2005) och pekar på deras kapacitet att forma dynamiska relationer med omgivningar som de upplevs i. Min forskning uppmärksammar de varierande och komplexa aspekterna instrument, kropp och rum i improvisatoriska musikframföranden och ger en utvidgad förståelse av klang. Jag analyserar inte inspelade improvisationer i efterhand men tillämpar undersökande metoder som integrerar och drivs genom framförande och skapande av konstnärliga verk. Jag ger mig in i härvan av ljud, material, kropp och rum med mina erfarenheter av lysning och framförande – inte för att försöka reda ut den men att organisera om och länka involverade komponenter och deras agens och framhålla komplexiteten i klanglig orkestrering. Ett generellt syfte i min forskning är att söka efter sätt att stimulera och vidga utövarens föreställningsförmåga genom att utveckla de komplexiteter som det innebär att skapa med klang.



## Klangligt minne

Studierna och de konstnärliga arbetena utforskar också de många överlagrade kvaliteterna i minne som strukturellt, reflekterande och performativt verktyg i skapandet av musik och motsvarande områden. Minne – tidsmässigt, rumsligt och fysiskt – befinner sig vid tröskeln mellan improvisation och komposition, eftersom det kan uppenbara och skapa relationer mellan ljudhändelser och är fundamentalt i lyssnings- och skapandeprocessen i ett framträdande; det innebär *en kontinuerlig aktivitet av att minnas och lyssna* till vad som just har spelats och att skapa i respons till det.<sup>71</sup>

För att förstå klang krävs att vi erkänner de mångfaldiga och komplexa roller som minne spelar i nutida improvisatorisk praktik. Jag introducerar termen *klangligt minne* (timbral memory) för att beskriva hur jag använder minne strategiskt som ett medel att nå kunskap om improvisatoriska processer i linje med en vidgad förståelse av klang. Det utgör ett kompositoriskt verktyg i flerkanaliga framträdanden genom gester och rörelser som påminnelser om tidigare och kommande ljudhändelser och medel för att strukturera tid, genom minne inbäddat i objekt och minnen av spatiala ljudupplevelser som används för att konstruera ett narrativ i en föreställning.

## Utgångspunkter och forskningsfrågor

Under 2013 var jag medproducent för ett radioprogram som innebar utforskandet av många olika infallsvinklar till *Inside and Prepared Piano*, dvs. sätt att spela inuti och med preparerat piano (Mayas 2013). Det var startpunkten för den här avhandlingen och forskningen kring att utveckla djupare personliga insikter och förmågor i nära relationer

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71) se till exempel Butch Morris "conductions" (Conduction 2019); John Zorn's spelstycke "Cobra" (Brackett 2010); eller Walter Thompson's "Soundpainting" metod (Thompson 2018).

mellan instrument, rum och kropp och metoder att undersöka dessa relationer i klang, när musik skapas och framförs.

Jag ser improviserad musik som en platsspecifik praktik och ett djupgående och etiskt engagemang med en situation, där framförandets rum, objekt eller verktyg – tekniken inbegripen – för att spela och bearbeta processen och instrumentet, samt även publiken blir komponenter inom ständigt föränderliga omständigheter och villkor.

Undersökningarna av klangliga improvisatoriska processer har till största delen gjorts genom utforskande projekt integrerade i min praktik. Det har inneburit ett skifte av fokus och en förhöjd medvetenhet i framställning och lyssnande. Beslut och metoder uppstår ur och genom de konstnärliga verken själva, som ett privilegium och en fördel av att vara inne i en konstnärlig process inom den praktikledda forskningen. Att orkestrera klang vänds till en öppen och hybridartad kompositorisk ansats som kan tillämpas i olika improvisatoriska sammanhang och som inbegriper dynamiska relationer och omformar dem; ett sätt att förstå och använda den potential som interaktioner instrument-kropp-rum och minne genererar. Här har också ingått att utveckla och utvidga vokabulären för att spela inuti pianot och att använda prepareringar och objekt som utvidgningar av själva instrumentet.

