

A PORTFOLIO OF COMPOSITIONS
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A thesis submitted to
The University of Birmingham
For the degree of
DOCTOR OF PHILOSOPHY

Department of Music
College of Arts and Law
The University of Birmingham
March 2012

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ABSTRACT

This thesis describes a portfolio of musical compositions and artworks that explore the development of real-time acousmatic music composition, multimedia music and dance performances, interactive sound and video installations, and collaboration between interdisciplinary artists.

Two works, *Cell* and *Gong*, are analyzed for their role in the development of Max/MSP software and improvisation performance techniques to create live acousmatic music. Musical material created with these methods was used in studio compositions and live performances. Improvised multimedia (Live Cinema) performances were also explored with the development of Max/Jitter software for that purpose.

The creative process of interdisciplinary collaboration between a composer and dancers in performances that use multimedia elements, live acousmatic music performance, and computer vision interfaces for motion tracking is detailed with the explanation of three dance performances: *Phases*, *Knowledge Box*, and *Tu:la*.

Two computer interactive sound and video installations that explore audience interaction are documented. *Polyphonic Passport Photo* is a photo booth-like installation that transforms the RGB (Red, Green and Blue) values of a photograph into a melody. *The Bather* is an interactive installation that allows the audience to trigger bathing sounds and the choreographed bath movements of an individual in a bathtub, using a touch sensor as an interface.

DEDICATION

I dedicate this PhD to my parents Robert Pinchbeck, K. Elsie Pinchbeck, and to the memory of my grandmother Ellen Pinchbeck. I thank them for their support and encouragement over the years. Also to the generosity and creativity of the artists I worked with on my portfolio: Gerry Morita and Mile Zero Dance, Fine 5 Dance Theatre, Hello Upan, Reimo Võsa-Tangsoo, Sulo Kallas, Chris Driedzic, and Susanna Hood. I also thank my friends and fans that continuously supported my artwork over more than 25 years by attending my performances and exhibitions, buying CDs, and providing outlets to share my work. You continuously confirm my belief that the best part of making art is communicating one's spirit and imagination to another.

ACKNOWLEDGEMENTS

I wish to acknowledge the financial support of the Canada Council for the Arts, the Alberta Foundation for the Arts, and the Bob Brown Memorial Scholarship.

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PORTFOLIO OF MUSICAL WORKS

DATA DVD 1 – Max Patches (Max 5 and OSX compatible unless otherwise noted)

Knowledge Box – Ghost Stick

Phases

Pinchbecker

- No audio files included

Polyphonic Passport Photo

- Originally designed for Microsoft Windows, but can be tested on OSX

The Bather

VideoMasher

- No video files included

DATA DVD 2

<i>Cell</i>	9:51
<i>Knowledge Box</i>	60:22
<i>Phases</i>	24:55
• Please note the audio quality of this documentation is not studio quality because of limitations of the equipment on which it was recorded and the live setting.	
<i>Polyphonic Passport Photo</i>	3:45
• Folder “PhotoExample” includes an example photo and MP3 file created by the installation. Click on 000873.html to open in a web browser to see and hear the photo.	
<i>The Bather</i>	7:21
<i>Tu:la</i>	
1. <i>Limbs</i>	16:54
2. <i>Ints</i>	8:56
3. <i>Duplex</i>	16:35
4. <i>Cold Steel</i>	15:44

AUDIO CD

<i>Gong</i>	21:02
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INTRODUCTION

This PhD portfolio is a selection from a large collection of creative works that fall within current electroacoustic music practice. The commonalities between these creative works are sound, collaboration, and my aesthetics of working with acousmatic sound sources. They reveal a multidisciplinary approach to electroacoustic music composition that explore aspects of live electroacoustic music performance (laptop performance); works that include an element of improvisation and spontaneous creativity; custom software creation; interactivity; sound and video installations; the use of computer vision as a motion sensor; music composition for dance performance; video; and interdisciplinary collaboration.

These works were created in a professional context for presentation to audiences made up of the general public which, overwhelmingly, did not have a knowledge or background in electroacoustic music or interactive art. The collaborative works were made in conjunction with other working professional artists as part of their regular creative output. They embarked upon the projects as a matter of course for their own artistic interests and personal development, attracted to the creative concepts I was exploring in my work.

This commentary will explain my creative approach where I set out to discover new compositional directions through multidisciplinary works, new software tools and exploring ways to instil spontaneity in my music while still anchoring myself in the aesthetics of acousmatic music composition.

Throughout this discussion, I will also touch on the various collaborative aspects of those works where others were involved, and how this creative process has affected that work. There are many aspects of this such as the context, resources available, individuals involved, and purpose. All these things change the creative process, morphing it into something very different from what one might necessarily expect, plan or anticipate when working alone. In the context of my artistic practice, this is something I seek and enjoy, allowing me to find new directions and destinations in electroacoustic music as a creative form.

Computer software tools and processing power now allow for many new approaches to composing, sound creating, and presentation. The creative process that I have been developing has come to encompass a large cross section of technologies and techniques that I strive to make appear seamless to the audience. Studio composition, live improvisation and interactive instruments are all used to create new performance and compositional possibilities. These works are not presented as “interactive dance works” or “electroacoustics with interactivity”. My view has been a holistic one where the tools and devices used are no longer important. My argument is that with forty years of interactive art history already past, these tools are no longer new or a gimmick. Audiences are familiar with touch screens, accelerometers, motion sensors, and GPS on their mobile phones, video game systems and other everyday objects. It should be time to stop viewing multimedia, interactive music and interactive artworks as experiments, which in the past I, too, have done. I am taking the step to recognise sensors and interactive systems as tools, like any others. My ultimate aim is to create challenging artworks where the audience is not concerned with the technology or how it is made, but is able to focus on the emotional or creative connection to the work and the artists involved.

EARLY INFLUENCES

My music composition and interactive arts practice developed in the early-1980s when I was influenced by the industrial music, experimental music, and progressive rock movements of the 1970s and early 1980s. The campus radio station CJSR at the University of Alberta in Edmonton, Canada featured a show of experimental music *Departures* hosted by Marcel Dion. He influenced a generation of young sound artists and later spawned the creation of the Boreal Electroacoustic Music Society (BEAMS) in Edmonton, Alberta in 1989.

I started by exploring tape loops, computer programs that generated music, performance instruments with light sensors and galvanic skin response interfaces driving oscillators, circuit bending, and live instruments. By High School, I was presenting interdisciplinary multimedia performances that featured: dance; film projections; theatre; simple acousmatic and soundscape tape pieces constructed of found, environmental, and instrumental sounds; and analogue synthesizer driven electronic music.

In 1991, I studied Electroacoustic Music at the University of Alberta in Edmonton, Alberta, Canada, for a year with composer Garth Hobden where I was introduced to the acousmatic music of Quebecois composers such as Francis Dhomont, Robert Normandeau, Claude Schryer, Christian Calon, Gilles Gobeil, and many others. This became a very inspirational and influential time, opening up the world of electroacoustic music composition to me. Later experiences as Assistant Technical Director of the 1995 International Computer Music Conference in Banff, Canada introduced me to the music of Jonty Harrison, Andrew Lewis and other British acousmatic composers. The influence of these composers on my own

creative melange is somewhat direct. I have composed several fixed media acousmatic music compositions with and without acoustic instrument accompaniment. I identify with the aesthetic and compositional approach of these composers inspiring my thinking about the tools I use to compose, sounds I like to work with, spatialisation of sounds, and multi-channel diffusion. These along with other influences described here have shaped my current sound.

For two summers in 1993 and 1994, I attended the Computer Art Intensive at Simon Fraser University in Burnaby, Canada. This was a month long intensive that featured workshops, seminars and courses taught by legendary artists in the world of interactive art. Through discussion, practical exercises, experimentation, and lectures, I was introduced into the concepts and practices of interactive art, physical computing, computer music, virtual reality, and computer animation. Teachers and lecturers from this program that had a particular influence in my creative direction from that moment onwards were: George Lewis, Barry Truax, Myron Krueger, Don Ritter, and David Rokeby. Additionally, lifelong collaborations and friendships developed at this time contributing to my creative path, the most influential of which was Canadian sound and media artist Ken Gregory.

There were several concepts that intrigued me from this experience. The first was from George Lewis' lectures and discussions about interactive music, software art and improvisation. Lewis' *Voyager* software was developed around this time and was discussed and demonstrated in detail. *Voyager* was an interactive music system written in the Forthmacs programming language that Lewis used to improvise with live as an accompaniment to his

trombone.¹ It was created as a direct response to the non-realtime computer music creation at the time where mainframe computers would take days or weeks to process audio files for use in studio based compositions. Lewis' background as a jazz improviser inspired him on the path to real-time interaction. The system used various algorithmic techniques to analyse and formulate a response to his trombone, creating a real-time exchange between performer and machine. At this time, these types of systems utilised MIDI (Musical Instrument Digital Interface) to playback the computer's response on various rack-mounted multi-timbral synthesizers. Lewis' concept of software being the musical composition was very interesting to me, but the use of MIDI triggered samples and notes was not. In the years subsequent, I sought ways to create computer interactive music applications for acousmatic music, inspired by Lewis' work with *Voyager*, which generated or processed sounds and music real-time in a way that appealed to my personal aesthetics as a live performer.

Another lesson learned from Lewis was improvisation, at which he spoke at length. In one session, Lewis performed an improvisation twenty to thirty minutes in length. At various times during the improvisation he paused, describing his thoughts at that moment in the improvisation. Random thoughts or feelings like "I feel like a dog barking", musical structures, themes, tempos, tuning systems, what he had played five or ten minutes earlier, what he would play five or ten minutes into the future, accidents, and other ideas would influence him on an ongoing basis throughout the creation of the piece. At that moment, I realised that improvisation was composition taking planning, thought, experience, and intuition. The improviser was creating the composition on the fly, but was very cognizant of the structure and direction of the piece while it was in progress. As a live performer, this

¹ Lewis, G. (1993). *UbuWeb Sound - George Lewis*. Retrieved October 3, 2012, from UbuWeb: <http://www.ubu.com/sound/lewis.html>

resonated deeply and has stayed with me since that time, guiding my explorations into improvising real-time electroacoustic music.

Another highly influential lesson learned at the Computed Art Intensive was a lecture by David Rokeby regarding the *Very Nervous System*. In this lecture, he described this hardware-based system that analysed motion in a video frame and quantized it as a stream of numbers. The possibilities for matching movement with interactive software and electroacoustic music were immediately apparent to me. In addition to this lecture, there was an Apple II Computer based motion to MIDI system developed at Simon Fraser University that was available for experimentation, which resulted in my interest in computer vision systems for movement based interactive art works.

A lecture by Myron Krueger about Virtual Reality topics, techniques, hardware, and his *Tiny Dancer* piece with performance artist Galen Brandt², broadened my interest in interactive artworks. Based on his *Videoplace* environment, the dancer's movements are captured in a virtual environment where the avatar is manipulated and twirled around by another's influence, in this case Krueger's hand. Of particular note were his concepts about interfacing the real world with the virtual world where one's full body was used as the interface rather than a glove or other tethered device. To me, it seemed logical that interactive interfaces of the future would have to develop to be a natural extension of the human body. I have pursued this idea of interaction with my interactive dance pieces, described later in this commentary, where the dancers' motions through space trigger sounds.

² Brandt, G. (2003). *Taking Tiny Dancing Lessons in Cyberspace: I, An Avatar*. Retrieved 09 7, 2012, from VirtualGalen: <http://www.virtualgalen.com/virtualhealing/myron.htm>

Don Ritter's *Orpheus* video sequencing software was another revelation for me. This software analysed the music being played and based on "pitch, loudness, note duration, rest length and tempo"³ would determine a musical category, triggering a video sequence or frame. In the demonstration, George Lewis performed his trombone while the software "listened", interpreted and played video sequences. Though, I did not have the technical possibilities or inclination to do video work until 2000, my interest in computer interactive video performance, and synchronising video to electroacoustic music was aroused. What engaged my interest was the possibility to link the evocation of emotion in the music to an image in a way that was mediated by software, allowing for new types of connections between image and picture to be made. I found it a very powerful and compelling idea (Ritter).

A lecture by composer Barry Truax regarding Soundscape Composition Principles⁴ and granular synthesis further inspired me regarding compositional techniques, form and sound processing. Though I never really adhered to Soundscape Composition rules, "Moving Perspective" and "Variable Perspective" forms relate to my personal style and aesthetic, and are somewhere in the back of my mind when composing. My pieces often reflect an abstract journey that transitions from episode to episode, to and from "real" and "imaginary" sounds, and uses layers of "untransformed" and "transformed" sounds. My works can respect the original sources of the sounds used, but very often they abstract, going into the realm of "Variable Perspective" and often deviating further away from what Truax and others would likely consider Soundscape Composition. In this way, my approach is influenced by my interest in Quebecois acousmatic composers, soundscape composers of Canada's west coast

³ Ritter, D. (n.d.). *Orpheus*. Retrieved 09 08, 2012, from Don Ritter: <http://aesthetic-machinery.com/orpheus.html>

⁴ Truax, B. (n.d.). *Soundscape Composition*. Retrieved 09 07, 2012, from Barry Truax: <http://www.sfu.ca/~truax/scomp.html>.

and my own aesthetics developed out of my formative years in the 1980s in the isolation of the Canadian Prairies. Access during the Computed Art Intensive to a prototype post-PODX granular synthesis hardware based system developed at Simon Fraser University introduced the possibilities of composing with granular synthesized sounds. It is a synthesis technique that I regularly use in my current compositional approach when creating sounds in the studio or a live situation. I would consider that these early influences by Truax's work played a role in my current aesthetics (Truax).

My first interactive art piece was exhibited in 1996 entitled *The Decay of Lying* at the Ortona Gallery in Edmonton, Alberta, Canada in collaboration with visual artist Tim Folkmann. This exhibit brought together the concepts I learned at the Computed Art Intensive and expanded on some of my earlier experimentation taking my artwork into the realm of the art gallery. This playful exhibit, inspired by Soviet experiments with psychic phenomenon, consisted of ten quasi-scientific devices that facilitated psychic or supernatural phenomenon to manifest. They had names like *Effluvic X-Ray Device*, *Acoustic Levitator*, *Pandemic Membrane*, and the *Psychic Displacement Apparatus* – which used a hammock covered in piezo contact microphones to trigger an abstract quadraphonic soundscape, similar to *The Bather* described later in this commentary, The playfulness of *The Decay of Lying* was an approach that I subsequently explored in many of my following interactive installation pieces.

In the mid-1990s, I started to explore live improvised electroacoustic music performance, which led to collaborations with sound and media artists Steve Heimbecker⁵ (Calgary, Canada) and Ken Gregory⁶ (Winnipeg, Canada). My instrumentation for these performances consisted of multi-track tape recorders, mixers, outboard multi-effect units, Boss guitar pedal effects, samplers, analogue synthesizers, and four or eight channel sound systems. Heimbecker used spatial delay effects, multi-track tape recorders, oscillators, and his “Sound Sailing” technique for mixing microphone feedback sounds into multiple channels. Gregory had developed a number of physical interfaces for live performance via Max and hardware samplers. “The Board” was an example of one that used a piece of wood with switches, light sensors, and an old Roland SH-101 synthesizer modulation handle mounted on it that allowed him to modulate granular synthesis parameters live. At this time, the live performances were created based on sketches and improvisations made in rehearsals that were then built upon in the live setting. This collaboration culminated in several performances and the Compact Disc recording *Sonic Waking*⁷, recorded at the Send & Received Festival of Sound in Winnipeg, Manitoba, Canada in 1998.

This collaboration and the individuals involved were very inspirational to me aiding in the development of my artistic process and aesthetic. Heimbecker’s sculpture and visual arts background mixed with an interest in sound art inspired my thinking regarding sound installations and performance by giving me an understanding in contemporary arts practice. A noteworthy example is his piece *Soundpool: The Manufacturing of Silence* (1996). It has eight

⁵ Heimbecker, S. (n.d.). *Heimbecker Qube Assemblage*. Retrieved 09 11, 2012, from Heimbecker Qube Assemblage: <http://www3.sympatico.ca/qubeassm/>.

⁶ Gregory, K. (2012). *cheapmeat.net*. Retrieved 09 11, 2012, from cheapmeat.net: <http://www.cheapmeat.net>.

⁷ Gregory, K., Heimbecker, S., & Pinchbeck, S. (Composers). (2005). *Sonic Waking*. [CD].

large painted canvases arranged as speakers in an eight channel sound system would be. The canvases are each connected to a motor and a piston, which moves the canvas back and forth at a frequency of 3 Hz, filling the room with sound waves you cannot hear. This creates the question of whether it is a kinetic installation or a sound installation, challenging the boundaries of the genre. Gregory's work with sound art, interactivity, robotics, and physical interfaces are some of the most intriguing new media artworks I have experienced, inspiring much thought about the realms of performance, art installations, and tinkering with electronics. His piece *12 Motor Bells (2001)* is a case in point, consisting of twelve Max controlled fire bells with servo-motors lashing the edge of the bells with shoelaces. The Max patch controls the triggering of the bells based on an algorithmic score and sensor data collected in the space of the audience's movements, creating a calming spatial sound environment of quiet ringing at different pitches.

