A PORTFOLIO OF FIXED ELECTROACOUSTIC AND LIVE LAPTOP WORKS

by

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Abstract

This Ph.D thesis includes a portfolio of electroacoustic and live electroacoustic compositions carried out at the Electroacoustic Music Studios at the University of Birmingham. The portfolio consists of fixed multichannel and stereo works as well as a piece for solo live laptop performance written using Max/MSP and the SuperCollider programming language. I will also discuss my work with laptop performance and its influence on my compositional output during this Ph.D.

Acknowledgements

LIST OF PORTFOLIO WORKS

Piece	Year Composed	Duration	Details
you are here	2010	5:06	Stereo
suddenly there is	2010	7:54	8 Channel
Alone Together: LOUDER	2010	9:41	Stereo
Alone Together: what will remain:	2011	10:26	Stereo
Alone Together: hospital suites	2011	7:36	Stereo
fiddle music	2011	8:38	Stereo
trans canada	2011	13:56	Stereo
airport fragments	2012	11:15	Stereo
spheres	2012	11:00	Stereo
Lichten	2012	14:12	Stereo
Dream Cycle: higher	2012	11:30	Stereo
Dream Cycle: i've had dreams like that	2012	7:01	Stereo
blur:spin	2012-13	15:53	Laptop Performance

Total Time: 132 minutes 08 seconds

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- *Alone Together: hospital suites*

- *fiddle music*

- *airport fragments*

- *spheres*

- *Lichten*

- *Dream Cycle: higher*

- *Dream Cycle: i've had dreams like that*

DVD 2

- *suddenly there is*: Includes a folder containing: one 8-channel file, a folder containing 8 mono files, and a "read me" file explaining how to assemble the mono files for play back.

- *blur:spin*: Includes folders containing a Recording of a Performance of *blur:spin*, SuperCollider code, a Max/MSP interface and additional sound files.

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- *interrupt*: Includes a folder containing: One 8-channel file and a folder containing 8 mono files.

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Chapter 1

INTRODUCTION

This commentary documents the music and research which I undertook during my Ph.D at the University of Birmingham. The work contained in the portfolio is comprised of fixed studio compositions and a work for live laptop performance.

I came to Birmingham with a background predominantly rooted in instrumental music and live electronic composition. I had originally planned on creating a portfolio of works which would include more mixed pieces, in particular pieces with live laptop. This plan changed slightly after attending my first BEAST concert and subsequent studio sessions. I began to focus my attention on working on fixed studio compositions which could integrate my interests in ambient music and growing interest in field recordings. In my final year of Ph.D study, I decided to go back to my original plan, creating two works for solo laptop, and a mixed piece for clarinet, sound file, and laptop. I felt that I had grown artistically through my fixed studio pieces to the extent that I could contribute something different from my previous works involving instruments.

When I arrived at the University of Birmingham, one of my goals was to perform laptop music, both as a soloist and in an ensemble. I helped co-found BiLE (Birmingham Laptop Ensemble), alongside five other postgraduates in the Electroacoustic Studios. In BiLE, I created software performance interfaces for laptop performance, which I have used both in the ensemble, as a soloist and in my fixed studio compositions. Since 2011, I have

also been a member of BEER (the Birmingham Ensemble for Electroacoustic Research), a live coding laptop research and performance group led by Dr. Scott Wilson. It was through working with BEER that I discovered live coding, and I have integrated this into my own performance and compositional practice. This will be discussed later in this commentary.

I employ a variety of approaches to formal structure throughout the pieces in the portfolio; in some works, such as *fiddle music*, I use a relatively strict formal structure, which is quite similar to ternary form (ABA) whereby the first section returns (somewhat altered) after a contrasting section. By way of contrast, in *spheres*, and *higher* (part one of *ive had dreams like that*), the use of form is less strict, in that the sections do not have any overt links or similarities.