Den centrala forskningsfrågan är: Hur orkestrerar jag klang? Den har inramat alla övriga frågor, som jag mejslar ut i de olika projekten:

- Vad är relationen mellan klang och gest/kropp, rum och materialitet i min praktik?
- Hur formar objekten (pianot, prepareringar, högtalare, mikrofoner) mina idéer?
- Hur interagerar jag med rummet – hur koreograferar jag klang?

Forskningsprocessen ledde vidare till följande frågor, som jag undersöker i kapitel 2-8 med skiftande betoning på två fokuserande aspekter:

- Hur utvecklar jag och förstår teknik och vokabulär?
- Vilken roll spelar minne i improvisatoriska processer, hur kan det användas och göras påtagligt som strukturellt verktyg, rumsligt, ljudmässigt och fysiskt?

## Undersökande metodik

Ett ljuds klang är ett fenomen som fortfarande är svårt att definiera eller ens tala om, även om det funnits många försök att kvantifiera eller konceptuellt närma sig det: Ibland sker det helt enkelt genom att beskriva vad det *inte* är; genom att hänvisa till det som ett ljuds "färg"; genom att uppfinna olika skalor och system för att kategorisera det; genom att fokusera hur olika klanger *produceras* snarare än att beskriva deras ljudmässiga resultat; genom att jämföra det med språk; genom att beskriva frekvens och balans mellan olika delar i ett spektrum<sup>72</sup>; eller inom psykoakustisk forskning genom *klangrum* (timbre spaces), en grafisk representation av upplevda (o)likhetsgraderingar av komplexa klanger översatta till en avståndsmodell.<sup>73</sup>

Genom hela min forskning har jag tillämpat en explorativ och experimentell metod konstnärligt och analytiskt för att undersöka klang primärt genom framföranden och lyssnande. Vad som förenar alla projekten och sätten jag ledde dem på är deras integrering i min egen

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72) "timbre, the subjective perception of spectral content (frequency and balance between various parts in the spectrum)" (Kleiner 2008, 77)

73) För en introduktion till klangrum, se Wessel 1978.

praktik av utövande-framträdande, inspelningar med pianot och samarbeten med andra utövare.

Metoderna och de systematiska och konstnärliga arbetssätten jag använder är inte didaktiska – jag konstruerar inte kvantifierbara kategoriseringar eller terminologi för klang – och de konstnärliga verk och estetiska val som görs i skapandet är inte förklarade. Snarare avtäckar jag komplexiteten i klangliga processer istället för att reducera dem, utforskar och utvidgar min praktik och visar på klang som dynamisk energi, ständigt omvandlad i framföranden. Jag presenterar en utvidgad förståelse av klang, diskuterar komplexa lyssningsmodus och erbjuder systematiska strategier för subjektiva kartläggningar som sätt att närma mig teknik och vokabulär och som kan anpassas och tillämpas bortom min egen praktik, inom andra konstnärliga områden.

Jag har valt att ha fokus på pianot och min solistiska praktik och går inte in på improvisationer i ensemble, detta för att behålla transparens och enkelhet eftersom det annars skulle öppna för många frågor som rör samarbeten, kollektiva beslut inom ensembler etc., vilket är bortom ramen för den här avhandlingen. Det finns dock vissa undantag där bearbetningar av stycken för ensemble diskuteras.

Avhandlingen vänder sig emot idén om generaliserbara, reproducerbara och direkt överförbara tekniker och erbjuder istället detaljerade och ingående sätt att närma sig teknik och material, vilket leder till *objektklang*, *handlingsklang* och *gestisk klang* som aktiva agenter i ljudproducerande processer.