LIVE AND STUDIO COMPOSITIONS

From the beginning of my PhD research, I focussed on my compositional approach from the perspective of a composer who uses acousmatic sources. I wished to combine my interests in acousmatic music composition and live performance, thus creating new compositional and performance possibilities by improvising live with acousmatic sounds from various sources. In this context, I use the term “improvisation” to refer to the spontaneous (“in the moment”) composition of electroacoustic music through a live performance.⁸ By the middle of the first decade of the 21st century, it was easily possible to do a wide range of real-time audio processing on a laptop computer. Prior to my starting my PhD in 2007, I had returned to my performing roots after several years focussing on computer interactive installations (Wikipedia, 2012).

When I first started performing with computers live in 2000, I rejected the notion of a “laptop performance” where an individual would sit on stage in front of a laptop playing sound files, oblivious to the audience. The desire to create a better way of interacting with computer software and enhancing the performance “show” and experience led me to experiment with various physical interfaces. Some examples of input devices I experimented with were piezo transducers as microphones and touch sensors, light sensors, camera vision, buttons, pressure sensors, bend sensors, and a P5 Glove. I conducted a tour in 2000 that featured a light sensor and pressure sensor that allowed me to control two different granular synthesis parameters in my SuperCollider patch while I mixed sound files and manipulated Boss pedal effects with

⁸ *Musical improvisation*. (n.d.). Retrieved 09 19, 2012, from Wikipedia: http://en.wikipedia.org/wiki/Musical_improvisation

the other hand. The advantages of this scenario were that I could manipulate multiple parameters live, facilitating more complicated performance functions, and it gave the audience something to watch; at the time, it was not very common to enhance the visual aspect of a live musical performance with a physical computer interface. Some drawbacks of working with this technology in this era was the high cost of buying a sensor input device, such as an I-Cube Digitizer, while making your own with a BASIC Stamp microprocessor was technically challenging. I tried to design my own, but failed to create anything useful for live performance. I had trouble stabilizing the data coming from the sensors due to too much noise and the trial and error nature of matching the electronic components to the BASIC Stamp's input range. I also experimented with a P5 Glove that gave x,y,z glove position information, had several buttons, and sent bend information from the fingers. This too was fraught with inconsistent data challenges. In the end, I used a foot pedal input box with two inputs that allowed consistent data from my photosensor and pressure sensor.

When creating a physical performance instrument, one typically maps the sensor information to the modulation of various parameters in the processing or playback of sounds – things like pitch of playback, delay parameters, granular synthesis playback position, physical modelling parameters, MIDI parameters, sampled sound triggers, or other parameters. This requires careful planning of the performance in advance by determining which parameters are being manipulated, which sounds can be changed or chosen, and learning to perform the interface in a virtuosic manner. An example of this type of instrument would be *The T-Stick*, which has a number of sensors to perform in the manner described.⁹ This is not the type of performance

⁹ Malloch, J. (2012). *projects:the_t-stick [Input Devices and Music Interaction Laboratory (IDMIL)]*. Retrieved 09 15, 2012, from Input Devices and Music Interaction Laboratory (IDMIL): http://www.idmil.org/projects/the_t-stick

experience I was striving to achieve in my PhD. Indeed, my performance software the *Pinchbecker* follows a mixing board model with sliders and adjustments for the effects and file playback. I do perform with an eight-slider fader box, which allows the manipulation of up to eight parameters at the same time. However, a mouse is still needed to manipulate the myriad of other faders and controls, and selecting the sound files to be played from the hundreds available in my library. In the performance *Tu:la* (described later in this commentary) I incorporated motion detection of the dancer's gestures that manipulated a granular synthesis control; and most recently *Chasm*, in March 2012, featured iPhone motion sensor control over sound file playback. Development of my performance system is ongoing and follows my interests, performance needs, and technological innovations.

For a few years after this tour in 2000, I did not perform live and focussed on interactive sound installations. When I did resume performing around 2005, my performance focus had changed from methods that were tightly controlled and rehearsed to those that involved improvisation and decision-making. I found it challenging enough in a performance situation deciding what comes next that coping with sensors, interfaces and their performance seemed like a distraction. Indeed, my performances were not about creating and exploring a physical performance instrument, it was about exploring improvised acousmatic music performance – listening, mixing, making decisions, adapting, and experimenting with sounds.

Those early performances with live computer processing combined a number of elements: software tools in SuperCollider, prepared audio files that I would mix on the fly, live sound creation with piezo contact microphones and various Boss foot pedal effects. In 2005, I returned to live performance with a laptop and a self-created Max/MSP patch. It allowed

some of the same processing as my previous SuperCollider patch, but included more mixing, effects, quadraphonic panning and other enhancements. My approach had not changed radically from my earlier work. I would mix prepared files into a performance with live processing, and some live sound creation elements. To enhance the live performance aspect, I collaborated with visual artists who added live video jamming (VJ'ing) and live manipulated 16 mm film loops¹⁰. Under the name the *aDemod Media Jam*, these performances toured to a number of Canadian and international sound and media art festivals, including the 2006 International Computer Music Conference in New Orleans. The content of these performances was rehearsed. It consisted of fixed media acousmatic music compositions processed live with additional sound files added in an improvisatory manner. The intention was to embellish gestures and textures of the original fixed media works by changing their dynamics, density, pitch, timing, duration, and spatialisation. Meanwhile, additional sound files were layered in to add to this effect and to bridge disparate fixed media pieces together into a contiguous work.

Parallel works in this same time frame were exploring the introduction of live elements to fixed media acousmatic pieces, David Berezan's 2007 paper *Flux: Live Acousmatic Performance and Composition*¹¹ and Adrian Moore's 2008 paper *Fracturing the Acousmatic: Merging Improvisation with Disassembled Acousmatic Music*¹² are two instances. Berezan's

¹⁰ Kelly Bolen (VJ) and Aaron Munson (16 mm film loops)

¹¹ Berezan, D. (2007). *Flux: Live-Acousmatic Performance and Composition*. Manchester, UK: Manchester University. Retrieved 11 06, 2012, from <http://www.novars.manchester.ac.uk/indexdocs/Flux-Berezan-EMS2007.pdf>

¹² Moore, A. (2008, 08). *Fracturing the Acousmatic: Merging Improvising with Disassembled Acousmatic Music*. Sheffield, UK: The University of Sheffield. Retrieved 11 06, 2012, from [Academia.edu: http://www.academia.edu/177646/Fracturing_the_Acousmatic_Merging_improvisation_with_disassembled_acousmatic_music](http://www.academia.edu/177646/Fracturing_the_Acousmatic_Merging_improvisation_with_disassembled_acousmatic_music)

Flux System was designed to introduce manipulations to a fixed media piece while it is being diffused live. The software analysed the diffusion and sound material, and depending on “measurements of audio amplitude, determining how the material is distributed (ie. discrete spatial occupancy), and how dynamically it is distributed (ie. trajectories)” it introduced “fluctuations” into the performance of the piece. These “fluctuations” included filtering, layering, variances in pitch, granulation, and time stretching. This approach differs from mine in that the system is imposing changes depending on a certain set of criteria configured by the performer, while I am introducing manipulations of my fixed media works based on my whims of the moment. Berezan’s intentions are to introduce variations while respecting the original fixed media piece, while I am hoping to transform it into a new experience in part or wholly in that moment for that audience (Berezan, 2007).

In Moore’s paper, he describes a performance instrument that uses a graphics tablet and a Behringer input controller that allow him to load a number of pre-composed soundfiles and to ring modulate, filter, granulate, record, loop and reverberate those files. It was built out of his desire to intervene after the initial creation of sound materials and mixing. The subsequent development of performances around this instrument are described as following a “semi-structured plan” for the performer and consists of directed actions to achieve certain gestures and textures in the performance. He describes the soundfiles as “pre-composed”, prepared in advance of the performance, and are made from “recorded improvisations” and other “ready made” files (Moore, 2008).

My approach is different in that I was using the inherent structure of an acousmatic fixed media piece and creating variations of that source material, while adding other sounds to it

too. Moore has devised a complex performance instrument to create structured or even recreate “scored” acousmatic works in a live setting. It is an approach that is much more controlled and precise than mine. In my work, I did not want to know the end result in advance of the performance. I was interested in finding something new in the material for each performance. For the sound materials I would mix in and bridge between the fixed media pieces, I too had pre-composed soundfiles, but also raw soundfiles, environmental sounds and sound effects, creating a large pool of many types of material. The difference is that in my work they were only a starting point and would be transformed into something abstracted from the original, sometimes lending a timbre or structure to the final result, but sometimes ending up vastly different. The variations in approach no doubt stem from my long history as a live performer of electroacoustic music. I do not feel so precious about the source material with which I am working. In my improvisations, I am looking to create something new. It may or may not have any discernable relation to the original sources. That said, I do find the work of Berezan and Moore very intriguing and food for thought.

In 2006, I started working with Estonian violinist Hello Upan. We created a number of performances in Estonia with her improvising on violin while I processed her instrument and mixed sound files of raw and processed sounds on the fly. This collaboration continued into my PhD research period and culminated in several works including the soundtrack for the Estonian student film by Maksim Golomidov *Behind Closed Windows*. I later reworked the music into a fixed media piece for the Mile Zero Dance piece *Limbs* as part of the *Tu:la* performance discussed later in this commentary. It was during this period that I developed my current ideas and techniques for live acousmatic music performance, which I have explored for the duration of my PhD.

Working with Upan necessitated that I move away from using prepared fixed media segments of music stitched together. It made sense that this collaborative process should be spontaneous and allow for a large amount of variation that depended on the moment. The violin was a rich source of sounds that I could loop, pitch change, delay, filter and otherwise manipulate. I created a library of acousmatic sounds consisting of environmental sounds, machinery, noises, synthesised sounds, animals, people, instruments, and many processed variations of those sounds. I could then create beds of sounds, which I mixed and manipulated on the fly, with the violinist improvising along with it. I could then take the violin sounds, manipulate them, and feed those sounds back into the mix, prompting the violinist to respond to the new sounds and creating a performance feedback loop between violin, my sound beds and manipulations of the violin.

This type of performance proved to be interesting. The sounds were quite varied: rhythmic, textural, noisy, and melodic. Upan's violin playing demonstrated she was out of her comfort zone as a performer. Her performances were marked as being hesitant and quiet, giving the work a very fragile and beautiful quality. This is exemplified in the previously mentioned composition *Limbs*. It became evident that the possibility exists to perform live acousmatic music that includes variation, structure, content, and compositional merit. I explored how this improvisational approach could be used to enrich the various compositional and sound design genres in which I was active. In *Behind Closed Windows*, Upan and I improvised pieces for the film's scenes live while watching it with the director. It allowed spontaneity, emotional response, and feedback from the director to have an instantaneous effect on the recordings. This improvisatory approach added something new to the creation of a film sound design and soundtrack that I had not previously experienced. A process that was normally a variation of

studio composition was suddenly opened up to a new kind of open creative process with sounds and instrument, thus creating a new tool for this type of project.

With this revelation, the lines between live performance and studio composition blurred. At the beginning, I was taking fixed media pieces and putting them into a live context, processing, manipulating and trying to bring something new from them. Then, the process reversed: pieces that were completely improvised either in the studio or in a live context would influence my studio composition process. Segments, sounds, and pre-composed fragments created in the heat of the moment in various contexts could be reworked and included in studio works. These studio pieces would then in turn often end up back in the live context to be manipulated again and processed into variations or new works, depending on my needs at that moment. At the present time, I have accumulated a large library of acousmatic sounds and pre-composed fragments for use.

As this process developed through several projects, other elements were introduced into my live performance toolbox. In the dance works, this included interactive elements such as motion detection with video camera (Camera Vision) which triggered acousmatic or MIDI (Musical Instrument Digital Interface) sounds. The dancer's motion on stage would then add variation to the piece, which would be perfectly synchronised to the triggering movement. That same motion detection also triggered video, creating complex intertwined multimedia performance scenarios. Additionally, circuit bent electronics (consumer electronics rewired to create a wide range of sounds), analogue synthesisers, piezo contact microphones (attached to metal or other objects), coil transducers, and other noise makers have been explored over many works. Furthermore, I developed a Max/Jitter patch-- the *VideoMasher*-- to explore the

creation of real-time video and audio performances known as Live Cinema. These varied types of instruments and elements have allowed me to create a dynamic performance experience for the audience and myself as performer while embracing the laptop performer paradigm.

Software

During my PhD research, I developed two main performance environments for creating my live and studio work: the *Pinchbecker* for audio and the *VideoMasher* for video. These two Max patches were created to allow me to custom mix, process and perform sound and video to my needs. They do not allow infinite flexibility, features, or have any commercial value, but they do impart a quality that personalizes my work. I could, like so many others, adopt software like Ableton Live for the performance of live audio. However, all software has certain artefacts that (because of design, programming and function) tend to homogenize the work created with those products. There are obvious paths or limitations that guide one's exploration a certain way. As a creator, I did not want that kind of artefact introduced into my work. As a result, I created a Max patch of my own design, so that the artefacts would at least be my own, giving my work a personal quality and signature.

Pinchbecker

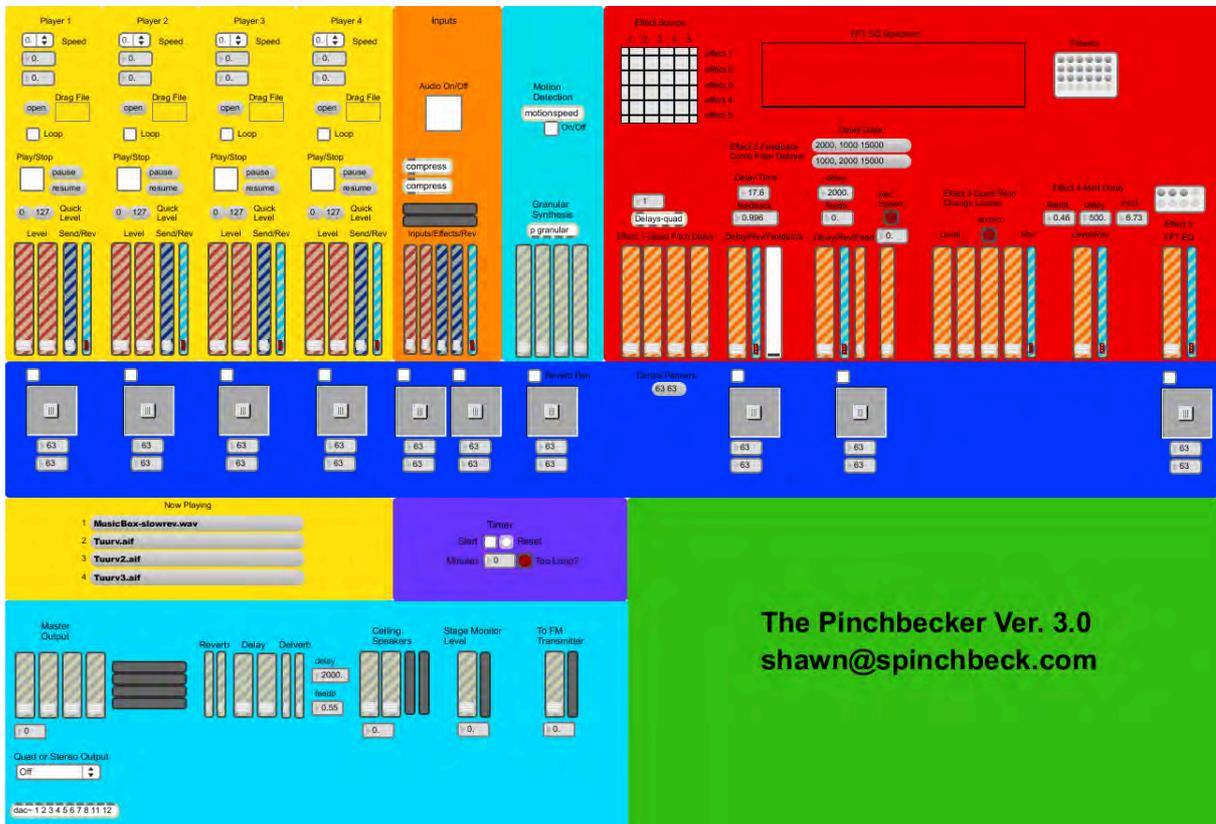


Figure 1. The main interface for the *Pinchbecker* Max patch.