Although the pieces in my portfolio vary in terms of themes, what they all have in common is an exploration into combining "experimental electronic" music genres (Collins et al 2013, 136), such as drone ambient, ambient, and other varieties of electronic dance music (EDM), with more traditional acousmatic techniques. Over the course of my Ph.D, I purposefully created music and musical systems which combined ambient electronica with acousmatic music. During my research, I did not uncover prior examples of a deliberately synthetic approach to marrying these two genres. I did however find inspiration in pieces which, to my ear, were redolent of genres beyond serious electroacoustic music. These included Robert Normandeau's *Le cap de la tourmente*, which consists almost entirely of long, drawn-out drones and Bernard Parmigiani's *Dead End* with its resonant tones which are close to the resonant echoings which are stylistic hallmarks of dub techno. These were useful models which acted as starting points for this research and inspired me to experiment with combining the aesthetics of genres in order to try to produce work which would sound fresh whilst still displaying evidence of its diverse lineage.

Combining these styles has given me a new palate of techniques and methods from which to draw. Through the process it has also been very interesting to discover the inevitable overlap between these two seemingly different styles of electronic music com-

position. Over the past 4 years, I have been trying to implement these ideas in order to engage listeners who may not be familiar with a traditional acousmatic concert, such as a BEAST event.

The following commentary will discuss the works contained in the portfolio, and offer insights into the techniques which were used. I will also document my experiences as a laptop performer; both a soloist and as an ensemble member while showing how these experiences have impacted upon my composition of both fixed and live computer based works.

Chapter 2

Laptop Performance Activities: An Overview

The majority of my performance output during the last four years has been through means of laptop performance, both as a soloist and a member of an ensemble. Therefore, I feel that it is important to describe these activities due to their impact on my compositional output and thought processes during my Ph.D. The following section will give an overview of the various laptop performance activities which have either had a direct influence or have facilitated the works presented in this thesis. This discussion will include a brief overview of the work I did with two laptop ensembles: the Birmingham Laptop Ensemble (BiLE) and the Birmingham Ensemble for Electroacoustic Research (BEER), as well as discuss the solo laptop sets which I have performed during my Ph.D.

2.1   BiLE and BEER: Laptop Ensemble Performance

BiLE was founded in January 2011 by myself, Charles Celeste Hutchins, Chris Tarren, Jorge Moncada Garcia, Julien Guillamat and Shelly Knotts, all postgraduate students at the University at the time of its inception. The idea for the group was put forth by Scott Wilson in 2010. The main goal of the group was to be an ensemble which

supported the idea of being cross-platform, that is, each member should "write their own sound code in whatever language is the most comfortable for them" (Hutchins 2011, 31). This model is similar to that used by other laptop ensembles, such as the Huddersfield Experimental Laptop Orchestra (HELO) who describe their approach as a "Do it Yourself (DIY) laptop instrument design paradigm" (Hewitt et al. 2010, 1). HELO embraces "a lack of hardware uniformity as a strength (ibid 1), implying that their software diversity is a strength which grants them greater musical focus. BiLE worked with similar goals in mind, allowing for all of its members to create software for ensemble and personal purposes, all the while having access to a test ground for sonic experimentation.

During my time with BiLE (from late 2010 until mid 2012), I created several software instruments in Max/MSP for laptop ensemble and solo performance. The tools ranged from simple live sample processors to more complex gestural controller interfaces. These tools were used during group and solo performances, and have also been used to process samples in my fixed media compositions. Through my work with BiLE, I learned to produce pieces of software/patches at an extremely fast rate. Programming and performing with BiLE allowed me the freedom to create the tools I needed, thus providing new ideas which I could incorporate into my own solo laptop performance and fixed media compositional practice.

BEER was formed in the latter half of 2011. It is a networked laptop ensemble and research group led by Scott Wilson, at the University of Birmingham. The main practice of the group is to work with live coding, structured improvisation and networked performance in the programming language SuperCollider. Since its inception, BEER has been focused on live coding laptop performance, that is "the activity of writing a computer program while it runs" (Ward et al. 2004), where "changes to the source code are enacted by the running process without breaking the musical output" (McLean 2011). In early performance and rehearsal situations, we worked extensively with Alberto De Campo and Julien Rohrhuber's SuperCollider quark (a user library available within SuperCollider) called *Republic*. Republic allows for users to share their code in real time, which can be

then manipulated and used during the performance. Currently, BEER works primarily with *Uptopia*, a set of tools for making Network Music Apps in SuperCollider, which builds further upon the work done on Republic. The project is currently being developed by Scott Wilson, and others.