I forskningsprocessen ledde jag fyra explorativa projekt som varit integrerade i min egen praktik och i samarbeten med ljudingenjörer, en instrumentbyggare och en koreograf. Projekten ingår i en personlig konstnärlig utveckling som vidgar min praktik or erbjuder en metodik för att undersöka klang genom explorativa ansatser till instrument, objekt, rum och kropp. Den praktikbaserade forskningsmetodiken har gjort det möjligt att utveckla ett flertal mångbottnade kombinerade, konstnärliga och analytiska tillvägagångssätt för att närma sig klang: att undersöka verkningsfulla objekt och artikulera ett spektrum

av olika perspektiv genom dialoger och intervjuer med andra utövare; att göra systematiska jämförande lyssningsexperiment kring ljud, objekt, spelsätt, gester och klang för att utveckla en detaljerad vokabulär och teknik; att genomföra konstnärligt drivna experiment samt mappningar (ompositioneringar) för att utforska samverkan mellan mikrofoner och högtalare, inspelning och förstärkning i skapandet av spatiala kompositioner; att medverka till en specialbyggd anordning för live-spatialisering (live spatialization, dvs. rumsskapande med ljud på plats)<sup>74</sup> som sätt att utvidga och fördjupa spatio-klangliga (spatio-timbral, rumsligt klangliga) relationer; att använda gestiska ansatser för att undersöka spatialt komponerande och *klangliga koreografier*.

I forskningen har jag successivt utvecklat explorativa strategier och metoder för att undersöka klang:

- Jag introducerar en utvidgad förståelse av klang, artikulerar relationer mellan rum, material och rörelse/kropp som icke-hierarkiska och icke separerbara agenter i improviserad musikalisk gestaltning.
- *Teknik och vokabulär* som verktyg och material i improviserat musikskapande måste vara individualiserade och anpassade till varje situation i enlighet med en utvidgad förståelse av klang. Jag definierar och arbetar med dem som *idiosynkratiska, multisensoriska och kontinuerligt återuppfunna*.
- *Intentionalitet* i musikaliska framträdanden diskuteras som en inneboende del i orkestrering av klang som kan spåras och behöver differentieras igenom alla olika aspekter av framföranden.

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74) Jag använder termen spatialisering för att beskriva möjligheterna att styra och sprida ljud genom högtalar- och mikrofonplaceringar i rummet. Live-spatialisering (live spatialization), dvs spatialisering i rummet, hänvisar till att förflytta och rikta ljud mellan högtalare vid framträdanden i rummet (live performances) i motsats till att de är fixerade i förkomponerade stycken.

- Jag skapar och utvecklar *lyssningsmodus* som nära inneboende och detaljerade ansatser i ljudproduktionsprocesser, grundläggande för orkestrering av klang.
- Gester och rörelse formar en strukturell del i ljudproduktionsprocesser och fungerar då som aktiva agenter i den utvidgade förståelsen av klang. Jag använder gester och rörelse som autonoma, överförbara delar, som ger sensoriska erfarenheter av ljud, rum och tid.
- *Klanglig koreografi* innebär en rumslig orkestrering av klang som jag utforskar genom fysiska rörelser och genom användning av högtalare och mikrofoner.
- *Minne* fungerar som en sammanbindande kraft i strukturerandet och komponerandet med klang och som ett reflekterande och transformativt verktyg i och utöver musikskapandet. Jag undersöker minne som strukturellt, reflekterande och performativt verktyg i skapandet av modus i utövande och lyssnande och som integrerade delar i orkestreringen av klang.
- Genom taktisk användning av *mappning* och *katalogisering* definierar jag aktiva agenter i den klangliga orkestreringens och koreografins processer.

## Om material och kapitlens innehåll

Metodiken har bland annat resulterat i två ljudpublikationer (audio papers), en serie flerkanaliga kompositioner för solopiano med mig som pianist samt en specialbyggd anordning för live-spatialisering (se *Audio papers* och *Object Stories*, kapitel 3 och Intermission II).

Avhandlingen bygger delvis på, utvidgar och refererar till artiklarna "Transmitting a listening" (Mayas 2017) och "Creating with timbre" (Mayas 2019), liksom många skrivna reflektioner, tidskriftsbidrag, intervjuer och samtal med och berättelser tillhandahållna av andra

praktiker. I forskningskatalogen (Research Catalogue, RC)<sup>75</sup> finns "Orchestrating Timbre" utställd, se <https://www.researchcatalogue.net/view/382024/382025>. Den utgör en del i avhandlingen och kommer att arkiveras på GUPEA, Göteborgs universitets publikationer i det elektroniska arkivet för e-publicering och open access, tillsammans med den skrivna avhandlingen.