In 2012, it has become commonplace to perform onstage with a laptop. There are several approaches to these types of performances, such as: ProTools or other Digital Audio Workstation sessions that are mixed live in concert, Ableton Live sessions, self-programmed performance systems (Max/MSP, Pure Data, Supercollider, Chuck, etc), and using various software synthesizers onstage. The context of my work is in the realm practitioners that have created and perform live with a Max/MSP based performance system. My software, the *Pinchbecker* allows me to work in a way with which I feel comfortable, creating sounds and textures that are interesting to me. Evolutions over time have added new capabilities for

inputs and outputs, processing, and mixing, but fundamentally it has worked in a similar way from the start.

The *Pinchbecker's* functionality is basically of that of a sound file player and mixer with some simple processing. Indeed, the onus is on the operator to have good source files to begin with and a clear idea what sounds and processing work together. As mentioned in the previous chapter, I designed it to reflect a performance model with which I was familiar. For many years, I performed live with tape players, synthesizers, outboard effects, and a mixer. I started my career before computer Digital Audio Workstations were accessible and spent my early years mixing down my multi-track recordings in real-time. As a result, I am a proficient live mixer and enjoy a hands-on approach to sound making. I like the process of playing a sound, adding effects, layering more sounds, changing the playback speed, and continuously transforming them further; whereby building a complex soundscape from the ground up.

This model does create some limitations, the largest of which is the ability to transition quickly from one group of sounds or soundscape to another. With the eight-channel MIDI fader box I own, there is the possibility to fade quickly back and forth between sources, but changing a scene of effects and settings along with that is difficult. Triggering a number of short duration sounds requires clicking on them individually with the mouse, which is possible, but limits one's ability to do other things while that is happening, like choosing the next sounds you will play. As a result, longer soundfiles are easier to work with. This creates the tendency for the creation of compositional structures that develop in a flowing way rather than with sharp transitions. Of course, one can drop the faders suddenly or stop the playback of a file by clicking it off, but to make several very quick changes is problematic. Also with

four soundfile players as sources, there are limited options for change before one has to reload the soundfile players with new sources. Other limitations are the limited playback options for the sounds files with no random access to the playback position, and the many software faders that have no physical controls and have to be accessed with the computer mouse. A performance system similar to the one Adrian Moore has developed, mentioned earlier in this commentary, addresses some of these issues with triggers and the mapping of various sound files to areas on the graphics tablet for manipulation with the tablet pen. It seems to me, this makes the performance more about manipulating and triggering individual predefined sound objects rather than the layering and creation of complex soundscapes, which is my goal. I do draw inspiration from this example though and future revisions of the *Pinchbecker* may take these approaches into consideration to allow for greater diversity in the dynamics and qualities of a piece.

It has been an aim of my PhD research to create new and challenging art by looking for the art within the technology. Working with processes or tools that have a set number of functions, forces one to be more creative with one's approach. Often with software, the latest update comes before one has the possibility to explore all of the options, causing a constant learning curve. I worked with a certain set of possibilities and explored how to create interesting artworks with them. As a result, I see this software as a type of instrument, offering particular performance capabilities that result in a certain type of sound. I have embraced these limitations, investing a fair amount of time exploring them over many live performances.

The *Pinchbecker* interface is divided into several sections: sound file playback, external inputs, effects processing, panning control, and output. Each of the four soundfile players has

a pitch control with four presets of 0.25, 0.5, 0.75 and 1.0 of real-time. There is also an incremental pitch control for fine adjustment. A “line” object allows for a smooth pitch adjustment over two seconds between settings. There are controls for start, stop, pause, resume, and loop. There are four sliders per file player: left and right channels, a pre-fader effect send, and a post-fader send to a reverb using the “gigaverb~” object by Juhana Sadeharju and Olaf Matthes. There are quadraphonic panning controls for each channel that can be set manually or for random panning. There are currently two external input channels (there have been up to four, but the design is modified for each performance depending on the needs). Each input has a simple compressor subpatch to control dynamics depending on the input source. There are pre-fader effect sends for each input channel and one post-fader effect send to the reverb. There are five effects that receive output from the effect sends, a granular synthesis subpatch where an audio file can be loaded into a buffer, and a simple delay and reverb on the Master output stage. The effects sends route their signal via a “matrix~” object from the sound file players and the external inputs to their destination. The five effects available through the effect send are: Quad Pitcher Delay (1), Feedback Comb Filter Delayer (2), Quad Pitch Change Looper (3), Modulated Delay (4), and FFT Graphic EQ (5). Several effects have pre-fader reverb sliders next to the main level slider.

The Quad Pitcher Delay has four delays with “phasor~” objects modulating the delay times to the four output channels. It has several presets that can be toggled for various modulation delay effects creating spatialisation, textures, and increasing density of the sounds being affected. The Feedback Comb Filter Delayer allows strange comb filter effects with fine tune control over the delay feedback allowing one to create near-feedback short delays easily. There are two delay lines with the output of the second capable of being fed back into the

first. There is also a looper with pitch control that feeds its signal back into both delays. Mostly, I use this without the looper and the second delay acting as a longer delay. The Quad Pitch Change Looper allows one to record three seconds of audio and play it back with four different pitches that are set to 0.5, 0.75, 1.0 and 1.5 of original speed. Each loop player is assigned to one of the four output channels. The Modulated Delay effect is a delay with a phasor~ object modulating the delay time. It can be used as a normal delay, or the modulation can be manipulated to create low frequency, ‘clicky’ pitch changes; pitch changed delays with feedback; or frequency modulation effects depending on the frequency of the phasor~ object. The FFT Graphic EQ is based on an example patch from old class notes from my Max lectures with Erik Oña when he was in Birmingham. It is very similar to the example “Forbidden Planet” that comes with Max 5. It has 512 bands of equalisation and can be used to create filtered airy effects, low frequency rumbling effects, notch filtering, or other filter effects.

The Granular Synthesis patch is based on the *msp Granular Synthesis v2.0* by Nobuyasu Sakodna.¹³ The only variations I have made are to allow for the alteration of the grain envelopes between sine and triangle shapes, and the addition of more voices to sixteen grain players. The volume of the granular synthesis can be modulated by the motion sensing input from a video camera in the case of mapping a dancer’s motion to the output. The analysis of the video input is done through the “motionspeed” subpatch. It takes a camera input and subjects it to several filters to simplify the video input and then an average filter to allow pixels to sustain depending on a threshold setting. The speed of the moving dancer is calculated by the number of active pixels at any moment in time. I use this value to control

¹³ Sakodna, N. (2000). *download*. Retrieved 11 06, 2012, from Sakoweb: <http://formantbros.jp/sako/download.html>

the volume of the granular synthesis patch as used in the piece *Tu:la – Cold Steel* discussed later in this commentary. This “motionspeed” subpatch makes use of the following cv.jit external objects created by Jean-Marc Pelletier: “cv.jit.framesub”, “cv.jit.ravg”, and “cv.jit.sum”.¹⁴

There are quadraphonic panning controls for the file players, external inputs and effects 2, 5 and the reverb. The random panning control was developed for my previous installation *Sonic Spaces (the kinetics of sound)* and was used unchanged in this patch. The Output Stage has a four channel gain control for the Master; a composite stereo send for the “Ceiling Speakers” output; a mono Stage Monitor send; and a mono send to a FM radio transmitter as used in *Knowledge Box*. The Master output has a reverb effect send and a delay with reverb send attached to it to process the final output. There is fader box control available, via MIDI, of the file players’ gain and effects send sliders. Finally, there is a timer to display the number of minutes of the performance.

To compare the *Pinchbecker* with two practitioners with whose work I am familiar, one finds several similarities and differences in design. Ken Gregory uses his Max based software for creating improvised laptop performance and processing audio files for use in studio compositions, installations, dance performances, or other creative projects. He collects sounds on a hard drive, manipulates them, and then uses the original and processed files to improvise with. He has 8 sound file players with an auxiliary buss for sending audio to an effects section. Though an accomplished designer of physical computer interfaces, he prefers to use a mouse for input for interaction with this software. His patch allows the loading of folders of

¹⁴ Pelletier, J.-M. (2010, 10 13). *cv.jit*. Retrieved 11 06, 2012, from Jean-Marc Pelletier: <http://jmpelletier.com/cvjit/>

sounds into a large list displayed on the screen, which he accesses by a file number. His performances tend to be episodic and soundscape based, often creating slowly evolving shifting pieces. He uses some processing on the sounds, but often maintains their referential content or, in combination with other sounds, creating new contexts.¹⁵

Scott Smallwood also uses a Max based software system for performing live. His software uses a combination of sound file players, pre-loaded buffers and different types of audio synthesis. He prepares his sound files in advance, often with different kinds of processing of the same files, so they can be selected depending on the appropriate processing of that source. He uses a combination of mouse input, keyboard button combinations and a MIDI fader controller when available. His system supports multi-channel outputs for dividing the sound file player outputs to different speakers, but does not support multi-channel panning. His live performances also evolve slowly in an episodic structure creating ambient soundscapes. He does not post-process his audio other than some equalization. He has his sound files preloaded into a dropdown menu, and a function to randomly choose files that can be accepted or rejected depending on the need of the performance.¹⁶

The common link between their two approaches and mine is the concept of mixing sounds using faders and sculpting a piece by blending sounds together. We similarly developed our craft in the 1980s and 1990s at the end of the analogue recording era and grew up mixing sound by touch. My approach differs from theirs in that I use more post-processing, transforming my source sounds into new material as part of the performance process. I also

¹⁵ This information was obtained in a discussion with Ken Gregory on November 1, 2012. Used with his permission.

¹⁶ This information was obtained in a discussion with Scott Smallwood on November 1, 2012. Used with his permission.

perform objects and electronic instruments onstage that I can then manipulate and blend into the mix. Additionally, I include sound spatialisation with the use of quadraphonic effects and automated panners. Comparing the performances I have seen by them with my own, I have observed that we all have a very different aesthetic. Smallwood's seem very ambient and layered while Gregory's slowly range from nature sounds and sound effects to noise. My performances tend to be abstract, noisy and changing, likely due to my influences from acousmatic fixed media works, which they do not share. We all use a computer mouse as the primary device for interacting, likely an additional factor in the development of a common episodic compositional structure. In discussions with them both, the portability, ease of travel, and simplicity is a big factor for the preferred use of a mouse for performing, as it is with me. Another variation is my software loads files by dragging and dropping them from a directory listing. This allows me to choose files from a wide range of folders. In summary, a combination of technology, methodology, and practicality shape our collective approach to laptop performance.

VideoMasher

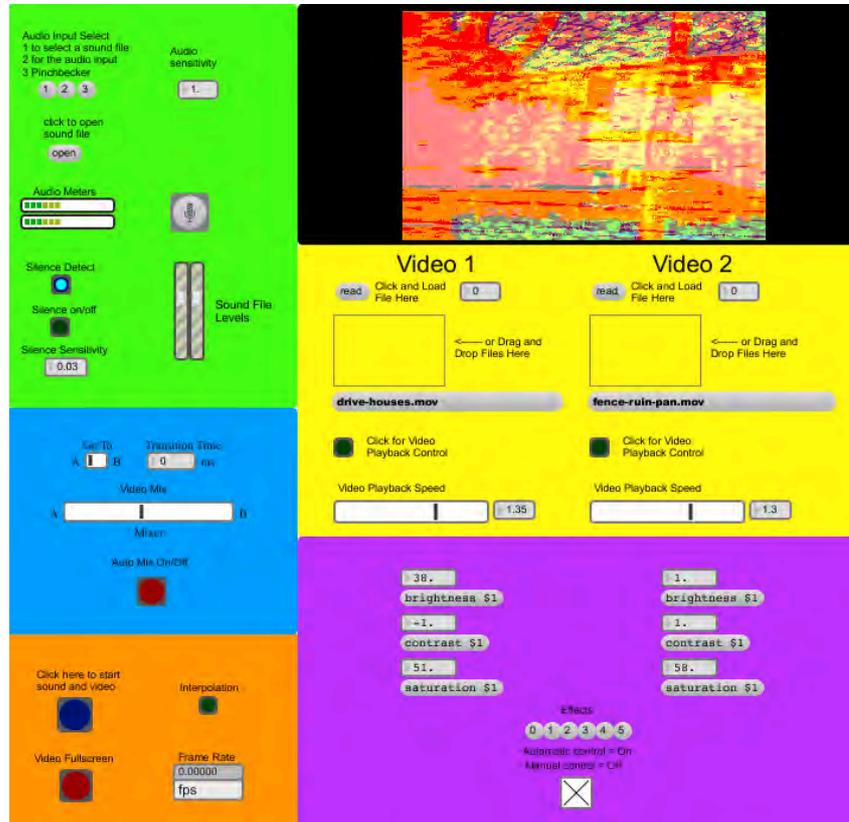


Figure 2. The *VideoMasher* VJ software interface.

The *VideoMasher* allows me to mix and manipulate video live while I am creating sound in the *Pinchbecker*. I approach the creation of live video in a similar way to that of live sound by recording video clips of compelling images and mixing and processing them into an improvised Live Cinema performance. I created several performances using this software during my PhD research period of which *Cell* is discussed as part of my submitted PhD Portfolio.

My earliest interest in interactive video performance began in 2000 when I attended a workshop on the Max add-on video programming environment *nato.0+55* at the V2

Organization's Dutch Electronic Arts Festival.¹⁷ There I was introduced to programming video applications in *nato* and the idea of VJ'ing. Other attendees of the workshop were several well-known Max gurus who I found very inspirational, including Vidvox Prophet's Johnny Dekam. In 2002, I created a piece, *Between Fields*, using an early version of Dekam's Vidvox Prophet software that allowed a clarinet player to trigger video sequences of a dancer by playing specific notes. This was somewhat similar to Don Ritter's Orpheus software, but without the analysis of the style of music being played. In 2004, I created an early version of the *VideoMasher* for a classical music performance with visual accompaniment. After the tour with VJ Kelley Bolen and film artist Aaron Munson in 2006, I started developing my own software for creating live video, as they were not always available to perform with me

At that time, VJ subculture was very popular in Estonia, where I had a teaching position. This spawned the Plektrum Festival of Audio Visual Culture in 2006. Over the next few years, I experienced many VJ performances accompanying DJ'ed dance music. One thing that I observed with these types of shows was that the video tended to consist of short repetitive loops of abstract or concrete images, or animations. A case in point is VJ artist Nuno Correia and his Video Jack project. He uses custom software for triggering Adobe Flash-like animations that he can trigger and interact with using the computer mouse. His imagery uses this type of repetitive looping style with interactive elements, which does seem very suitable in a dance club environment.¹⁸ Other VJ artists, such as Piibe Piirma and Jane Suviste who I collaborated with on several projects during my PhD period, created interactive applications for triggering animations and prepared clips of video that they played at planned moments in

¹⁷ *nato.0+55 -- V2_Institute of the Unstable Media*. (2000). Retrieved 10 03, 2012, from V2: <http://www.v2.nl/events/nato-0-55>

¹⁸ Correia, N. (2012). *PROJECTS / nuno correia*. Retrieved 10 03, 2012, from Nuno Correia: <http://www.nunocorreia.com/c/projects>

the show.¹⁹ My video work is somewhere between the repetitive loops of the club VJ's, the planned clips of Piirma and Suviste, and more like the layered and textured work by Kelley Bolen who uses the *Dervish* VJ software created by Joshua Goldberg to create her imagery.²⁰ My work with the *VideoMasher* uses longer video sequences of thirty seconds to one minute with heavy layering of images, processing using mathematical operators, and manipulation of the colour saturation, brightness and contrast. This creates a very abstract type of imagery, which evolves over time. It does loop, but due to the longer clips it has a less rushed feeling.

What I found doing my Live Cinema performances is that the amount of attention required to create audio and video simultaneously was very arduous in a live situation. It is more enjoyable as a performer to focus on one or the other. Typically, a performer doing this type of work would prepare either the audio or video in advance or divide the tasks between two individuals. Though I find it an interesting genre in which to work, I tend to focus on sound performances, limiting the number of Live Cinema shows I have done and often to segments of a performance when used.