BEER's performance output has been quite varied, focusing mostly on works which use structured improvisation, imposing limits on what we can do. For instance, our piece *Telepathic* makes use of a "networked system to facilitate coordination and formal articulation" (Wilson et al. 2014). The prime feature of the piece is a shared clock, which allows broadcasting of beats and tempo to performers on the network, for further processing using live coding. In our piece *Pea Stew*, we make use of audio feedback, where an "arbitrary number of performers share various audio streams over a wireless (or sometimes wired) network" (Wilson et al. 2014). Performers use live coding techniques to process incoming audio data (Wilson et al. 2014).

Through working with BEER, I gained useful ideas and insight into ways of processing sound material within my own fixed media compositions. Works such as *Lichten*, *spheres* and *Dream Cycle* are heavily informed by many techniques learned from working with BEER, namely structured improvisation and the use of beat-based material. BEER has had a great influence on my own solo laptop performance pieces, such as *blur:spin*, where structured improvisation through means of live coding is a central feature to the work.

Working with both BEER and BiLE has been very beneficial for both my fixed media and live composition output. They have each provided platforms for implementation of new ideas which have allowed me to work in alternative ways. For instance, I have frequently utilised the Max/MSP tools which I designed in BiLE to create and process material for fixed media works. I have also used these tools in my own solo laptop performances in combination with live coding improvisation.

2.2   Solo Laptop Performance

Much of the latter part of my PhD program has been spent creating performances using a mix of live coding and gestural controllers. As a soloist, I have taken many of the principles and techniques learned as a member BiLE and BEER, and applied them to my own solo performance practice. For instance, *blur:spin*, a laptop-based piece which has undergone many variations in the last year and a half, has posed interesting issues with respect to performer-audience interaction, namely that of *liveness*. In the following section I will briefly discuss this issue.

2.2.1   Liveness and laptop performance

As with any performance practice, laptop performance has its own set of unique issues, which the performer must take into consideration. One issue which I have had to consider while planning performances, has been that of demonstrating liveness, or more specifically, establishing a more "live" presence while performing; that is, one which is more transparent to the audience in terms of how the music is created. After a few of my solo performances, I have had audience members ask what it is I've been doing. I have explained to them what went on in the simplest terms as possible, but regardless, they would say that they thought that I was either checking my email, or perhaps just pressing "play". After these experiences, I began to think a great deal about how I could portray this notion of liveness, that is "a quality of the live" (Cooke 2011, 9), in my own laptop performances and make my actions more transparent to the audience.

In his article, "Theses on Liveness", John Croft provides the following description of liveness:

> The material fact that live sound is being transformed in real time, and aesthetic liveness, a situation in which... aesthetically meaningful differences in the input sound are mapped to aesthetically meaningful differences in the output sound (Croft 2007, 61).

Liveness can thus provide a meaningful connection between the audience and the performers. Unfortunately, this has not been the case with many computer music performances that I have witnessed

Often in computer music performance, and in particular laptop music, there is a disconnect between the sound being heard, and that which is being produced. Many times, when the laptop is used as an instrument, there can be difficulty in trying to discern any meaningful connection between physical gestures and the sound being produced. In a traditional instrument each element of the interface (the keys on a clarinet, for example) has a clearly defined set of functions, whereby specific gestures arise through interaction with the interface. With a laptop, the musical association is not always as apparent to the audience (Paine 2008). When a laptop performer is sitting in front of their computer during a performance, they may look as though they are performing some mundane activity such as checking their email, or doing something else besides performing. The audience may perceive no connection between the gesture and resulting sound. In his book, *Living Electronic Music*, Simon Emmerson also discusses this disconnect between laptop performer and its audience:

> Exactly what does live mean anymore? How do I know you're not just miming on stage? What clues are there? It is only a laptop and a mouse. You claim you are taking decisions and acting on the result even based on how I (a listener) am responding to you. Can I hear that? Does it matter how you got there or how the music got there? Did you make it? Or did a machine? Based on what? Are you just another icon? What do you and I take away from the performance and bring to the next one? Do I have any real evidence that you are not a complete fraud? If icons work and give the audience a buzz, a sense of occasion ... does it matter providing I enjoyed the experience? (Emmerson, 2007).