Avhandlingens disposition startar med en introduktion och bakgrund till forskningens sammanhang i kapitel 2-3. Textens centrala del i kapitel 4-8 består av beskrivningar och reflektioner över de fyra delstudierna och projekten. Kapitel 9 avslutar med en diskussion av forskningsresultat och förändringar. Här följer ett sammandrag:

## **Kapitel 2: Instrumentrelationer**

Kapitlet är en introduktion till att spela inuti piano och preparerat piano (inside and prepared piano playing), som ger en kort historisk överblick till klangforskning inom relaterade områden och positionerar författaren inom fältet. Relationer utövare-instrument i improviserad musik diskuteras specifikt för författarens praktik. Teknik och vokabulär undersöks systematiskt och detaljerat som sätt att arbeta nära med instrumentet. Det följs av en introduktion till förstärkning och inspelning som forskningsmetoder med detaljerade beskrivningar av interaktioner mellan mikrofon och högtalare som klangliga och spatiala utforskningar.

## **Kapitel 3: Objekt**

Kapitlet inriktas mot objekt och prepareringar använda som instrumentella tillvägagångssätt i musikskapande. *Objektminnen* (Object Memories) berättas från egna erfarenheter och ger uttryck för den

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75) Research Catalogue (RC) är en internationell databas för konstnärlig forskning med open access för spridning av egenpublicerat innehåll liksom för kvalitetsgranskade publikationer, tidskrifter och institutionsutgivningar.

roll som objekt spelar i den mentala och fysiska struktureringen av ljudmaterialet i min egen konstnärliga praktik. Det följs av *Objekthistorier* (Object Stories), en samling korta berättelser av olika konstnärer och musiker som speglar hur teknik och vokabulär utvecklas genom objekt på många olika och unika sätt i musikskapande. Berättelserna vänder sig emot indelningar under beteckningar som "utvidgade tekniker" och visar på mångfalden av utövande praktikers framställnings-sätt inom improviserad musik.

#### **Kapitel 4: Performativ klang**

Kapitlet beskriver en intensiv lyssningsstudie i samarbete med Palle Dahlstedt. Här används en subjektiv mätning av likheter, en adaption av en teknikvetenskaplig metod (Timbre Space method) för att mäta klangrum och som uttrycker klang i relation till material, gestik och spelmetod genom en omfattande lyssnings- och jämförelseprocess. Det följs av en introduktion till strategier för mappning som mental strukturering av vokabulär och teknik, och som tydliggör kopplingar och relationer mellan aktiva agenter i orkestrering av klang. De vägledande frågorna har varit: Hur lika är ljuden i termer av (1) vilka objekt som används för att producera dem; (2) spelmetoden för att producera dem; (3) de fysiska gester som görs för att producera dem; (4) vilken klang de har.

#### **Kapitel 5: Katalog över former och rörelse**

Efter undersökningen av performativ klang översätts i det här kapitlet resultaten av lyssningsjämförelserna och graderingarna till grafiska representationer utvecklade tillsammans med Palle Dahlstedt. *Multi-dimensional scaling*, MDS – en spatialt analytisk metod – används för att visualisera samlade data och resulterar i fyra perceptuella klangkartor: *karta över objektklang*, *karta över aktivitetsklang*, *karta över gestisk klang* och en sammanfattande *klangkarta*. Kartorna analyseras



och jämförs med varandra, vilket avslöjar relationer mellan och inom de olika aspekterna och uppenbarar detaljer, förändringar och komplexiteter som del av klanglig orkestrering i improviserad musik.