On the technical side, the *VideoMasher* allows the possibility to mix two videos together. Each video channel has a "Dropfile" box or "read" button to load a video. There is a green button to start and stop the video playback. There is a slider adjustment for the direction and speed of playback. There is also a "coll" object with a list of available video files for accessing the files by typing a number in the "number" box or by pressing a note on a MIDI keyboard. There are buttons to start the sound input and video playback, to make the video

¹⁹ Pinchbeck, S., Piirma, P., & Suviste, J. (2010, 09 01). *FUTURAMORGANA - YouTube*. Retrieved 10 04, 2012, from You Tube: <http://www.youtube.com/watch?v=U1M9zWMss0s>

²⁰ Goldberg, J. (2002). *Dervish*. Retrieved 10 04, 2012, from joshuagoldberg: <http://goldbergs.com>

full screen, to interpolate the video if the files are low resolution, to select a sound file or external input for audio, and a gain control for the audio input. To process the video, there is a “Video Mix” slider to control the mix of the two video channels. There is a possibility to use a mathematical operator on the mixing of the two channels with the “jit.op” object, so instead of a normal “+” sum operator between the two videos there can be: +, -m, max, absdiff, |, ^, >, <, >p, and <p. These various operators change the way the colours of the two videos interact causing different colour changing effects to occur. These effects vary depending on the content and mix between the two videos. The audio input is mapped to the “Video Mix” slider allowing the gain of the input to affect the slider position. Additionally, there is a “toggle” button to allow the audio input passing a specified threshold level to change the “jit.op” operator, thus allowing the level of the audio to modulate the video effects processing the image. Percussion, musical gestures, or changes in the dynamics of the audio cause direct changes to the video image that can be seen by the audience, making the video and music synchronised. The “Silence Detect” toggle stops video playback in moments without audio. These interactive effects help give the sense that the music and video are linked in some way. The final video effects are simple brightness, contrast, and saturation controls for each video channel. In the style that I developed, I used them to make the images more abstract and colourful by setting them to extreme levels. My patches are often modified for each performance, and variations of this software allow a musical instrument to trigger specific videos depending on the musical note played, using Miller Puckette’s “fiddle~” object, and another used the Auvi group of externals by Kurt Ralske for advanced video effects. I have not included these here as no completed projects used these features.

Compositions

Cell

Cell is an improvised Live Cinema piece created using the *Pinchbecker* and *VideoMasher* software. It was performed on September 1, 2007 at Media Lab Tallinn, Tallinn, Estonia as part of the Polymer Culture Factory Festival.

Before I start a performance of this type, I typically explain to the audience that it will be improvised. This prepares them mentally for the abstract and free flowing nature of the work they are about to experience. When I begin, I normally cue up four sounds in the *Pinchbecker* that I know will work together. If for some reason, I have a moment lacking inspiration, I can default to the pre-loaded files. In the case of *Cell*, I started with some time-stretched and granular synthesis processed bass flute sounds and layered them together. I proceeded to pan and process the sounds, and added more sound files while planning where the piece would go next.

I have many non-processed sounds on a hard drive organized into folders named after the sound sources, for example: trams, trains, water, cars, dogs, flute, environments, etc. I tend to gather all the processed sounds into a few main subfolders; this reduces having to search for items during the performance. The clips tend to be fairly long ranging from two to ten minutes' duration. There are a significant number of files, so knowledge of the existing material is very important and requires preparation when any new files are added. Processing the files can alter their nature entirely, creating a myriad of new possibilities.

When I am considering the direction of a piece, I think several minutes ahead of what is going on at that moment. I plan changes, variations, and processing, seeking new sounds that are either similar or quite different. I try to build transitions to these sounds using the available mixing and processing. The types of sounds with which I like to work are matched with the design of the *Pinchbecker* with file players and mixing. Often the result is pieces with a few slowly evolving but distinct episodic sections. As the piece reveals itself, these cued sounds are discarded as new ideas, combinations or directions come into my mind. Then a new set of files is cued up to accommodate the piece's change of direction. It is an evolving, living process and sometimes the piece that results is completely different from my original intention at the beginning of the performance. The connections being made between the sounds are spontaneous in that they reflect the needs of the piece, its mood, and the chemistry between performer and audience while it is being created. The result is fresh, unique and relevant to the moment of the performance, directly reflecting the performance context. Composing like this requires a combination of experience, instincts, taking chances with combinations of sounds, listening and seeing how it all unfolds.

I kept the choices of sounds for *Cell* within a certain realm, working with the processed flute sounds by layering, sampling, panning and adding modulated delay effects for the first half of the piece. The sounds are mostly very abstract, though the mood is somewhat ambient as I add in layers of high and low frequencies to keep an overall balance between the sounds. Someone with a trained ear would likely recognise the processed flute sounds at the beginning, though they are very altered. They sound rather like breaths, which makes the piece slightly unsettling from the outset. The soundscape becomes denser as I introduce high frequency modulations to the flutes while a slow somewhat wistful melodic line plays. (1:42)

As the piece builds, I increase the abstraction, the pitches are more random and the high frequencies are more intense. (4:00) My aim through these movements was to build the tension in the piece, taking the audience through several emotional states and creating a sense of unsteadiness and intensity – even taking it to the point of being rather frightening. (5:15) This comes to a point of resolution when the low drone comes in around (6:30) and all that is left is that and very high shimmering frequencies bringing the audience back to a centred point. It is calming, but unsettling with the high frequencies being somewhat sharp and abrasive. Finally, there is the referential sound of the train arriving at a station somewhere in the United Kingdom. It takes the audience to a familiar safe place, perhaps indicating that it is a return to reality, or that the entire piece was a journey or travelogue.

The video improvisation is approached in a similar way to the audio. Video is a new medium for me and I have much to learn about it. The language of image is very different from that of audio. In my early performances with the *VideoMasher*, I used images that were not processed very much. I received a few comments from visual artists regarding the images chosen. They were offended by some of the juxtapositions I had made between images, lack of sensitivity to others, confusing narrative, and clichés. I had unwittingly infringed upon the world of film and television. My intentions were to combine abstract images, textures, and shapes and combine them in the same way I do audio. However, the audience made connections between the images I did not intend or consider, because of their awareness of the language of media from their lifelong experiences with television, movies and the Internet. My solution to this problem was to make my images more abstract, as in *Cell*. I was more satisfied with the result of my video work once I did that, as the audience was not distracted

from the intended audio-visual experience and the images matched my abstract soundscapes better.

The video in *Cell* goes through several transformations, reflecting things that are happening in the audio. The sense that the piece is a travelogue starts from the first frames with images from the windows of a moving bus in Canada. It quickly begins to be transformed as the images degrade into pure abstraction with moving perpendicular lines of colour. The video reflects the audio making the piece dreamlike and unreal. There are no recognizable shapes until the audio approaches its climax with the introduction of moving water images. (4:30) This changes the video textures bringing glimpses of recognisable forms into an otherwise abstract mediascape. I wanted to introduce an element that would start to focus the audience's attention as the piece peaked and other transformations took place. The largest shift occurs at (6:30) when the image of the tree is introduced. The high and low frequencies of the audio complement the shimmering qualities of the processed tree image. A tree is a solid object, immovable like the low frequency drone; however, this tree dances with a shimmering video effect. I wanted to focus the audience's attention back to something real, but not completely. It is a slow transition, perhaps like that of coming from a sleeping state to a waking state. The next big shift happens at (8:28) when the image changes to an aerial shot of the Canadian prairies and the audio of the train arrival begins. The ending of the journey correlates to the image of the Estonian train from (9:05) until the end of the piece. The journey is over. We return to lucidity. In some ways, it reflects my own travels as I commute back and forth between Canada and Estonia for work, with occasional visits to the United Kingdom. The raw video footage is a record of these trips with the performance of *Cell* being a reflection on that.

Gong

Gong is an acousmatic fixed media composition that exemplifies the process of working with improvised source materials in the recording studio to create a work that is a hybrid of improvisation and studio composition. I went through several steps to come to the final piece, by improvising with first raw and then processed recordings of a gong, percussive instruments, saxophone and an electric guitar. The source sounds were multi-track recordings of various sounds given to me by Pearu Helenurm of Estonian progressive rock band Phlox. He recorded them in the studio, but did not know what to do with them once he had them. He gave them to me with the instructions to “mess them up”. I did, and he has subsequently incorporated the results into his next (currently unreleased) CD project.

The recordings he gave me were not organised into any kind of composition. They were bare sounds with some repetitive rhythms, single percussive hits, a saxophone riff and a guitar chord. I created a one-hour improvisation using the source files processed through the *Pinchbecker*. I time-stretched, granulated, delayed and layered the sounds into several sections of new material. I edited the sections of the improvisation creating twelve shorter clips with names like “gong-clacky”, “gong-glass”, “guitar-random-crazy”, “random-ticky” and a long seventeen-minute file named “improvisation1”. I then took those recordings and ran them through the *Pinchbecker* again. The longer seventeen-minute section, which upon listening had a structure and intriguing sonic elements, but was not a completed composition. I decided to use it as an overall structural arch for the piece and the shorter files were layered in to add content and depth. This process consisted of an improvisation that re-processed all the files, dramatically altering them to create the final shape and sound of the piece. Choices

were made on the fly during this real-time improvising regarding the length of sections, the type of processing, alterations of the density, frequencies present, qualities of the sounds, and emotional intensity. In the final step, the piece was normalized, edited in length slightly to remove two sections where the levels clipped during the improvisation and a few other irregularities were removed.

This hybrid method of composing creates several qualities that separate it from both improvisation and studio composition. It still has the spontaneous feeling of an improvisation, but it has had the advantage of being reworked and tweaked. I was able to fix a few issues that resulted from the improvisation, and I was able to build on the structure and sonic variety of the piece. When I compare it to *Cell*, there is a wider range of sounds, and they are heavily modified from their sources, whereas in *Cell*, the sonic manipulations are more modest. That said, the purpose and goals of the two pieces are different, with the instigating impulse of *Gong* being to transform the sources files in a drastic way, while *Cell* was performed live in front of an audience making it important not to make a serious error. Though, my approach to *Gong* has more in common with *Cell* than with what I did in the dance piece *Limbs* (discussed later in this commentary), where a number of separate improvisations were mixed and edited together in Digital Audio Workstation software to create the final piece. There are many gradations between an improvised work and one that I would call a studio composition. I enjoy exploring both extremes.

Aesthetically, the piece moves through several episodic sections of varying intensity. The piece, as with much of my music, has a film soundtrack quality to it with the sections creating layered and dense soundscapes. My compositional style is to take the listener through several

plateaus with transitions connecting these sections together. The transitions can be short or long and be at a lower or higher emotional level than the sections before or after, depending on the needs of the piece. In this type of work, I want the listener to be on edge. I am taking them on a trip where some of the destinations are a little perilous. I like sounds that are complex, layered, have a full character to them, or have a quality that cuts through everything else changing the focus of the listener. I pay attention to high and low frequency content creating soundscapes that use them in tandem, against each other or as solo elements. The sounds in *Gong* are abstractions of musical instruments. I make reference to their sources with the name of the piece, and the moments when those sources become obvious in the composition – for example the gong at the beginning or the saxophone riff towards the end. The origin of these sounds is not important to the outcome of the piece. I am using them as building blocks. When they do become legible, they act as a device to release tension or function as a contrasting element. Like most musical works, my compositions play with the notions of unity, disunity or chaos, transition and resolution. In *Gong*, I move from moments of stability, to introducing unstable elements that transform into new sections taking the listener to heightened emotional states. With each transformation a new point of stability is eventually attained until the next transformation. I try to build pieces with dynamic, variation, high and low emotions, intensity and release using sounds that can be big gestures or very small ones, giving the listener changing focal points to consider. I wish my compositions to be unpredictable, involving, emotionally charged, jarring, soothing, and do not leave the listener indifferent.

Gong starts out calmly with a processed bell chiming interspersed with random metallic and other sounds building the piece to its first transition. These exhibit processing artefacts from

the Max “phasor~” object modulated delays causing clicks in the recording at certain moments. I felt this piece needed to be rough, dirty, gritty, unsettling and intense. Dissonant and chaotic elements are introduced with a resonant comb filter feeding back marking the first transition. Some of the same elements remain with the high metallic sound, which continues as other slightly disruptive elements are introduced, unsettling the feeling of the piece, making it strange, even unnerving. I like using sounds together that are very different from each other. A calm drone-like tone with harsh metallic chimes makes the listener a little uneasy. Another disruptive element is introduced – a pulsing noise rising and falling in pitch. It is unsettling and ominous, taking the listener away from the safety of the gongs and bells, though those elements continue in the background (7:20). The section builds in variation as random disjointed sounds are introduced over the gong drone foreshadowing the next section (9:40). This following section is characterised by randomly pitched sounds, percussion and high frequency noises. It has a machine-like quality to it. The sounds are harsh; there is a random high frequency sound, reminiscent of 1960s science fiction soundtracks. It builds in intensity over several minutes taking the listener very far from the soothing gong sound at the beginning of the piece. In this section nothing is stable: it is sporadic, with noises coming in and out. I wanted to unbalance the listener completely by creating an anxious jittery intensity that builds to the climax of the composition. It continues building slowly until a note from a processed electric guitar cuts through everything. For a moment, it elevates the listener; then a few notes of a processed saxophone join it. It is a moment of stability, melody and something normal. This moment is a reprieve to manipulate the listener; one may think that things are about to be resolved into a safe melodic section. This does not last long as a buzzing digital noise suddenly emerges; harsh high frequencies hurt the ears as the piece peaks. This turns into a droning granular noise as the saxophone returns distant and jumbled. Its melody comes

in and out of the mix with the granular sound. Its descending pitch is warped and modulated until it is a low wandering bass note that carries the piece to its end. Like the beginning of the piece with the gong sound, the saxophone is recognizable as an instrument bringing the piece full circle. The resolution of the piece is not clean and simple. It is an ominous, dark and creepy soundtrack.

Interestingly, I find that pieces, like this one, where I have placed limitations on the source materials, tend to be the most interesting for me. They demand that I explore all the variations of the sounds available, searching for their inner qualities, prodding them, finding interesting points in the frequency content, textures, dynamics, emotional effect, referential content, and overall impact. It requires fresh listening as those sounds' qualities are sought after and tweaked out of them with audio craft. I can always fall back on some material I know by digging into my hard drive library of sounds, but this is a special challenge that I find very stimulating. Pearu Helenurm was very happy that his few strikes and notes of a gong, percussion, saxophone and guitar ended up taking such a new direction. I look forward to hearing how he used it on his next Phlox CD when it is released.

WORKS FOR DANCE

A major part of my PhD research was devoted to creating electroacoustic music, interactive systems, and multimedia performances for dance. This work spanned over the full duration of my PhD and included collaborations with two dance companies: the Fine 5 Dance Theatre of Tallinn, Estonia and Mile Zero Dance of Edmonton, Alberta, Canada.

My creative approach between the two was very different due to the nature of the collaborations. The work with Fine 5 Dance Theatre was centred around work with computer interactive systems that used a video camera (Computer Vision) as a motion detector to allow the dancers to trigger sounds and control the way the performance unfolded. Rather than the music leading the dancers around the stage, this system allowed the dancers to control when the gestures of the electroacoustic music score would happen. The collaboration with Mile Zero Dance was more diverse, encompassing many different styles, media, contexts, and purposes. My experience with interactivity, multimedia and electroacoustic music composition made the collaboration with Mile Zero Dance more of an exploration of these things in the context of dance performance. The works included various combinations of studio compositions, live laptop performances, improvisation, interaction and video.

Though quite different artworks, the collaborative aspects of the pieces had many interesting parallels and challenges to them – at the very least, that of bridging the interdisciplinary gap between dancers and composer. The impetus of both collaborations was the desire for the dancers to explore interactive technologies in the context of dance and work with me as a composer. In both cases, the choreographers had an idea of what they wanted from the

collaboration and their ideas of what technology could do for their creative works were sympathetic with my own, allowing the creative process to have a natural feel.

The biggest learning curve for myself was to gain some notion of the language of dance. Prior to these collaborations, I had limited knowledge of dance knowing what I liked, but unable to explain why. Through the creative process (which included rehearsals, discussions, analysis and exploration by everyone involved), I learned about the motivations, needs, psychology and process of dance. In January 2009, I went so far as to attend the *Interarium* Dance Residency at the Banff Centre for the Arts in Banff, Alberta, Canada. There, I spent two weeks learning about dance improvisation and movement by intensively participating in it for eight hours a day. These lessons have served to expand my knowledge and tuned my aesthetic palette for work with dance.

Phases

Choreography: Renee Nõmmik

Dancers: Rain Saukas, Laura Kvelstein, Eneli Raud, Dmitri Kruus

Violin: Hello Upan

Interactive system/Music: Shawn Pinchbeck

Phases is a piece for interactive electroacoustic music score and dance. This piece was the culmination of a year's work with Fine 5 Dance Theatre. In my MMus degree research, I developed the piece *Sonic Spaces (the kinetics of sound)*. This piece featured a video camera for a sensor input and software to analyse the motion of people through an active space to create an interactive acousmatic score. The response to this piece by audiences suggested the notion that this approach may work with dance. I was introduced to Fine 5 Dance Theatre and discussed their wish to expand their palette through working with technology, and my desire to explore mixing dance with my previous work.

Having observed interactive dance performances and experiments in the past, I was very conscious of the fact that many works force the dancer into the role of a computer operator. In order for the interaction to work, the dancers have to make certain unnatural gestures for the system to recognise the movement, or they have to wear special devices, costumes, or coloured arm bands to enable tracking. I wished to develop an interactive system which allows the dancers to choreograph freely, one that is not controlled or impeded by the need to trigger the sounds in a specific way. My desire to make the technology transparent to the audience is an important part of that.