It can also be said that there have been various new means of technology which al-

low the performer to better demonstrate their interaction with their computer to their audience. These include the Microsoft Kinect or Apple iPad, both of which have the potential to produce exciting and interesting work, when not used merely as a technological fetish. John Croft discusses this very issue in his *Theses*. Croft argues that technological fetishism, meaning to be preoccupied with the technology at the expense of the music, is rampant amongst computer music performers. He feels that many times, these types of performances become more about showcasing the interface mappings, rather than a musical performance (Croft 2007, 60).

In pieces such as *blur:spin*, I wanted to integrate not only the use of gestural controllers, but also to utilise live coding in such a way that made my performances appear less clinical and more transparent to the audience. Gestural controllers such as an iPad or Wii have been a great aid in demonstrating gesture and liveness with my laptop performance, especially when used with very specific intent (i.e. not just for waving around randomly in a performance). For instance, I have constructed interfaces in Max/MSP which I use to control sound with an iPad. One of these interfaces will be discussed in further detail in Chapter 3's discussion of *blur:spin*.

As previously mentioned, I also use live coding in my laptop performances, oftentimes with the code projected on the screen. By revealing the code through projections, the audience gets a glimpse into the compositional processes which are usually hidden away. By combining a gestural controller with live coding, I am allowing the audience to get a better picture of what I am doing, regardless of whether or not they fully understand what is going on. I believe that ultimately a musical performance should be about captivating the audience's attention, both visually and musically. That being said, I look forward to exploring new technologies, which would better enable me to do so in future laptop performances.

Chapter 3

Works

The following chapter offers a discussion on the works presented in the portfolio. It gives insight into the compositional processes used and also discusses themes and technical details for each piece.

3.1 *you are here*

Background

you are here is a drone-ambient inspired piece composed in early 2010. The name *you are here* is inspired in part by the book "Wherever You Go, There You Are: Mindfulness meditation for everyday life" by Jon Kabat-Zinn. This book discusses mindfulness in Buddhism, with emphasis on meditation. In meditation, one often uses a mantra which gets repeated over and over in order to help with concentration during meditation. *you are here* allows the listener to stay focused on the present moment. By focusing on one single sound creating stasis, the piece allows the listener to enter into a meditative state.

At the time of composing this piece, I was listening to a great deal of drone ambient music, in particular that of Richard Lainhart. Lainhart is an American composer, best known for his electronic music combining analog and digital technology with extended performance techniques, often derived from traditional acoustic instruments. A great

deal of his electronic music is informed by ambient and drone music techniques. His 30-minute work, *White Night*, has particularly informed the composition of *you are here*. It was through composing *you are here* that I became fond of creating ambient-drone based music. Since I frequently use both of these styles in many of the works in my portfolio, I will take a moment to define how I am using the terms herein.

Drone music, often known as drone ambient, typically relies on the use of sustained repeated sounds, or tone clusters. Drone music is said to have originated in the 1960s, with composers such as La Monte Young, who in 2000 defined it as a type of minimalism which emphasises sustained tones. Ambient music has been defined by Brian Eno as music "designed to induce calm and space to think." (Eno 1978) Ambient music dates back to as early as 1917, when composer Erik Satie created a type of ambient music which he called *Musique d'ameublement*, also known as "furniture music". Satie describes it as music which would create a background atmosphere for activities such as eating dinner, without having to be the focus of attention (Jarrett 1998).

Compositional Processes

The construction of *you are here* combines a few methods. I recorded the original sound source, which is a 30-second piano sample. This sample was then processed through various means. I used a combination of macPOD [1] and AudioSculpt in order to process the piano material. I processed this into a reverb unit which I had coded in SuperCollider. It was through working on this piece that I began to construct my own granulation tools in Max/MSP and later in SuperCollider. I felt that I would gain more flexibility and freedom in this piece, if I used my own software tools.