### **Mellanspel I: Är det fortfarande magiskt?**

Det här är en verbal notering av de två ljudpublikationerna *Transmitting a Listening* och *A Fuchsia Colored Awning*, som skapades under forskningsprocessen och finns representerade i RC-utställningen. Den omfattar transkriptioner av intervjuer och citeringar tagna från bägge styckena för att reflektera den tematik som berörs i båda verken: improvisationsprocesser och den roll som minnet spelar i dem, en diskussion om olika system för att kategorisera och notera ljudmaterial, lyssningsmodus samt relationer mellan gester, rum och ljud.

### **Kapitel 6: Memory Piece**

Projektet *Memory Piece* beskriver en serie kompositioner för förstärkt piano och flerkanalig uppspelning. Inspelningar från tidigare framträdanden överlagras med nytt pianospel på plats vilket spårar soniska, spatials och temporala relationer och transformerar det som passerat tidigare samtidigt som det skapar nya ljudupplevelser. Lagren av inspelningar och nya improvisationer beskrivs detaljerat som en mångkanalig kompositionsprocess med tekniska kapaciteter, överföringar och skiften, där minnet är medskapande och med soniska och estetiska implikationer. Variationer och adaptationer av verket till olika rum, instrument och ensembler diskuteras.

### **Kapitel 7: Piano mapping**

Kapitlet beskriver *piano-mapping* som en metod att genom ompositioneringar närma sig spacialt komponerande, en kartläggning och

utveckling av relationer mellan rum och ljud genom interaktioner mellan högtalare och mikrofoner. Arbetsprocessen och utvecklingen av ett specialbyggt *spatialiseringsverktyg* i samarbete med Sukandar Kartadinata beskrivs detaljerat, vilket integrerar begreppet *piano maps* (mappningsscheman) i improvisatoriska gestaltningsprocesser. Det resulterar i ett spektrum av spatiaala-kompositoriska möjligheter och perspektiv som *klangliga koreografier*. Texten beskriver framträdanden som använder verktyget för piano-mappning i olika rum, i några fall tillsammans med flerkanaliga kompositioner som *Memory pieces* eller *Audio papers*.

## Mellanspel II: Om koreografi tvärs över discipliner

Det här mellanspelet innehåller en dialog mellan mig och koreografen Toby Kassell om rörelse, minne och improvisation på tvärs över disciplinerna. Det beskriver arbetsprocessen och samarbetet som ledde fram till konsertframförandet *Accretion* och ger en bakgrund till begrepp och intentioner bakom stycket.

## Kapitel 8: Accretion

Från samarbetet med koreografen Toby Kassell beskrivs i det här kapitlet gestiska och fysiska sätt att närma sig instrumentala framträdanden vilket resulterade i *Accretion*, ett stycke för tre pianon och en pianist. Kapitlet ger en introduktion och skiljer ut olika gestiska ansatser i musikaliska framträdanden. Arbetsprocessen är detaljerad och roller och utvecklingsmöjligheter för gestik utforskas i relation till en vidgad förståelse av klang och dess orkestrering. *Accretion* utvidgar musikaliska och fysiska gestiska ansatser till större ramverk för spatio-temporal kompositioner och koreografier som en organisering av ljud, instrument, kropp och rörelse i rummet.

## Kapitel 9: Coda

Avhandlingen slutar med en diskussion om resultaten och bidragen av min forskning och förändringarna i min egen praktik. Jag pekar på fortsatt forskning och möjliga utvidgningar av de presenterade projekten.

Klang och dess orkestrering från utövarens perspektiv utgör hjärtat i min forskning. Jag utforskade och utvidgade klang inom min praktik och exponerade den som en dynamisk energi i framträdanden som hela tiden förändras. Jag betonade att kategorisering med separata rubriceringar av improvisation och komposition skulle vara alltför stelt och har istället behandlat dessa varierande sätt att skapa musik som nära sammanflätade, överlappande och uppkomna genom musikalisk interaktion, där utövaren oavbrutet skiftar plats och positioner. Jag vände mig också mot föreställningen om generaliserbara, upprepningsbara och utvidgat överföringsbara former av teknik och erbjöd istället kompletterande, detaljerade och ingående sätt att närma sig teknik och material i mångbottnade samspel.