My exposure to dancers working with interactivity had its genesis during the *Computed Art Intensive*, described earlier in this commentary. It was there that I also saw my first demonstration with a dancer wired with sensors. It consisted of Axel Mulder, creator of the iCube Digitizer, with bend and other sensors sewn into a costume where the bending of his limbs manipulated the parameters of a Lexicon multi-effects unit processing his voice. I found it intriguing, but not practical as the physical gestures of the dancer were bound to the system. It resulted in that person having to move their body in an unnatural way, making them a computer operator or some kind of puppet rather than a dancer. The additional burden of having wires attached to the dancer, further restraining their movements, guided me towards the use of Computer Vision as an interface for dance.

Other artists working with interactive motion capture systems also notice these same issues related to the constraints of interactive systems:

That the physical nature of current motion capture systems function to constrain the performer in many ways, often profoundly diminishing the movements they can safely perform, is also an important choreographic consideration. The systems of constraint generated by these high-frequency monitoring technologies also become consciously employed as conditioning elements in the determining of choreographic material. The movement phrases thus generated function to contain the frustration of being physically and socio-semiotically constrained (Biggs & Hawksley, 2006).²¹

²¹ Biggs, S., & Hawksley, S. (2006). Memory Maps in Interactive Dance Environments. *International Journal of Performance and Digital Arts Media*, 2 (2).

This effect can also be seen in the recent works of Marco Donnarumma where performances using his Xth Sense technology have the sense of being restrained incorporated into the choreography and movement associated with the performance of the system. Xth Sense uses “biosensors” to measure “subcutaneous mechanical oscillations”, which requires several cables to be connected to the performer restricting their free movements. Donnarumma uses this fact to good effect in his piece *Hypo Chrysos* (2011) where he fights against concrete blocks with ropes attached to his hands, while the Xth Sense sensor cables are attached and dangling from his arms.²² (Donnarumma, 2011)

In 2000, I saw a performance by Jools Gilson-Ellis and Richard Povall entitled *The Secret Project* (1999)²³ that utilized STEIM’s *Big Eye* software to trigger voice, sound and video with the dancers’ movements. I found this a very well integrated use of camera motion sensing and performance. At this time, I was already creating *Sonic Spaces (the kinetics of sound)*, which also used *Big Eye*. Seeing such a well-integrated performance using this technology assured me that it could be utilised successfully, spurring me on. My subsequent completion of *Sonic Spaces* in 2003 and the response by dance students who came everyday after school to explore the interactive sound space, inspired me to take that technology and pursue its use in dance performances.

At first, Fine 5 Dance Theatre and I experimented with the interactive system from *Sonic Spaces* at weekly dance classes they offered. We learned what aspects of the motion tracking

²² Donnarumma, M. (2011). *Marco Donnarumma | Hypo Chrysos*. Retrieved 10 13, 2012, from Marco Donnarumma | new media art, live media performance, sound design: <http://marcodonnarumma.com/works/hypo-chrysos/>

²³ V2. (2000). *The Sectret Project -- V2_Institute for the Unstable Media*. Retrieved 10 11, 2012, from V2: <http://www.v2.nl/archive/works/the-secret-project>

and sound creation worked and what did not. The system from *Sonic Spaces* was very complex and the reflection of the movement through the active space in the soundscape is unpredictable. Audio activity is not directly mapped to physical activity in the space, and the software exerts a lot of the control over the results. We determined that simpler systems that allow the dancers to have more control over the audio results would allow the dancers to gain a better feel for the audio they were performing. I rewrote the motion tracking software using Max/Jitter/Cyclops and created new ways to analyse motion through space. More advanced dancers were brought in and the first result was the piece *Manipulations*, an in-studio public performance that tested the technology in a performance situation.

Manipulations consisted of three works exploring two separate approaches to motion capture: the original *Sonic Spaces* system that used STEIM's *Big Eye* software and a Max patch that analysed several aspects of motion (velocity, duration in one location, presence in one of four zones, and duration to move from zone to zone), and a grid system where position in the active space related to a sound or effect being triggered. The performance was very interesting with the pieces with the best relationship between the motion and the sound being the ones using the simpler grid system. The first of those consisted of improvising dancers moving around the space while a dancer acting like a television interviewer followed them around the space carrying a microphone with long cord asking them and the audience nonsensical questions about hair products, celebrity gossip and other banal questions. The voices were processed and sampled depending on the location of the dancers in the active space creating a montage. The other piece consisted of melodic violin loops triggered by the position of the dancers in the space. As more positions were occupied, the number of loops

playing increased making the melody more layered. This last technique was the starting point for our second performance piece *Phases*.

Phases in its entirety consisted of three sections: a long interactive section with two duets and a fixed media section at the end with a violinist, and two non-interactive sections with another composer's music. The two non-interactive sections of *Phases* are considered standalone works that Fine 5 Dance Theatre regularly perform separately. I will not discuss them as I did not contribute to them.

The interactive first section of *Phases* has several divisions within it, starting with an introduction where the first dancer enters and steps into two framed lit regions on the stage. In this section, the sound was manually triggered. This was a decision by the choreographer to introduce the audience to the idea that when the dancers step somewhere, their movements would trigger a sound. Though the piece was not advertised or presented as an interactive dance performance, the choreographer thought that this introduction would help the audience understand the direct relationship between the sound and the dance. It was not important to the aesthetic appreciation of the piece, but it would help those paying attention to gain deeper understanding of the inner workings of how the piece functioned. Since this type of interactive work had not been performed frequently to the mainstream dance audiences in Estonia to whom this piece was marketed, Nõmmik felt it necessary to introduce the concept of interactivity in this subtle way. After the introduction, the lights were turned up and the system was put into "auto" mode starting the duets, which consisted of a first and second couple dancing separately, and then the two couples dancing together. The piece transitions when the violinist appears and the dancers move mirrors onto the stage. The sound fades into

a noisy acousmatic section with layers of radio noise and spoken text. The texts are snippets of strange facts, news clips, products, and Estonian political speeches read by actors. Thematically, *Phases* is about modern life – the difficulty of relationships in this mechanised world, our isolation and our detachment from natural things. At the end, the bedazzled violinist is surrounded by mirrors, reflected light, and noise.

In the Max patch, the dance floor was divided into 25 regions with nine zones that would trigger a sound when the dancer entered it. The active zones were arranged among the regions in a pattern that would give the best musical performance based on the choreography and triggered sounds. As the dancers moved around the stage, they would step into certain zones at certain times. The choreography was semi-improvised but had specific anchor moves for sound and lighting changes which allowed the dancers to perform with a certain amount of freedom. There were four moments when the assigned sounds would change, allowing for variation during the piece. I suggested in the design stage the possibility to have sounds change or develop over time algorithmically. The choreographer preferred that the sounds were predictable and static over time, but that the dance would build the compositional structure. As a composer, my instinct would be to create a complex and changing composition, but part of the collaborative process is to take the creative needs of your collaborators into consideration. In this case, it was decided the compositional structure would be determined by the dancers movements with four changes to the sounds at specific points.

The sounds that were chosen for *Phases* were a combination of melodic violin loops, spoken text and environmental recordings. The violin loops when combined played a looping layered melody. They were used to add a mechanical musical quality to the piece with their repetitive

loops. This tied in with the underlying theme of hectic modern life. It also acted as a bridge to the appearance of the violinist later in the piece once the duets were completed. The text chosen by Nõmmik consisted of strange extracts from the media, perhaps things you might read when browsing the web; a woman discussing beauty products, a man discussing women's underpants with GPS tracking to spy on their partner's whereabouts, and scientific terminology related to biology. These created a certain tension between the male and female characters in the dance. The referential environmental sounds were used to reflect and evoke the different emotional states of the characters in the dance. In the first duet there is the environmental sounds of frantically blowing wind, and calmly lapping water. The second duet is a busier section with a different dynamic between the two dancers, more physical. The environmental sounds consisted of calming birds by the sea, intensely croaking frogs, frantically blowing wind with birds, and the mating coos of doves. In the section with the double duet, the environmental sounds consisted of the spooky barking of miniature deer in the woods, the mating coos of doves, and cheerful birds chirping.

Part of the process of collaborating with the choreographer and dancers was to choose the sounds, create the software, and to make the system as reactive, interesting, and as foolproof as possible. The dancers had to learn that instead of being led around by the music, as usual, they were in command of how the musical performance unfolded. They needed to develop a musical sense and finesse to their dance performance. Dancer Laura Kvelstein stated in a discussion of our work in *Phases*:

We knew that as we moved around the performance space, we could evoke different sounds in different areas of the space. We were totally in control of

the sound - its appearance, duration, repetitiveness, pauses, and the mixture of different sounds (as two dancers moved around simultaneously).

This situation created a totally different awareness, both sensory and kinaesthetic. Instead of an automated performance, perfected during a long rehearsal period until quasi-flawlessness, the interactive situation forced us (in a good way) to stay alert and attentive each moment, to be present simultaneously in our mind and body, instead of in a secure flow of movement that is more common with performing fixed choreography. It made us acutely aware of the other body(ies) in the space and affected our movement decisions, related to the overall effect we co-created for the audience.

For me, the interactive part of the performance helped also break the routine when doing a series of performances, as each time the result the dancers created together was different. (Kvelstein, 2012)

The system allowed the dancers to create a strong unhindered choreography, which was interesting to watch and full of emotion where the dance and sound were perfectly synchronised.

Technically, the piece had to function as simply as possible. There was limited time for setting up, tuning the system and troubleshooting. There were many challenges in getting it to function well in each performance space. The video camera was positioned above the stage area so that an X,Y coordinate system could be tracked. I used a USB Logitech webcam as a

camera which required bright and even lighting across the stage. Only 20 m of active USB extensions could be run from the camera to the lighting booth before the USB port would run out of power and stop functioning. Moreover, the USB cable had to be run away from power cables to prevent the lighting grid from interfering with the USB signal. In some theatres, the power could fluctuate, causing the lights to change intensity over time making the tuning of the brightness and contrast of the video image difficult. In every theatre, the stage area would have different dimensions. Normally, the dancers would simply readjust their choreography in the rehearsals to accommodate the change. With the interactive system, I would have to adjust the dimensions of the active area to accommodate their change. This varied the distance between the trigger zones. A larger stage meant the sounds would occur less often, a smaller stage meant sounds triggered more often, due to the time it took to travel around. This changed the dynamic of the piece and how the dancers reacted to it. There was an optimal size of the active space with which the dancers felt the most comfortable and would react with the most emotion and feeling. Unfortunately, we usually had only a few hours to set up and rehearse in the space, making it difficult to discover the best configuration. Towards the end of the tour, it was easier to get everything running as close to optimally as possible.

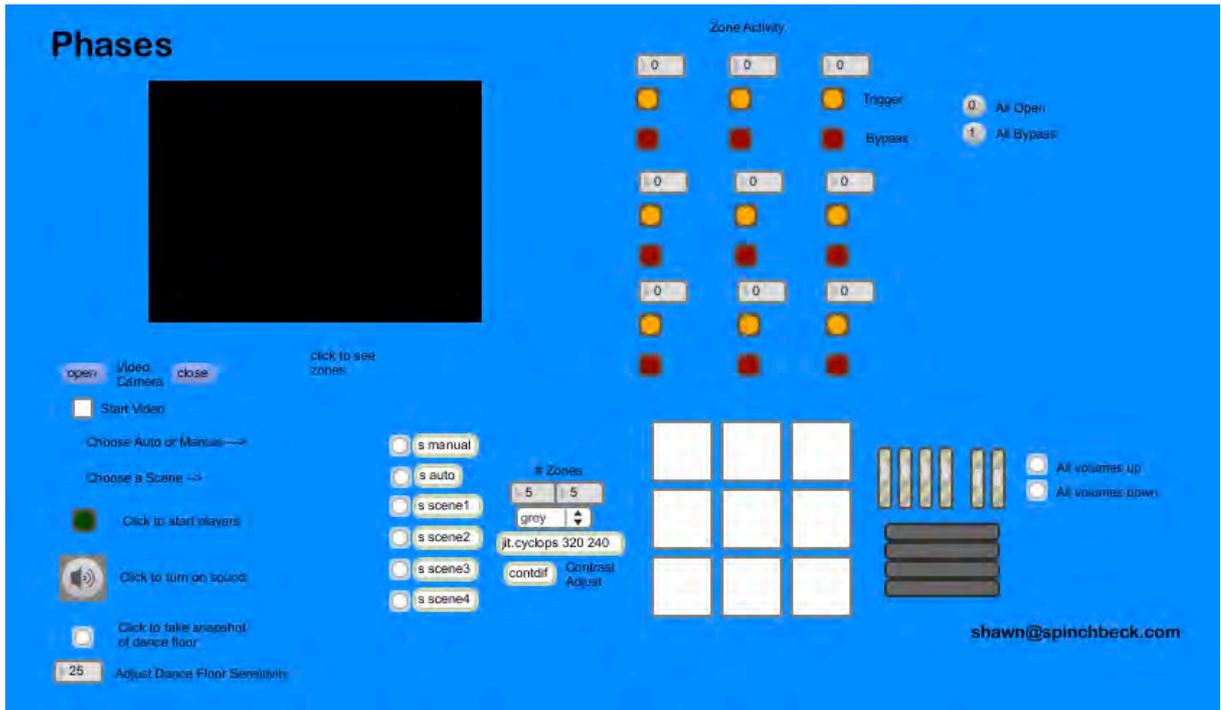


Figure 3. *Phases* software interface.

The *Phases* software functions by comparing the video input against a snapshot of the empty dance floor. An absolute difference operator combines the live video and snapshot so that when the video frame is empty they create a cancelled out black image. When dancers enter the video frame, they show up as a bright white blob. Using the Cyclops object by Eric Singer, the amount of grey in that zone is passed on to a threshold filter. If a dancer moves on the dance floor, he or she will cause an increase in the grey value and trigger a sound when in an active zone. Nine “sfplay~” objects are loaded with sounds by clicking on the appropriate scene number. The files are looped and played constantly in order to keep the violin loops in synchronisation. When the dancer moves in or out of an active zone, the volume increases or decreases for that “sfplay~” object. New scenes are chosen by clicking that scene number. There is a “manual” control to allow the sounds to be triggered at the introduction of the piece when the first dancer enters the stage, and an “auto” control for once the lights come up and

the dancers start their duet. There are also manual controls to allow for the moderation of the interaction, if necessary. If the dancers stay too long in one position and the looping sound starts to annoy, that active zone could be muted for a moment until they move. This was necessary from time to time to help the musicality of the performance. Additionally, if the lights fluctuated from poor power in the theatre, it could cause the live video to drift from the snapshot of the empty dance floor causing random triggers. If raising the trigger threshold did not correct the problem, there was a means to control the sound output.

Knowledge Box

Choreography: Gerry Morita

Dancers: Gerry Morita, Eryn Tempest, Katrina Smy, Richard Lee, Danica Smith

Designers: Guido Tondino, Victoria Zimski

Music and Video: Shawn Pinchbeck

My work with Mile Zero Dance of Edmonton is the second of the dance collaborations. This is a very different type of collaboration from that with Fine 5 Dance. The many works I have created with Mile Zero Dance include different kinds of media, music, performance contexts, and venues. The collaborative process is much more free-flowing, reciprocal, and reactive. Their process is full of many ideas that need to be rationalised, pared down and developed. Depending on the venue, dancers, resources, and function, the pieces can take various forms.

Knowledge Box was the result of an initial pairing between me and Mile Zero Dance by the Alberta Dance Alliance Festival. We were put together for a few weeks in 2009 to create a new work as part of their series to create interesting collaborations for their festival. We created *Public Domain*, a piece inspired by the drawings and stories of Edward Gorey. *Knowledge Box*, created in 2010, was a continuation of this creative process to develop the same piece further. The core of the piece is more or less the same, however there was the addition of some new sections, dancers, and lighting/set designers.

In this work, we did not use any stories or situations arising from the works of Edward Gorey, but adopted the macabre feel, absurdity, costumes, and an overall sense of his aesthetic. The free-flowing creative process involved several weeks of work in the studio, which generated

the ideas of the piece, costuming and sound creation. The choreographer mapped several scenarios on a piece of paper: The Deadly Tea Party, Ghost Girl, Drowning Brides, Swinging Window, The Cone, Duelling Widows, Blindfolded Girl, Man in Fur, Vodka Sisters, etc. We worked together, developing these ideas into the sections of the piece. I gave regular feedback on the choreography and the dancers gave me feedback on the sound, creating a communicative creative environment. I participated in the morning warm-up with the dancers and would sometimes join in the improvisations when working on scenes, on a few occasions almost getting choreographed into the piece. The process moved into the theatre for the final week where the lighting, the flow of the performance, and the technical aspects were expanded into a performable show.