The processed sounds were layered on top of each other in order to create a very thick and lush wave of sound with subtle changes occurring at a slow pace. The approximate pitch centre tone of *you are here* is just slightly higher than G4. The other notes hover around the centre tone, usually a 2nd or 3rd above or below. If you listen very closely,

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[1]macPOD is a real-time, sample-based granular synthesis engine built by Chris Rolfe and Damian Keller, named in honour of Barry Truax's POD GSAMX system for granular synthesis.

there are tiny peripheral changes which occur within the dense texture. Lainhart describes this phenomenon, "One Sound". "One Sound" is defined as "music in which a single complex sound, or in many instances of a single sound....where one complex sound is all that there is to listen to" (Lainhart 2011). In many ways, *you are here* uses the idea of "One Sound" as its basis. One sound source is used and transformed over five minutes. There is very little harmonic change, if any, and generally speaking, the piece is quite static.

3.2 *suddenly, there is*

Background

suddenly, there is was composed in early 2010, and is an 8-channel piece inspired by drone-ambient style. Generally speaking, static music, such as drone music, tends to avoid all conventional harmony and melodic goals, and instead taken specific steps to distort any true sense of the passage of time, something which had previously always been an extremely important element of Western music (Demers 2010, 16). When stasis is heard in electronic music, such as drone-ambient or dub techno, the drones impose a sort of "sensory deprivation", replacing the variation that the listener often takes for granted in more teleological (time driven) music (Demers 2010,100). *suddenly, there is* moves at a slow pace, hopefully putting the listener into trance-like, meditative state.

suddenly, there is is also inspired by the work of the French electronic music composer, Eliane Radigue. Radigue, who studied with Pierre Henry and Pierre Schaeffer, eventually developed her own compositionafl style, using hardware synthesisers such as the Buchla and ARP. Radigue converted to Tibetan Buddhism in the 1970s, which subsequently had a great influence on her compositions, particularly her *Trilogie de la mort* (1998) (Demers 2010, 94). The first movement of the trilogy, *Kyema*, which takes its title from a tibetan word referring to the state of surprised mixed with sorrow, is an example of the composer's interests in synthesised drones, and has a reflective quality reminiscent of

meditation. *suddenly, there is* makes use of many of these teachings, using drawn out, static, synthesised drones constituting a sonic depiction of the meditation process.

Compositional Processes

At the time of composing *suddenly, there is*, I was listening to the music of Asmus Tietchens, a German composer whose music combines the use of electronic musical instruments, synthesisers and tape loops. His work *Biotop* was an inspiration in the creation of *suddenly, there is. Biotop* begins on a single piercing note, which gradually expands into a drone. The drone contains a variety of overtones and alternates between expanding and retracting throughout the entire 3'33" of the piece.

In *suddenly there is*, a single drone grows and evolves throughout the piece, transforming and then returning to its original state at various points. The drones are the result of sounds being continuously layered until a thick ambience is produced. The original sitar sample was processed using a granulation patch I made in Max/MSP, with additional processing in SuperCollider. The other sound sources were produced and processed using a program I created in SuperCollider.

In terms of the multichannel spatialisation, I focused on creating an immersive and diffused space, where the sounds floated around the ring of eight speakers in a smooth movement. Instead of regarding the speakers as individual entities, I treated the ring as a continuum and moved the material across varying widths in order to create the aforementioned smoothness. This in turn expands the acoustic image and avoids drawing too much attention to the loudspeakers. There is some localised speaker movement, where certain gestures travel around designated speakers, but for the most part I chose to keep the movement to a minimum, opting for smooth, diffused sounds.

3.3   *trans canada*

Background

trans canada was composed in 2011, and serves as a homage to the work conducted

within the World Soundscape Project, based at Simon Fraser University in Vancouver, British Columbia, Canada. The piece was composed using field recordings taken on Vancouver Island (on the West Coast) and Cape Breton Island, Nova Scotia (on the East Coast).

The World Soundscape Project (WSP)

trans canada is heavily influenced by the World Soundscape Project (WSP), an international research project founded by Canadian composer R. Murray Schafer at Simon Fraser University in the late 1960s and early 1970s. The project was originally meant to be a modern study of acoustic ecology, with the ultimate goal being to find "solutions for an ecologically balanced soundscape where the relationship between the human community and its sonic environment is harmonious" (The Canadian Encyclopaedia 2010). The project was meant to provide education about the soundscape and noise pollution particularly in Vancouver, Canada, where the project was primarily based.