### Minne inom konstnärlig praktik

Projektet och forskningen i klang förde också med sig den mångfaldiga och komplexa roll som minne spelar i nutida improvisationspraktik. Jag har introducerat termen *klangligt minne* (timbral memory) för att beskriva hur jag använder minne strategiskt i relation till en utvidgad förståelse av klang. Det har varit ett medel för att nå kunskap om improvisatoriska processer där skapandet av material, rörelser, rum och omvandlingar utgjort ett generativt verktyg i komponerandet av flerkanaliga framträdanden som *Memory piece* och ljudpublikationerna (audio papers). Det har påmint om tidigare och kommande ljudhändelser genom gester och rörelser; strukturerat tid i *Accretion*; varit inbäddat i objekt; samt medverkat som spatiala ljudande erfarenheter i *piano mapping*. Minne inom konstnärlig praktik har kapaciteter och implikationer som når långt bortom instrumenteringen i komposito-

riska strukturer. Minne framkallar en medvetenhet om våra egna beteenden och gensvar till den musikaliska kontexten – den omedelbara rumsliga och kulturella omgivningen med mänskliga och icke-mänskliga agenter – genom reflektion över passerade (ljud-)händelser och pågående situationer av framförande.

### **Att arbeta med klang**

Projektet kombinerade intuitiva, direkta och inövade, kroppsligt och mentalt grundade processer och användes som grund för utvecklingen av min vidgade förståelse och orkestrering av klang. Dessa flersinnliga klangerfarenheter återkopplade till min konstnärliga praktik och genererade sätt att stimulera och vidga utövarens föreställningsförmåga genom att utveckla komplexiteterna i skapandet med klang. För mig är det ett kraftfullt och spännande sätt att förstå och använda den potential som genereras i interaktioner mellan instrument-kropp-rum och minne.

Allteftersom jag utvecklade och framförde projektet som beskrivs i avhandlingen, började jag också se fler samband och interaktioner mellan klang, rörelse, material, rum och minne som länkar mellan det fysiska, auditiva och visuella i mina verk: Jag deltar i orkestreringen av klang genom en organisering av energier – att omvandla energi från ett klangligt stadium till ett annat och från en form till en annan. Det utvidgade min kompetens som utövare och har lett till en multisensorisk, mer skiftande, diversifierad och detaljerad ansats i framställningen. Det förändrade också min relation till instrument, rum och min kropp som utövare och mångfaldigade möjligheterna till kreativa gensvar i framträdande-situationer. Sammantaget ledde dessa metoder och projekt till ett mer komplext och engagerat sätt att lyssna och gestalta i enlighet med en platsspecifik improvisatorisk praktik som sätter utövaren i en dynamisk relation till en komplex och ständigt föränderlig omgivning i framträdandet och bortom det.

*Orkestrering av klang* formar en hybridartad kompositorisk ansats, som kan tillämpas i skiftande kontexter och som inbegriper dynamiska relationer och omformar dem; ett sätt att förstå och använda de potentialer som interaktioner instrument-kropp-rum och minne gör möjliga. Orkestrering av klang kan utvidgas och tillämpas av många utövare inom improvisatorisk musik och fortsatt ge flera kollektiva interaktioner eller samarbeten som erbjuder spännande dynamiska möjligheter på tvärs mellan discipliner. Det har också ökat min tolkande förmåga i att känna igen och reagera på andra musiker och tillvägagångssätt inom en grupp och stärka en språklig förståelse inom improvisatorisk musik. Här ser jag också en potential inom områden som överbryggat konstnärliga installationer och konsertframföranden, med bestående värden som vidgar både spatiala och temporala parametrar.