In my compositional process, I would improvise music using the *Pinchbecker* while the dancers rehearsed the scenes in the studio. I recorded the improvisations and then edited the suitable parts of those long improvisations into individual files. The files would then be the anchors or parts of layers for scenes or segments. Some sections were completely live, others featured the improvised sections with additional live processing and sounds. The compositional structure of the various pieces was episodic, reflecting the emotions, moods and actions of the various scenes of the performance. The music and dance were made for each other, making the musical structure intertwined with the choreography. Performing live, I had to bring all the elements together. As the dancers were partly improvising their choreography, I had to lead or react to various cues in the dance. I had to keep everything flowing and moving along by mixing, creating, reacting and spatialising, thereby making each performance unique. The music developed to include speakers on the dancers via FM radios and a transmitter in addition to a six channel sound system with four speakers in the corners

and two ceiling speakers. The result was a very integrated and diverse show with a variety of media including interaction, video, and electroacoustic music performance. The responsibilities as a live performer, video/computer technician, and sound diffuser made it the most complex live performance I have ever done.

A deck of cards was handed out to the audience as they entered the theatre with graphical depictions of characters and scenes in the piece. *Knowledge Box* has a twisting narrative that explores the exploits of the various characters created. The cards act as a humorous guide for the piece. In the first scene, the dancers walk back and forth across the stage, while their footsteps are processed and diffused into the loudspeakers. A low power transmitter broadcasts the sounds of whispering voices to FM radios on the dancers creating a second diffusion through the space as the dancers moved around. The whispering refers to the inner voices, secrets, gossip, and desires of the characters. The amplified and processed footsteps increase the impact of each physical gesture while they move through the space. This facilitates the setting of the mood for the piece and a hint of the relationships between the characters. In the second scene, “The Crone”, a dancer in black moves across the stage, holding a stick. This scene features a pre-recorded improvisation played back and diffused into the sound system. The sounds of the strange creaking/ticking and ventilation drone create a tension filled scene that is punctuated by the movements of the dancer, especially when she smashes the stick down on the floor increasing the sense of danger and mystery. The third scene, “The Vodka Sisters”, has a pre-composed section of music for which I change the playback speed manually, like a tape recorder, while the performance progresses. This creates an unsteady and humorous musical accompaniment as the dancers jump around in an increasingly bizarre scene until they fall to the floor. The music was written with circus-like

accordion and organ sounds to reflect the frivolity and carefree spirit of the characters, while its changing pitch the development of their manic alcoholic binge. The fourth scene, “Swinging Window”, is a completely live section. The jittery voice sound is generated by the granular synthesis subpatch in the *Pinchbecker* while I modulate the playback position in its buffer. The bass sound is a sound file playing back while I stop and start it manually. The sounds reflect the violence of the characters as they fight, adding to the tension of this scene. The granular wordless voice and pulsing beat are maniacal, intense, and nervous; putting the listener on edge. The fifth scene, “The Cone”, features a ballerina with a cone on her face, like a strange beak. It starts with looped violins playing at different speeds, which I layer as I start to process them live; creating a rhythmic bed for the dancers movements in the first half of the section. This fades into the sound of a modified music box which becomes processed and layered, making it more abstract as the piece progresses, creating a dreamlike and pretty soundscape. This reflects a certain delicacy, fragility, and beauty of the character that the male character notices as he walks in the background. The sixth scene, “Ghost Girl”, is the interactive section. There is a USB webcam installed above the stage picking up the dancer’s movement in an X,Y coordinate system. It uses the Cyclops object, with nine active zones on a 5 x 5 grid, as in *Phases*. The active zones are set to output when there is a difference in grey levels between frames. If the difference is above a threshold level, it triggers a random MIDI note with a bell-like sound. The interactive element to the section gives an animated feel to the movements of the dancer as she waves the stick with the white cloth on it. The character believes it is a ghost and the sound aims to reinforce the flighty swirling quality of the cloth’s movement. This is accompanied by an ominous low drone note creating a counterpoint to the bell sound. Its intent was to instil a sense of danger, even though the character is having fun with her ghost, perhaps there is something ominous regarding her actions. The seventh scene

is another where I mix, play and process sound files live. I combine dripping, ticking, and pipes clanking sounds into an unsettling soundscape. The dancer talks into a wireless microphone hidden in the lamp, describing how she is plotting the poisoning of the male character while he drinks. There are several cues that are punctuated with a backwards and processed music box sound as she sneaks over and poisons his drink. This sound adds a supernatural sense to her movements, as she is able to move without the man noticing. The scene ends with a pre-recorded rhythmic piece for her victory dance as the witless male character frantically views his tarot deck. The eighth scene, “Blindfolded Girl”, was primarily created by the further live processing of the pre-processed sounds of a crying baby. Though the source of the sound is masked by its processing, the sense of distress in the tone of the sound is retained as the bound and blindfolded character is led around the stage. As the piece develops other sounds are added to increase the tension and suspense of the characters’ actions. The ninth scene, “Duelling Widows”, features improvised music that was created during rehearsal, with additional live processing. The rhythmic electronic looping sound is accompanied with a slowed down creaking door, which later develops into heavy banging. The sounds setup the tension between the slowly moving “Widows” and the active looping screeching banging soundscape, hinting that there is more going on between the characters than what is seen on-stage. The tenth section, “The Ladder”, is similarly created, with sound file playback of a piece created earlier in improvisations in the dance studio. The sound of the processed flute has a certain strangeness, sadness, and anxiety to it, reflecting the mental state of the character on the ladder as she falls or jumps from it. In the performance, the sections where I have less live mixing to do gives me time to cue up the sound files for the coming sections. The eleventh section, the male character’s solo, features a pre-composed melody created with a combination of sampled Hammond “The Piper” organ rhythm section, DX7

harp and sampled horns. It creates a whimsical mood for the male character's musings while the ballerina dances behind him. The twelfth section, "Drowning Brides", features interactive video. A video projector is directed down onto the stage, creating a changing shimmering light on the dancers' wedding dresses. The video reacts to the sound using the *VideoMasher* Max patch. Live sounds are mixed while I modulate the video processing, creating further changes to the lighting. The slowed down voice-like drone sound matches the slow motion movements of the dancers, while the crackling and water lapping sounds give the scene an underwater quality and function as the amplitude trigger for the changes to the interactive video. The final section, "The Poisonous Tea Party", starts with another whimsical melody while the dancers mime the scenes depicted on the *Knowledge Box* playing cards. The melody degrades as I mix in live processing of the melody, reflecting the ominous turn of events for the tea party. The end comes when a reprise of the ballerina's music fades in and the male character reveals the Knowledge Box as she dances.

Tu:la

Choreography: Gerry Morita

Dancers: Gerry Morita, Lynn Snelling, Heidi Bunting

Film Projections: Patrick Arès-Pilon

Music: Shawn Pinchbeck

Tu:la was a multimedia dance performance on November 5, 2011 that consisted of two fixed media works (*Duplex* and *Limbs*) and two live performance pieces (*Ints* and *Cold Steel*). This performance combined many of the composition and performance techniques I had developed over my PhD research period into a cohesive event presented in a nightclub environment, demonstrating how my current creative process easily accommodates varied performance elements and venues. The two live pieces used a combination of live sound creation with my *Pinchbecker* software and metal objects with contact microphones attached. The metal objects were a vintage LP rack with squeaky wheels used in *Ints*, and a piece of banged and bowed sheet metal used in *Cold Steel*. In addition to dance, there were 16 mm film loops and slides projected onto the walls, stage and performers.

During the creative process, the choreographer Gerry Morita and I met several times a week for three weeks prior to the performance to discuss and improvise with ideas. Initially, we worked on the live performance pieces. I did a performance with a squeaky chair in October 2011 in Montreal, Canada, and wanted to explore this idea further. I found an old metal vinyl LP rack with squeaky wheels and attached a contact microphone to it. I created some processing using the *Pinchbecker* for the LP rack and built the performance for *Ints* around it. I improvised with some heavily processed sounds – a backwards and slowed down melody,

delayed water dripping, slowed down skin peeling, a looping distorted Formula One car, and a processed audio glitch from a crashed computer program. The sounds were chosen based on their sonic qualities rather than their referential qualities with the intention to create a sense of space, mood, texture and to act as a bed for the live improvisation on the LP rack. Morita started dancing to it and creating a sympathetic choreography. The film loops of Patrick Arès-Pilon were introduced soon after and integrated into the show, often acting as a form of lighting. During the creative process, each artist would continuously introduce elements into the work, playing off what the others were doing. The structure of the piece is episodic in nature with progressively building tension as my physical performance on-stage gets increasingly animated. The dance and projections compliment this adding to the eeriness with the long shadows of the dancer stretching on the wall. The work did not come together until the performance itself, making it a unique and special event for audience and performers.

Cold Steel developed when Gerry Morita went to the hardware store on the way to rehearsal and bought a thin piece of corrugated steel 100 cm X 40 cm in size. She suggested that it be used to create a piece. I got a violin bow and developed some processing on the *Pinchbecker*, creating a very loud noisy segment. I introduced the element of interactivity by bringing a camera and mapping the amount of movement in the video image to the volume level of the Granular Synthesis subpatch in the *Pinchbecker*. A black light was added to illuminate the dancer's movements, which she accentuated by wearing white gloves and clothing. *Cold Steel's* episodic structure develops through three sections. It begins with the interactive segment with the dancer's glowing hand movements controlling the volume of the granular sounds. These sounds consisted initially of someone speaking, then changes to the processed sound of a CD case being rubbed on a table, and then to that of metallic sounds. I modulate

some of the parameters of the granular patch to introduce variation to the sounds while the dancer is triggering them. I chose these sounds because of their sporadic tempos and random pitches, which match the dancer's movements, creating an abstract soundscape. The second section to the piece is a foreboding soundscape consisting of slowed down heavy beat of footsteps through the snow, screechy modulated balloon noises, a piercing metal grinder, a robotic processed circuit bent toy Speak and Spell, and the violent percussive hits and bowed steel sheet noises. They were chosen for their intensity and darkly disturbing qualities. Since this was the last piece of the concert, we wanted the show to build to a climax. The finale of the piece introduces a heavy driving rhythm created using the Tassman synthesis software. The dancer's movements reflect the intensity and disturbing sound of the piece, accentuated by the projections of film loops and burning film on the walls and performers. The result is a very disturbing noisy work, suitable for an edgy nightclub environment.

The two other pieces *Limbs* and *Duplex* developed differently. The music for *Limbs* was created from improvisations I did with violinist Hello Upan for the short film *Behind Closed Windows*. Many of the pieces we did for that film were not used. I enjoyed the work and wanted to make use of it in another project. I took seven or eight improvised sections for various scenes of the film and then edited them together into *Limbs*. Its reworking is another example of taking material from an improvisation session and then using it in a fixed media piece. The creative process for *Limbs* started with an improvisation between the dancer Heidi Bunting and myself. She was working with the mannequin legs when I started mixing and layering the improvised violin pieces on the *Pinchbecker*. I later edited these pieces together in the studio into the fixed media piece, allowing the choreography to solidify around it. The intention of the music was to create an eerie soundscape for the dancer, who is arranging

disembodied mannequin limbs from one area of the stage to another. The music, with its violin and laptop improvisations, exhibits those qualities. The variations in the piece as the improvised sections were layered in, allow an emotional profile for the character to develop. The piece ranges from a mysterious section at the beginning, as her task is introduced, to a busier section that increases the tension. The third section introduces delayed feedback sounds through the violin microphone that culminates in a frantic climax. The next section has random pitched short delays that create a sporadic rhythm. This leads to pitched down layered violins that have a somber lonely quality to them created by several passes through the *Pinchbecker*, as the dancer lies on the floor with her legs up in the air imitating her sculptural arrangement of limbs. The final section combines low-pitched glass bowls and a violin melody solidifying a lonely feeling to the piece as it concludes. The episodic structure of *Limbs* is somewhat oriented around the scene created by the choreography, but goes through several developments changing the emotional tension in the dance, which has a steady determined pace. I wanted the music to act as a soundtrack for her task while revealing an inner emotional state of the character.

Duplex also grew out of an improvisation with the dancers during rehearsal. They started dancing on the furniture in the room while I created a composition for their scenario. Later, I edited that improvisation into something more coherent. The piece's episodic structure and long development is designed to reflect the timelessness, loneliness and emotional distance between the two characters as they explore the space around their chairs. The sounds used are sparse granular processed bass flutes with long sustained breathy notes and a high-pitched whistling melody that evoke breaths and perhaps a ghostly presence. A crackling sound is introduced around 9:00 that increases the claustrophobic feeling of the piece. The flute sounds

at this time are more active and repetitive, in turn heightening the activity level of the dancers. Around 11:00, the flute sounds fade lower as the piece's presence drops to allow the vocalisations of dancer Eryn Tempest, a glitchy staccato sound, and an intermittent chime to emerge through the mix. The vocalisations have the effect of evoking the characters' inner thoughts, memories, voices, and pasts. The piece is about two people who are alone with their thoughts and memories. They may be neighbours, but they remain isolated even though there is someone physically near.

Working with a film projection artist for this performance was an interesting challenge. The projectors are very loud. In the rehearsals, we decided as a group when the projectors would be running, to cause the least conflict with the sound. In the most active musical sections and climaxes, the projectors are turned on and used for maximum impact. In the case of this project, it was a calculated trade-off between the sound performance and the noise generated by the projectors. I believe that the end visual effect and the creation of a complete multimedia experience justified this compromise for this event.

INTERACTIVE INSTALLATIONS

Another aspect of my PhD research was the creation of interactive multimedia installations. My solo installations tend to be a combination of playful exploration of interactive technologies and software generated acousmatic soundscape creation. During my PhD research, I created two collaborative sound and video installations: the *Polyphonic Passport Photo* and *The Bather*. By collaborating with other artists, these installations focus on different elements than in a solo work, but still encompass the things I really enjoy about interactivity.

These artworks fall within what would be considered New Media Art. Wikipedia defines New Media art as, “a genre that encompasses artworks created with new media technologies, including digital art, computer graphics, computer animation, virtual art, Internet art, interactive art, video games, computer robotics, and art as biotechnology.”²⁴ The areas I typically explore are digital art – those “that use digital technology as an essential part of the creative and/or presentation process”²⁵, virtual art – those that include “human-machine interfaces such as visualization casks, stereoscopic spectacles and screens, digital painting and sculpture, generators of three-dimensional sound, data gloves, data clothes, position sensors,

²⁴ *New Media Art*. (n.d.). Retrieved 10 26, 2012, from Wikipedia: http://en.wikipedia.org/wiki/New_media_art

²⁵ *Digital Art*. (n.d.). Retrieved 10 26, 2012, from Wikipedia: http://en.wikipedia.org/wiki/Digital_art

tactile and power feed-back systems, etc”²⁶, and interactive art – “a form of art that involves the spectator in a way that allows the art to achieve its purpose.”²⁷

²⁶ *Virtual Art*. (n.d.). Retrieved 10 26, 2012, from Wikipedia:
http://en.wikipedia.org/wiki/Virtual_art

²⁷ *Interactive Art*. (n.d.). Retrieved 10 26, 2012, from Wikipedia:
http://en.wikipedia.org/wiki/Interactive_art

Polyphonic Passport Photo

Concept and Construction: Reimo Võsa-Tangsoo

Interface Design, Printing Software and Hardware: Sulo Kallas

Photo Analysis and Music Software: Shawn Pinchbeck

The *Polyphonic Passport Photo* is a photo booth that takes your photo, prints your picture, and plays a melody by translating the RGB values of the photo to MIDI notes. It was conceptualised by Reimo Võsa-Tangsoo, an Estonian photographer. He wanted to create an interactive installation where the digital information of a person's face could be listened to. It is a comment on our information age where the details of a human being are readily quantified as collections of numerical data. He asks, "Does a photo tell the story of a person? What happens when you translate that image into another kind of data? Is it still an accurate depiction of them?"



Figure 4. Polyphonic Passport Photo

The collaborative process on this piece had several stages. Võsa-Tangsoo and I discussed the possibilities for creating music from a photograph. He had the idea that it could be mapped to the RGB values or colour histograms and I researched the possibilities of doing that. I had a previous piece that turned a photograph into MIDI notes by grey scaling the photo and adjusting the dimensions to 127 X 1000 pixels. I scanned each row of pixels, assigned a note value for each pixel, and generated a chord for that row. With this piece, each colour had to be analysed separately and have some value assigned to them. The programming tasks between Sulo Kallas and myself were discussed and divided up based on what our parts of the project needed to do. He focussed on the photo grabbing, printing, and uploading to the Internet. I focussed on reading the photo, creating a histogram and mapping MIDI values to it.