WSP attracted a substantial amount of composers and students based at Simon Fraser. These included Hildegard Westerkamp, Peter Huse, Howard Broomfield and Bruce Davis. The initial study resulted in a recording entitled "The Vancouver Soundscape", published in 1973, which included phonographical recordings of local soundscapes. WSP produced many more recordings and publications, with the project slowing down during the 1980s. At present, the entire library is housed at Simon Fraser University and is in the process of being digitised.

trans canada takes its name from the stretch of highway, which travels through all ten provinces of Canada. The highway is one of the longest national highways in the world, starting in Victoria, British Columbia, and finishing in St. Johns, Newfoundland and Labrador. The piece combines sea-based sound worlds from both ends of the highway; beginning with sounds from Vancouver Island on the West Coast, and combining with sounds from Cape Breton Island, on the East Coast.

Compositional Processes

The vast majority of sounds used in *trans canada* were recorded in 2009 on the West

Figure 3.1: Map of Canada Depicting Vancouver Island and Cape Breton Island

Coast Trail on Vancouver Island, with an additional set of sounds recorded on a walk on the Skyline Train in the Cape Breton Highlands National Park on the East Coast of Canada. The West Coast Trail presented various challenges due to its remote location and mass quantities of precipitation due to its temperate rainforest climate. The trail is extremely rugged and requires a minimum of seven days to complete. Comparatively, the Skyline trail walk can be completed in a few hours, and did not present as many challenges while recording.

I focused my recording on the sea worlds of both of these Islands, as the sea and its surroundings are one of the most significant characteristics of both regions. The piece serves as an aural depiction of a walk near a seaside, using a mixture of sounds recorded at both locations. I tried to follow the soundscape guidelines set forth by R. Murray Schafer in his 1977 book "The Tuning of the World", which includes the use of keynote sounds (the key of the piece); sound signals (foreground sounds); and soundmarks (sounds unique to an area). While I did not completely follow his guidelines, some of the sounds in *trans canada* can feasibly fit into Schafer's categories. For instance, the high-pitched drone-like sound object, heard clearly at 2'36", can be considered to be a "keynote"

sound, as it establishes a pitch centre, hovering around F. Similarly, the waves can be considered to be "sound signals", as they are heard mostly in the foreground, at various points throughout the piece.

The aforementioned sound sources are heard in a mostly non-processed state throughout most of the piece, and transform to a less recognisable state a various points in the piece. Most of the processing was conducted using various sound processing patches in Max/MSP, which I had originally constructed for use in BiLE. Processing of the more natural sounds, such as waves and fire, was kept to a minimum as I wanted to avoid making them sound overly artificial. Many sounds gradually become more processed as the piece goes on, eventually returning to a more natural state at the end of the piece.

trans canada is informed by Hildegard Westerkamp's work *Beneath the Forest Floor*. The latter piece was composed from sounds recorded in old-growth forests on the west coast of British Columbia, a region similar to where sounds were recorded for *trans canada*. *Beneath the Forest Floor* moves the listener through the forest, into a "shadow world, its spirit; into that which affects our body, heart and mind when we experience forest." (Westerkamp 1996). Most of the sounds from this composition were recorded in the Carmanah Valley on Vancouver Island. Similar to *trans canada*, sounds move in and out of the forest silence as the trail moves in and out of the clearing near the creek (Westerkamp 1996).

3.4 *Alone Together*

- *LOUDER* (2010) 9'41"

- *hospital suites* (2011) 7'36"

- *what will remain* (2011) 10'26"

Background

Alone Together is a set of pieces which explores the effects of internet culture on a society immersed in fast-evolving technology. There are three pieces in the set called *LOUDER*, *hospital suites*, and *what will remain*. The set takes its name from the 2011 book "Alone Together" by MIT professor Sherry Tuckle. The book discusses the effects of fast-growing technology and internet culture on human lives, claiming that the various technological gadgets which have supposedly brought us closer together have begun to draw us even further apart. Turkle alludes to the negative effects of the Internet, in particular email and social media communication tools, warning of the dangers of an internet-dependent future.

The pieces are also in part inspired by the themes discussed in Ray Kurzweil's 1999 book *The Age of Spiritual Machines*. The book discusses ideas surrounding technological singularity, that is the theoretical emergence of super intelligence through technological means (Bostrom 2009). The author also makes many predictions for the future, such as machines being capable of human intelligence, and that one day humanity and its machinery will become one and the same (Kurzweil 1999). *alone together* was conceived as a result of reading the aformentioned books. Each piece attempts to sonify various themes in the book, particularly the disconnection and isolation felt by such technological takeover.