Som kritiska improvisatoriska studier har den här forskningen potential att skapa en brygga från konstnärlig forskning inom musik – ofta ansedd och behandlad som egen, självtillräcklig disciplin – till ett flertal andra konstnärliga områden och på så vis inspirera till diskussioner, skapande arbeten och utbildning i en bredare sfär av mottagare. För utövare såväl som lyssnare inom musik och ljudkonst och över disciplinränsen erbjuder avhandlingen en metodik för att närma sig (ljud-) material och ta sig an det på ett fokuserat, detaljerat och gestaltande sätt och utveckla dess relationella kvaliteter. De resulterande projekten utgör samarbeten och användningar av verktyg och konkreta metoder för teknik och vokabulär genom strategier för kartläggning och katalogisering och skapande av lyssningsmodus som kan bli bryggor mellan musik och andra konstnärliga områden genom att översättas och tillämpas som detaljerade kvaliteter och perspektiv i upplevelsen av konstnärlig praktik.

Forskningen genom det här teoretiska och praktiska avhandlingsarbetet har varit roliga sätt att nå mer kunskap och gå djupare in i improvisatoriska strukturer, för egen del och förhoppningsvis för andra.

Jag ser ett stort pedagogiskt värde i att sprida och vidareutveckla den här metodiken för studenter, praktiker, forskare och lärare. Igenkännandet, organiseringen och orkestreringen av klang som ett vidgat begrepp i improvisatorisk musik ger möjligheter att utveckla en egen idiosynkratisk ljud-vokabulär och teknik. Improvisationsstudier vinner på såväl bredare metodologiska som interdisciplinära strategier och jag är upprymd inför att kunna fortsätta bidra och utvidga min forskning inom det här området.

Och viktigast av allt, kanske, har den här forskningen i orkestreringen, överföringen och framförandet av ljud ökat min glädje i att spela musik och framträda.

**Nyckelord:** utvidgad klang, improvisation, komposition, inuti pianot, preparerat piano, lyssnande, klangligt minne, spatialisering, gestik, koreografi, musikalisk perception, kroppsligt musikaliskt framförande, konstnärlig forskning.

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# Media Example List

All Media Examples are available in the Research Catalogue Exposition.  
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## *Media example A1*

Videos of inside piano techniques

## *Media Example B1*

Memory piece Ia in Zürich, Kunstraum Walcheturm, September 2016

## *Media Example B2*

Memory piece Ia at Gothenburg University, October 2016

## *Media Example B3*

Memory piece Ib in Melbourne, Inland concert series, January 2017

## *Media Example B4*

Memory piece II in Berlin, September 2017

## *Media Example B5*

Memory piece II in Gothenburg, October 2017

## *Media Example B6*

Memory piece IIIa at Montalvo Arts Center, California, November 2017

## *Media Example B7*

Memory piece IIIb performed at the Art of Record production conference, Stockholm, December 2017, adapted for the KMH Speaker Dome with 29.4 Speakers.

## *Media Example B8*

Memory Piece C for clavinet at Labor Sonor Berlin in May 2018

## *Media Example B9*

Memory Piece Spill

## *Media Example C1*

A stereo version of the audio paper which I first performed on August 14, 2017, in Gothenburg

*Media Example C2*

Audio paper Performance at the University of Gothenburg, October 3, 2017

*Media Example C3*

Audio paper performance in Aveiro, Portugal at the "Hands on Research Piano" conference January 2018

*Media Example C4*

This is a stereo Mp3 version of "A Fuchsia-Colored Awning" (Mayas 2019)

*Media Example C5*

This is a short stereo excerpt of "A Fuchsia-Colored Awning" (Mayas 2019)

*Media Example C6*

Audio paper "Performance with Piano Mapping Device," December 2018, Gothenburg University

*Media Example D1*

Object Mind Map

*Media Example D2*

Playing Method Mind Map

*Media Example F1*

Object Timbre Map

*Media Example F2*

Action Timbre Map

*Media Example F3*

Gesture Timbre Map

*Media Example F4*

Sonic Timbre Map

*Media Example G1*

Piano Mapping Performance, May 2017, Ohlinsalen, Gothenburg University

*Media Example G2*

Piano Mapping October 2017, at Gothenburg University



*Media Example H1*

Video essay Accretion

*Media Example H2*

Excerpts of a live performance of Accretion, September 23, 2018, at  
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