As a composer, my tendency is to craft sound into organised works using carefully considered sound material. During the development of this piece, I discussed the possibility of the notes being restricted to certain scales, or algorithmically assigning note values to form some compositional structure. I also explored recording the person's voice, processing it, and including that into the melody to expand the soundscape possibilities. It was decided as a group that the music should be literal and somehow translate the histogram directly and that low quality General MIDI sounds would be used exclusively, the rationale being that this best reflected the photographic information and intentions of the piece: a direct digital translation of a photograph to another medium. The "tickity-tockity" General MIDI sounds aesthetically capture this digital quality of the translation. In some ways, this was a compromise on my part; if I had been creating a solo project I would have followed my nature and created composed and produced music. Because this was a collaborative process, the utilised sounds were discussed and a choice made using different criteria from my own. As a result, the piece

reflects this group aesthetic and the needs of the piece to make it as robotic and digital as possible. It is this type of process and result that makes collaborating so intriguing, as it leads one to create work very different from one's normal practice, thus expanding the artistic language of one's creative output.

In Estonian Media Art, there is an interest in privacy, information, and the culture of an information society – Estonia is a leading nation in innovation and technology with its national ID Card, Digital Signatures, E-Voting, mobile phone banking and other technologies being commonplace for some time. *Polyphonic Passport Photo* was originally created for an exhibit by the Media Artists' Union of Estonia at the Vaal Galerii in November and December 2009, in Tallinn, Estonia where there was a number of New Media Artworks designed around this theme. A culmination of this current within Estonian culture and art is Tiimo Toots' *Memopol-2 (2010-2012)*. This piece allows the gallery audience to scan a passport or other identification document while a computer searches for all information about this individual on the Internet. This information is categorised by type and displayed on a constructed display in the gallery space.²⁸ For an Estonian, between their single national ID Card integrating all parts of their life and general information available on Internet search engines, the amount of data available about their daily lives is staggering: High School grades, prescriptions, driving and other licenses, military service, addresses associated with them, income, friends' names, family's names, and many more are displayed in the gallery.

The *Polyphonic Passport Photo* worked in a similar way to a normal photo booth. The computer screen allowed people to see their image, giving appropriate instructions as to what

²⁸ Toots, T. (2012). *Memopol*. Retrieved 10 26, 2012, from Timo Toots: <http://works.timo.ee/memopol/>

to do. The subject presses the button to take the picture, and the booth would print the photograph and simultaneously play the histogram melody from speakers above the computer screen. Each melody lasted about one minute. The printed photo included the picture, the RGB histograms, and a web address to view and listen to the photo online. On the screen, the message is displayed, “Enjoy the sound of your identity!”

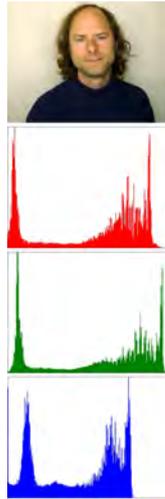


Figure 5. A photo from the Polyphonic Passport Photo installation

My Max patch (written for Microsoft Windows XP) used the “jit.histogram” object to take the statistics of the RGB values in the photo. When the button is pushed, Kallas’ software would send my Max patch a numerical value through UDP, which would be received by the Max “udpreceive” object. This would initiate my patch to read the photo that Kallas’ software has already saved to a folder in the Windows root directory. The photo would load into the Jitter matrix and be analysed by the “Histo” subpatch. After a three second delay, it would start playing music. The matrix size is 256 x 1. A “metro” object steps the MIDI player through each of the 256 pixels. The RGB values of the histogram at that location are played with each colour having a voice and an average of the RGB values being assigned to MIDI channel 10 to play a percussion sound. Thus four sounds are played for each pixel. A

“random” object chooses how soon the next note will occur – after 100 ms, 200 ms, 300 ms or 400 ms, creating rests. The player will continue stepping through the matrix until the end when the patch will empty the matrix and wait for the next individual to take a photo.

Polyphonic Passport Photo allows audiences to enjoy a twist on an everyday object. When they come upon the piece, they normally sit patiently and listen to the melody their photo has created. Depending on the clothes they are wearing, the lighting, how close they are to the camera, how tall they are, and how many people are in the booth at once; the melody can have a wide range of variation. People would return with a change of clothes or new objects to get a new melody. Everyone gets a personal tune that they can listen to later on the Internet and share with their friends. It is personal, intriguing, human, explores technology and our sense of identity in the modern world. Two booths have been built, one in Estonia and one in Canada; allowing regular exhibitions in galleries, public squares, and other high traffic locations.

The Bather

Choreography, Video Editing: Susanna Hood

Sound Engineering and Design: Chris Driedzic

Sound Design, Hardware Design, Max Programming: Shawn Pinchbeck

The Bather is a computer interactive sound and video installation created at the *Interarium Dance Residency* at the Banff Centre for the Arts, Banff, Canada in January 2009. The piece is to be presented in a darkened gallery space. When the viewer enters the room, they are presented with a bed with a video projection of an individual lying in a bathtub projected onto it. There is a bath mitt sitting on the projection surface suggesting to the audience that they should put the mitt on and “wash” the bather. When they do, alternating video projections of a man or a woman making choreographed motions in the tub with the sounds of someone enjoying a bath is played. As one continues to touch the mitt to the projection surface the density of the bath soundscape increases. The choreographed movement initiated with the touch continues uninterrupted until complete; at that point the projected person returns to a neutral position in the tub waiting for the next interaction.

The piece was initiated when Banff residency participants were assigned a task to create an interactive sound and video installation using a Wii Remote controller. The group of individuals I worked with turned out to be very creative and compatible as collaborators. After half a day of brainstorming about the piece, we came up with the idea of this playful work. The collective of individuals defined the type of work we could create with each individual contributing in their way. Chris Driedzic and Susanna Hood recorded and edited the videos and sounds of themselves in the tub, and I designed the hardware and wrote the

Max software. Being the only one in the group with prior interactive art experience, I facilitated the creative process, making the ideas that came out in the brainstorming process technically possible with the limited resources we had. When the piece was presented, the other participants of the residency enjoyed interacting with it. They found it very compelling, fun, personal and human. After the residency ended, our group agreed to work further on it, making it a completed work. In the final version, the Wii Remote that originally controlled effects and the panning of the sounds by tilting the mitt was not used. I suggested to the group that it over complicated the interaction in the piece and took away from its focus – the ritual of bathing and the connection of the audience to the projected bather.

At the time of writing this, *The Bather* has been exhibited three times in different contexts: a gallery, a sound art event and a dance festival. The audience response was slightly different depending on the location and space. At the Vaal Gallery in Tallinn, Estonia in November 2009, people gathered around it and played with it as a group. At the Festival of New Dance in St. John's, Newfoundland, Canada in October 2011 viewers lined up at the door of the space so those inside could have a private experience for a few minutes each. The context in which it is presented seems to determine how the audience treats the experience, perhaps because the comfort level for nudity is different in different places. The experience of the piece does depend a great deal on the viewer's prior personal experiences and memories. So far, the nudity aspect of the piece has not offended anyone; perhaps also because of the presentation context, audiences understand the artistic intention of the work.

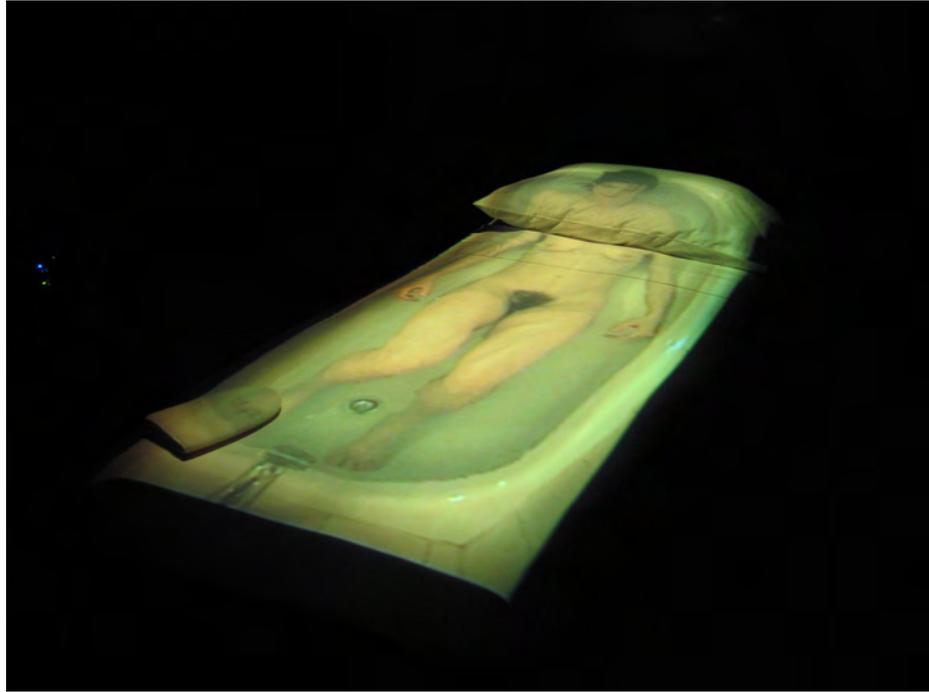


Figure 6. The Bather

The Bather hardware consisted of two piezo transducers imbedded in a foam mattress connected to the microphone inputs of an audio interface. The touch of the participant is transmitted through the foam to the piezos as vibrations. A threshold point is set in the Max patch to trigger sounds and a video file. The video starts at a “home” position with Hood lying in the bathtub. When triggered, a new video is crossfaded with the “home” position video. The figure in the new video, either Hood or Driedzic, carries out a choreographed movement in the tub and, once completed, returns to the “home” position. Only one video at a time can be triggered and it plays through until completed. However, up to eight sounds can be triggered if one continues to scrub the video projection on the mattress, creating a collage of randomly triggered bathtub sounds. These sounds play until they end. The choreographed tub movements consist of a collection of twenty-one videos that have the two figures making

movements, such as: turning left, turning right, crouching with their back to the camera, back rising, lifting feet, shimmying, turning over, etc, in addition to the image of the empty tub.

The Max patch has two main subpatches: “videoplay” and “audioplay”. The “videoplay” subpatch orchestrates the playback and selection of the video files. There is an audio input section for detecting the piezo triggers with sensitivity and threshold settings. Once a trigger is created, it sends a bang to the audio player and triggers a video. The video player starts with Hood in the “home” position. When a trigger is detected, a new video is selected randomly from a “coll” object and a 3000 ms crossfade to the new video is initiated. The length of the new video is calculated by a formula based on the frame rate. Once the video is over, a crossfade back to the “home” position is initiated. Due to the limitations of my computer, there is a mechanism to stop and start the videos to save CPU cycles for the video being displayed. Once the video is playing, there is a “jit.brcosa” object to adjust video brightness, contrast and saturation, if necessary. Additionally, there is a “jit.rota” object and a “zoom” subpatch to adjust the video size and orientation depending on the projector used, projection throw distance, and size of the projection surface.

The “audioplay” subpatch has an eight-voice sound file player that dynamically allocates a sound file to a free player, and an “sfplay~” object constantly playing the looped sound of a bathtub being filled and drained. I developed this eight-voice player for my previous installation *Sonic Spaces (the kinetics of sound)* and have used it in a number of projects since. When a trigger is initiated, a sound file is chosen from a table. The table is used as a weighted probability table to adjust the percentage of probability of a sound file occurring with each trigger. A series of gates allocates the file “coll” index number to a voice and closes the gate until the file has played to the end. A panning algorithm moves the sound randomly

around between four channels. When the file finishes playing a bang is sent to open the gate in the “audioplayer’s” subpatch allowing it to be reused for the next trigger. When all eight voices are allocated, subsequent triggers are ignored until a player is free.

The Bather was designed to explore the personalisation of a computer-mediated experience. The experience of being in a room with the projection of a person having a bath is very intimate and creates a personal space between the projection and the viewer. The projection onto a bed with a pillow highlights a sense of privacy and intimacy and evokes something dreamlike, appealing to the imagination of the viewer in a poetic way. The sounds used were chosen for their referential qualities to evoke the audience’s memories of bathing. There are thirty-eight audio files of bathing sounds, such as: washing, splashing, dripping, bath toys, shampoo bottle, filling and draining tub, and various movements in the tub. Everyone can relate to the experience of bathing and these sounds are designed to remind the audience of fun, happiness, relaxation or private time, playing in the bath as a child, or having a relaxing hot bath after a long day at work.

At the exhibition in Edmonton, Alberta, Canada in January 2011, a viewer made the comment that they would like to be able to pull the plug from the tub and drain all the water out, or that the person in the tub would be more reactive to their persistent scrubbing. I replied that it was not a video game. Certainly, the line between art and a video game can be blurred. Many games are very visually stunning with incredible audio and complex intricacies that are very artful. However, the purpose of a video game is different from that of an interactive art piece; generally, a game is entertainment; often goal oriented, and tends not to comment too deeply on society or the human condition. Also generally, a work of art is not made strictly to

entertain, usually has no goal in a gaming sense, and often is designed to lead the audience to consider and delve deeper into themselves, society and the world when contemplating its content. What one considers art is subjective. In the case of *The Bather*, we are using available technology to explore a human experience. We are communicating that personal experience and the intent that goes with it through the artwork to the audience. Like Marcel Duchamp's *Fountain*, it is art because we say it is, by placing artistic intent on the experience.²⁹

The technological experience explored in *The Bather* is relatively commonplace today, considering the prevalence of interactivity, touch interfaces on tablet computers and phones, physical interfaces for video games and the acceptance of virtualisation of our bodies and persons on the Internet. The projected image of a person onto a surface with which one can interact by touch is therefore a concept easy to accept for many people today. The idea of a private sanctuary in which the audience can participate, as depicted in an art piece, is a current I have observed in other pieces. Catherine Richards' installation *Shroud Chrysalis I (2000)* is a case in point.³⁰ In this piece, an audience member is invited to lie down on a Plexiglas table, be wrapped in a copper mesh taffeta by two attendants, and left to remain there for a twenty-minute period. Though the person can see and hear through the taffeta, they are completely shielded from electromagnetic radiation, making it a personal refuge from mobile phones, radio waves, and stray electromagnetic radiation. In a similar way, *The Bather* depicts someone in their private sanctuary and through an interactive experience the audience perhaps can imagine themselves in the place of the projected individuals, if only for a moment.

²⁹ *Fountain (Duchamp)*. (n.d.). Retrieved 10 28, 2012, from Wikipedia: [http://en.wikipedia.org/wiki/Fountain_\(Duchamp\)](http://en.wikipedia.org/wiki/Fountain_(Duchamp))

³⁰ Richards, C. (2004). *Shroud / Chrysalis I (2000)*. Retrieved 10 28, 2012, from Catherine Richards: <http://www.catherinerichards.ca/artwork/shroud/SCI-001.html>

The ideas of touch and virtuality explored in *The Bather* also bring to mind Thecla Schiphorst's piece *Bodymaps: Artifacts of Touch* (1996). *Bodymaps* consists of a projection of a clothed woman's body on a white velvet surface imbedded with many theremin-like "Electromagnetic Field Sensors" and pressure sensitive "Force Sensing Resistor Sensors". The presence of the audience within 30 cm of the table, hand gestures over the table and touch on the table create an interaction with the projected woman and a multichannel soundscape. Schiphorst's goal was to explore the control paradigm of interactivity where a click on a mouse gets a perceivable reaction, instead encouraging the audience to explore and touch. She wanted to "create a relationship between participant and technology that transgresses rules of ownership and objectivity and begs questions of experience, power, and being." The touch of the audience is not a direct action-reaction relationship creating a relationship to the user that is "disturbing, erotic, sensual and subjective."³¹ (Schiphorst, 1996)

The Bather explores a known space, somewhere safe, rather than focusing on the technology being used. Instead it is intent upon creating a virtual experience that relies on the emotions and memories of the audience. The technology mediates the experience, but because of the content's familiarity, it is secondary. I was aware of *Bodymaps* when we made *The Bather*, but I made a point not to mention the piece to the group in order that the creative process could grow in an unfettered manner. That said, many of the same human responses to touch, the visual, and the auditory are at work in both pieces reinforcing the powerful effect of these types of interactive experiences.

³¹ Schiphorst, T. (1996). *Bodymaps: Thecla Schiphorst*. Retrieved 10 28, 2012, from Dance and Technology Zone: <http://www.art.net/~dtz/schipo1.html>

CONCLUSION

In this commentary, I have detailed a selection of the creative works completed during my PhD research period. This research centres on the development of real-time acousmatic electroacoustic music composition and collaboration with interdisciplinary artists on multimedia performance projects and installations.