Compositional Processes

Both *LOUDER* and *hospital suites* are based on the use of ambient drones, overlapped with more gestural material. In *LOUDER*, sound objects float along in a drone-like sequence, building slightly, but never resolving.The wavering, dream-like sound objects represent the idea of disconnection and isolation, drawing further on the analogy of being "alone together". The floating sounds never quite resolve to anything concrete, connecting and disconnecting. The beginning of *hospital suites* is similar to that of *LOUDER*: sound objects are more insistent, and don't float away as quickly as they tend to do in *LOUDER*. There is a more pertinent sense of urgency in this piece, which builds in intensity until the end.

Both pieces begin with two natural sounds, which gradually become more distorted and inaudible. In the case of *LOUDER*, the sound of children playing and screaming at a summer camp; the sound begins very clearly, gradually becoming distorted, eventually being replaced by mechanical motions and ambient drones. In *hospital suites*, the sound of ambulances speeding through a city is heard at the beginning, before morphing into less recognisable sounds.

what will remain takes a different approach from the previous two pieces. It is based on small rhythmic fragments which are constantly ticking away, growing and receding throughout the duration of the piece. *what will remain* is divided into roughly two sections, with an interval of time separating the two. The piece is based on the principle of layering rhythmic cells on top of each other, which creates various polyrhythmic sequences. I aimed to produce as many rhythmic sequences as possible, closely resembling the sounds of various types of technology: computers beeping and noise from fans, amongst others. As a result, new textures and timbres were created.

Much of the sound layering occurs as a result of guess work: that is, moving sound files around into various formations, and then listening to how they interact with each other sonically. I enjoy this way of composing at times, as the results can be extremely interesting. As a result, the rhythms can be quite unpredictable, making this an interesting method of working.

The majority of the sounds used in *what will remain* are analog derived, made with the EMS Synthi 100 and the Korg MS20 hardware synthesisers. I recorded these sounds at the Cantos Keyboard Museum in Calgary, Alberta. Stylistically, the sounds used in *what will remain* are heavily influenced by the electronic music of the BBC Radiophonic Workshop, a unit within the BBC created in order to produce special sounds (Niebur 2010) for radio and TV programs. Composers working with the Workshop included Delia Derbyshire, Brian Hodgson and John Baker, who (amongst others), are well known for providing the sounds for Dr. Who, beginning in 1963. I became very interested in the Workshop's distinctive sounds, which are very closely related to those used in *musique*

concrete. Many of the sounds used by the Workshop's composers were created by using recordings of bells, lampshades, or gravel, and later manipulated by reversing and/or cutting the magnetic tape recordings, and processing with such effects as reverb and equalisation (Niebur 2010). While I did not use their specific techniques, they remained in mind while composing *what will remain.*

3.5 *fiddle music*

fiddle music is an aural commentary on the decline of the Sydney Steel Plant on Cape Breton Island, Canada, which existed from 1901 until the early 1990s. The plant was a source of employment for many people living in the region during this time period, and the closure caused a grave economic downturn for the area, from which it is thankfully now recovered. *fiddle music* juxtaposes sounds of industry, meant to represent the steel plant, and fiddle samples. The fiddle is an important symbol in Cape Breton music, and is often said to have been a source of hope and relief during the hard economic times which followed the closure of the steel plant.

Background

fiddle music is based on a fiddle sample recorded in Cape Breton, Nova Scotia, using a fiddle style unique to the region. The style arrived to North America by way of Scottish immigrants in the 18th and 19th century, during the Highlands Clearances (MacGillivray 1981). The immigrants were mostly from the Gaelic-speaking regions of Scotland, such as the Outer Hebrides. This fiddling style has changed considerably over time and is said to have been safeguarded in Cape Breton.

Cape Breton fiddling is characterised by being heavily accented, with an emphasis on up-bowing. There is also an importance on a strong downbeat, typically produced by the fiddler's heel digging into the floor (MacGillivray 1981). Cape Breton fiddling is also said to be strongly influenced by the accentuations of the Scots-Gaelic language, in particular a type of mouth music, that is a"tune from the mouth," called *Puirt a Beul* (Watson

2001).