My exploration of new compositional approaches to acousmatic music led me to a flexible and dynamic creative process that allows the elements of improvisation and studio composition to complement each other. Studio composed segments of music can be manipulated into new creative works in a live setting, extending the compositional process out of the recording studio. Similarly, a new compositional tool – improvisation – has been introduced into my acousmatic studio compositions allowing that element to be included in new works. My personal dichotomy of being a composer of fixed media compositions and a live performer of electroacoustic music has been unified.

My projects with dance explored the possibilities of computer interactive elements in interdisciplinary performances, extending my previous work with Computer Vision into new territory. They also allowed me to develop multimedia performance techniques that bring the elements of improvisation, Computer Vision, interaction, video, and live performance together into a palette of options to draw upon when developing new interdisciplinary works.

Expanding the creative process through collaboration via dance works and interactive installations has provided my artistic practice with many new destinations. The convergence

of creative energies of many individuals has enriched my PhD research. It has afforded me doorways to new experiences, creative processes, and pushed my imagination to create works I would not have otherwise have made. These lessons and creative partnerships will carry forward into my future work providing paths to pursue for some time to come.

Considering what I take away from the processes of working on my portfolio, it has informed my future work in several ways. It has expanded my artistic practice firmly into the area of creating music and interactive systems for dance. I have a long-term collaboration that has developed with Mile Zero Dance. Working with dancers has taught me about movement, a sense of space and my body. I am certain that these aspects will be explored in my future artworks either in performance or installations. Additionally, I have developed skills in analytical thinking, self-critique, listening, and collaboration. The collaborative projects required me to develop skills to communicate with individuals with very different backgrounds from my own. I had to learn how to constructively criticise, evaluate aesthetics from other disciplines, and find compromise on ideas to make a project better. From a compositional point of view, I have developed my improvisation, performance and sound creation skills for many diverse situations. This has taught me how to be flexible, creative and open to ideas. I also developed my instructional skills in several ways. I have broadened the variety of students I can teach. I started teaching dance students in the Tallinn University dance program about sound design, recording, sensors, computer vision and basic electronics. My collaborations with dancers allowed me to find new ways to communicate the ideas of my discipline to that of the dancers. My technical and analytical skills in relation to media studies has developed, helping my teaching and advising of media students, while my skills in multi-channel diffusion, Max programming, sound creation and design, audio technology, listening

and sound theory have been a boon to my film sound design students at the Baltic Film School. Indeed, the work I have undertaken on my PhD has prepared me to be a more complete artist, expanded my areas of exploration and prepared me for a career as an educator.

To conclude, this collection of work is a product of the constantly changing creative environment for electroacoustic music composers. As developments in software, hardware, computer processing power and current trends allow for and encourage the merging of medias, we explore these new options, looking for links between our imagination, tinkering and inspiration. This became a natural path to pursue in my PhD research, as I explore the environment around me through the eyes and heart of an artist. I hope I have contributed to the development of electroacoustic music and interdisciplinary art in a positive way and that my work will inspire someone in the future to take it to the next natural step. I look forward to seeing what will be.

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Berezan's paper describes a new computer controlled diffusion system that allows the performer to set up analysis parameters for the software to create "fluctuations" or alterations to a fixed media piece's playback and diffusion. I reference his work in my discussion about live electroacoustic music performance

Biggs, S., & Hawksley, S. (2006). Memory Maps in Interactive Dance Environments. *International Journal of Performance and Digital Arts Media* , 2 (2).

This paper describes the authors' exploration of interactive dance projects. They touch on points that relate to my discussion of the physical constraints of interactive systems for dance.

Brandt, G. (2003). *Taking Tiny Dancing Lessons in Cyberspace: I, An Avatar*. Retrieved 09 7, 2012 from VirtualGalen: <http://www.virtualgalen.com/virtualhealing/myron.htm>

This paper discusses the Brandt's work with Myron Krueger and his interactive virtual environment *VIDEOPLACE*. I discuss the influence of this lecture on the development of my interactive arts practice.

Correia, N. (2012). *PROJECTS | nuno correia*. Retrieved 10 03, 2012 from Nuno Correia: <http://www.nunocorreia.com/c/projects>

This webpage documents the video performances and video performance software of Nuno Correia, a Helsinki/Lisbon based VJ artist. I reference his work in my discussion about my *Videomasher* software.

Dhomont, F. (Composer). (1991). *Mouvances~Métaphores*. [CD]. Montreal, QC, Canada: empreintes DIGITALEs.

This double CD of Dhomont's music is intricate and varied. I include it here as his work as a composer and teacher is one of the sources of eastern Canada acousmatic music practice today.

Digital Art. (n.d.). Retrieved 10 26, 2012 from Wikipedia:
http://en.wikipedia.org/wiki/Digital_art

A simple definition for the reader of the discipline of Digital Art. Much of my work would be classified under this category

Donnarumma, M. (2011). *Marco Donnarumma / Hypo Chrysos*. Retrieved 10 13, 2012 from Marco Donnarumma | new media art, live media performance, sound design:
<http://marcodonnarumma.com/works/hypo-chrysos/>

A performance piece using the Xth Sense sensor system to create sound and video. I reference this work as an example of a piece where interactive interfaces restrict the movement of the performer. In this case, the performer uses it as a basis for the performance.

Fountain (Duchamp). (n.d.). Retrieved 10 28, 2012 from Wikipedia:
[http://en.wikipedia.org/wiki/Fountain_\(Duchamp\)](http://en.wikipedia.org/wiki/Fountain_(Duchamp))

An example of an artwork that is regarded as such because the artist stated it was so. I reference Duchamp in my discussion regarding The Bather in relation to it being different from a video game in content and intention.

Goldberg, J. (2002). *Dervish*. Retrieved 10 04, 2012 from joshuagoldberg:
<http://goldbergs.com>

Joshua Goldberg's Dervish VJ software, as used by my collaborator Kelly Bolen in our 2006 performances of the aDemod Media Jam.

Gough, H. (Composer). (2007). *with what remains*. [CD]. Birmingham, UK: Entracte.

Gough's compositions are sonically appealing, complex and have a sense of intensity that I find familiar. A past University of Birmingham student, her aesthetics cross paths with mine because of the same institution of study and the compositional values that led us both to study there. I often use her recordings to teach sound design and electroacoustics for the attention to detail and technical ability she exhibits in her work.

Gregory, K. (2012, 11 01). (S. Pinchbeck, Interviewer)

This refers to a telephone discussion with Ken Gregory about his Max/MSP based performance software. In my commentary, I compare the similarities and differences between my *Pinchbecker* software and Gregory's.

Gregory, K. (2012). *cheapmeat.net*. Retrieved 09 11, 2012 from cheapmeat.net:
<http://www.cheapmeat.net>

Ken Gregory's webpage documenting his sound, performance and installation works. I reference his work several time in relation to my own as a collaborator and on going inspiration for his interesting work.

Gregory, K. (Composer). (2008). Kite Song 1. On *Musicworks 99* [CD]. Toronto, ON, Canada: Musicworks.

Gregory's found sound piece *Kitesong 1* is an enjoyable example of listening and finding a sonic composition in the world around us. This piece was discovered when he was flying a kite and the string rubbed against his hat revealing this sound. He wired the kite to a guitar soundboard and recorded the piece. I find this work inspiring due to its simplicity, sonic depth and overall effect. This work reminds me of my creative process of recording in the field and finding interesting examples of natural phenomena that stand on their own when later listened to.

Gregory, K., Heimbecker, S., & Pinchbeck, S. (Composers). (2005). *Sonic Waking*. [CD].

This recording documents an early improvised electroacoustic music performance with Gregory and Heimbecker before I used laptop; instead relied upon mixing desk, outboard effects, samplers, analogue synthesizer and tape recorders as my instruments.

Harrison, J. (Composer). (1996). *Articles indéfinis*. [CD]. Montreal, QC, Canada: empreintes DIGITALes.

Harrison's *Unsound Objects* is a piece that I first heard in 1995 while working for the International Computer Music Conference at Banff, Canada. I enjoy the interplay of the sounds with transformed and unprocessed material taking the listener between sound worlds. The textures explored are rich and varied. I find the piece takes me on a sonic journey, something I try to achieve with my compositions.

Heimbecker, S. (n.d.). From Heimbecker Qube Assemblage:
<http://www3.sympatico.ca/qubeassm/>

Steve Heimbecker's webpage documenting his sound and installation works. I reference his work in my commentary in relation to his installations and our collaborations.

Interactive Art. (n.d.). Retrieved 10 26, 2012 from Wikipedia:
http://en.wikipedia.org/wiki/Interactive_art

A definition for the reader of Interactive Art.

Kvelstein, L. (2012, 06 26).

A reference to an email conversation with Fine 5 Dance Theatre dancer Laura Kvelstein regarding her experience with the interactive system I designed for *Phases*.

Lewis, G. (1993). *UbuWeb Sound - George Lewis*. Retrieved October 3, 2012 from UbuWeb: <http://www.ubu.com/sound/lewis.html>

Lewis' 1993 release *Voyager*. Lewis' music and ideas inspired me to pursue interactive and improvised acousmatic music performance and installations.

Malloch, J. (2012). *projects:the_t-stick [Input Devices and Music Interaction Laboratory (IDMIL)]*. Retrieved 09 15, 2012 from Input Devices and Music Interaction Laboratory (IDMIL): http://www.idmil.org/projects/the_t-stick

An example of a physical interface instrument that requires virtuosic skill to perform. I reference it in my discussion regarding my use of physical performance interfaces historically and more recently.

Moore, A. (2008, 08). *Fracturing the Acousmatic: Merging Improvising with Disassembled Acousmatic Music*. Sheffield, UK: The University of Sheffield. Retrieved 11 06, 2012 from Academia.edu: http://www.academia.edu/177646/Fracturing_the_Acousmatic_Merging_improvisation_with_disassembled_acousmatic_music

Moore describes a performance system that uses a computer graphics tablet and USB external controller to trigger and modify sounds during a performance. The system allows for scored and improvised electroacoustic music pieces to be performed. I referred to it in my discussion regarding my live electroacoustic music performances comparing his approach to my own.

Musical improvisation. (n.d.). Retrieved 09 13, 2012 from Wikipedia: http://en.wikipedia.org/wiki/Musical_improvisation

A basic definition of Musical Improvisation for the reader.

New Media Art. (n.d.). Retrieved 10 26, 2012 from Wikipedia: http://en.wikipedia.org/wiki/New_media_art

A basic definition of New Media Art for the reader

Pelletier, J.-M. (2010, 10 13). *cv.jit*. Retrieved 11 06, 2012 from Jean-Marc Pelletier: <http://jmpelletier.com/cvjit/>

A reference to Pelletier's *cvjit* objects which I use in the *Pinchbecker* software to detect dancer movements that then control the volume of a granular synthesis effect.

Pinchbeck, S., Piirma, P., & Suviste, J. (2010, 09 01). *FUTURAMORGANA - YouTube*. Retrieved 10 04, 2012 from You Tube: <http://www.youtube.com/watch?v=U1M9zWMss0s>

An example of one of my performances with video artists that use preplanned video clips and animations in a performance environment rather than improvised VJ technique.

Richards, C. (2004). *Shroud / Chrysalis I (2000)*. Retrieved 10 28, 2012 from Catherine Richards: <http://www.catherinerichards.ca/artwork/shroud/SCI-001.html>

A link to Richards' installation where an audience member is wrapped in an electromagnetic shielding copper mesh blanket and let to lie quietly for twenty minutes. I refer to this piece in relation to *The Bather*, which also depicts a type of refuge from daily rigors.

Ritter, D. (n.d.). *Orpheus*. Retrieved 09 08, 2012 from Don Ritter: <http://aesthetic-machinery.com/orpheus.html>

Documentation of Ritter's Orpheus performance environment that allowed for the triggering of video sequences based on analysis of George Lewis' trombone improvisations. I refer to it as an example of an early inspiration for my video work as in *Cell*.

Sakonda, N. (2000). *download*. Retrieved 11 06, 2012 from Sakoweb: <http://formantbros.jp/sako/download.html>

A web link to Sakonda's granular synthesis Max patch that I used and modified in the *Pinchbecker* software.

Schine, J. (2010). *Movement, Memory & the Senses in Soundscape Studies*. Burnaby, BC, Canada: Simon Fraser University.

This paper discusses the ability of sound to evoke memory through the use of soundwalking. I include this reference material in the context of *The Bather*, which also uses sound to evoke memory.

Schiphorst, T. (1996). *Bodymaps: Thecla Schiphorst*. Retrieved 10 28, 2012 from Dance and Technology Zone: <http://www.art.net/~dtz/schipo1.html>

An artist statement by Thecla Shiphorst regarding her piece *Bodymaps: Artifacts of Touch*, a piece where the audience uses touch and proximity to trigger soundscapes and videos. I refer to this work to contextualize my collaborative piece *The Bather*.

Smallwood, S. (2012 йил 01-11). (S. Pinchbeck, Interviewer)

This refers to a telephone discussion with Scott Smallwood about his Max/MSP based performance software. In my commentary, I compare the similarities and differences between my *Pinchbecker* software and Smallwoods.

Toots, T. (2012). *Memopol*. Retrieved 10 26, 2012 from Timo Toots: <http://works.timo.ee/memopol/>

A webpage documenting the interactive installation piece *memopol* by Timo Toots. This piece allows the audience to scan an identity document with which the installation will search the Internet for all the information it can find about the individual. This information is then displayed on the gallery wall in a colourful graphics and sounds. I refer to this work to contextualise my collaborative work *Polyphonic Document Photo* regarding its exploration of data collection and storage of individual's information in an information society.

Truax, B. (Composer). (2001). *Islands*. [CD]. Burnaby, BC, Canada: Cambridge Street Records.

This CD features Truax's soundscape composition approach to electroacoustic music creation and the use of granular synthesis and other processes to transform raw sound materials. Aesthetically, my work relates to that of Truax's with my compositional preference for using raw and transformed environmental recordings and episodic structures. The compositions *La Sera Di Benevento* and *Island* are of particular note on this recording.

Truax, B. (n.d.). *Soundscape Composition*. Retrieved 09 07, 2012 from Barry Truax: <http://www.sfu.ca/~truax/scomp.html>

A reference to Truax's description of the principles of Soundscape Composition. I contextualize my electroacoustic compositions with this approach to composing.

V2. (2000). *nato.0+55 -- V2_Institute of the Unstable Media*. Retrieved 10 03, 2012 from V2: <http://www.v2.nl/events/nato-0-55>

A webpage reference to my earliest exposure to VJ culture and performance when I attended a workshop programming in the nato.0+55 language at the Dutch Electronic Arts Festival in 2000.

V2. (2000). *The Secret Project -- V2_Institute for the Unstable Media*. Retrieved 10 11, 2012 from V2: <http://www.v2.nl/archive/works/the-secret-project>

A weblink to a performance by Jools Gilson-Ellis and Richard Povall, which used STEIM's *Big Eye* software. I saw this performance at the Dutch Electronic Music Festival in 2000 and found it a well executed performance using video motion capture to trigger sound and video. I refer to it to contextualize my approach to interactive dance performance using computer vision.

Various (Composer). (2004). *2004 Selected Works*. [CD]. ISCM Canadian Section.

This compilation includes a number of good Canadian electroacoustic music works. Of note to the reader is David Berezan's *Cyclo*. It is an inspired work with a driving intensity and masterful use of studio technique. I find the range of sounds, the interplay between real and abstract sounds, and the evolving structure captivating.

Various (Composer). (1997). *DISContact! II*. [CD]. Montreal, QC, Canada: C. E. Community.

This compilation by the Canadian Electroacoustic Community (CEC) includes a number of compositions by composers that I find inspirational. Claude Schryer – *3 Radiotudes* explores field recordings presented as sound etudes for radio. They are short and simple, but express an appealing sonic idea. I find these recordings appealing because they allow the imagination to create the mental picture of the place evoking the listener's memories and experiences. Gilles Gobeil – *Le Vertige inconnu* is an acousmatic music composition with sudden and abrupt changes with many sound sources being used. This style of composition inspires me because of its layers, imagination and sonic richness.

Various (Composer). (1995). *ICMC'95 Digital Playgrounds*. [CD]. Banff, AB, Canada: Banff Centre for the Arts.

Andrew Lewis' piece *Ascent* is a piece that goes through several transformations and abstractions. In 1995, I found the sound material, expression, and intensity of the work inspirational.

Virtual Art. (n.d.). Retrieved 10 26, 2012 from Wikipedia:
http://en.wikipedia.org/wiki/Virtual_art

A simple definition of Virtual Art for the reader.

Võsa-Tangsoo, R. (2011). *Nupp ja Vänt Näitusesaalis: Interaktiivse Kunsti Vastuvõtt*.
Estonian Academy of Arts, Photography Department. Tallinn: Estonian Academy of Arts.

This Master Degree thesis by Reimo Võsa-Tangsoo discusses his work with interactive art including our collaborative work *Polyphonic Passport Photo*. The thesis is written in the Estonian language with a summary in English included.