Compositional Processes

fiddle music comprises of three main sections. The piece begins with a fiddle sample, which was recorded at the Celtic Colours International Festival, in Cape Breton, Nova Scotia, in 2006. The festival is an annual event on the Island, attracting thousands of musicians and visitors from around the world, and is an excellent opportunity to hear world class fiddle music. The sample was recorded outside the main concert venue. The opening sequence in the piece is a 10-second sound sample of the fiddle playing in Cape Breton style:

Figure 3.2: Approximate rhythm of first 10 seconds of *fiddle music*

The above mentioned sample is layered on top of itself, until a completely different rhythm is created. The piece quickly picks up pace, with the various fiddle samples overlapping, creating fast staccato rhythms, which blur together. Eventually, the fiddle gradually juxtaposes with the more industrial, mechanical sounds. Interestingly, the harshness which is often associated with Cape Breton fiddling fits quite well with the harsh sounds of machines grinding away.

The second portion of the piece is comprised of sounds meant to represent the industrial history of the region. In this section, I wanted to create a feeling of industrial oppression, where the machines are constantly moving and buzzing, gradually overwhelming the listener. The sounds in this section are a combination of field recordings of industrial work areas in Cape Breton, and synthesised sounds produced in SuperCollider. The final part of the piece is a shorter reiteration of the beginning, but time stretched. By this point, the machinery has ceased, and the listener is left with a single drone of a fiddle, fading away to the end.

INTRODUCTION (0'-1'06")
Initial fiddle sample is introduced; various rhythmic combinations are presented;
rhythms never quite lock together.

Section I (1'06"-2'52")
Fiddle samples begin to lock together forming a unified unit of sound;
sounds gradually progress, preparing to transition into the next section.

Interlude (2'52"-3'45")
Fiddles begin to fade away and gradually being overtaken by
the sounds of machines.

Section II (3'45"- 5'18")
Sounds of industry and machines dominate the soundscape.
Sounds build until the climax at 5'18".

Interlude (5'18"-5'53")
Fiddles begin to fade away and gradually being overtaken by
the sounds of machines.

Section III (5"53- 8'39")
Fiddles gradually begin to reemerge. Sound material from
previous section of piece begin to emerge, as sounds begin to
combine together. Material gradually begins to fade; texture
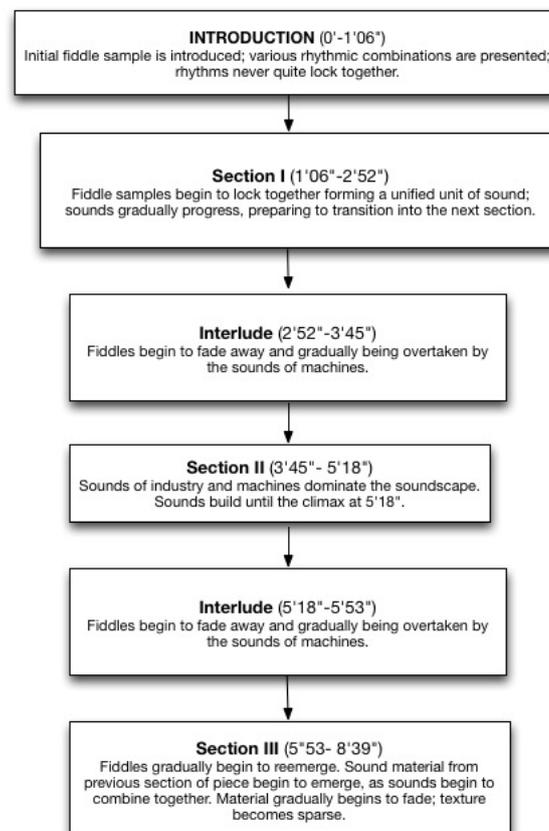becomes sparse.

Figure 3.3: Structural outline of *fiddle music*

fiddle music is in part informed by Monique Jean's piece *13'13 pour voix defigurees*. Jean's piece is about the helplessness and confusion in the face of destruction and uses similar sound objects as in *fiddle music*, namely large swooping gestures produced by active machinery, with an overall sense of anxiety, as the sounds of industry collide.
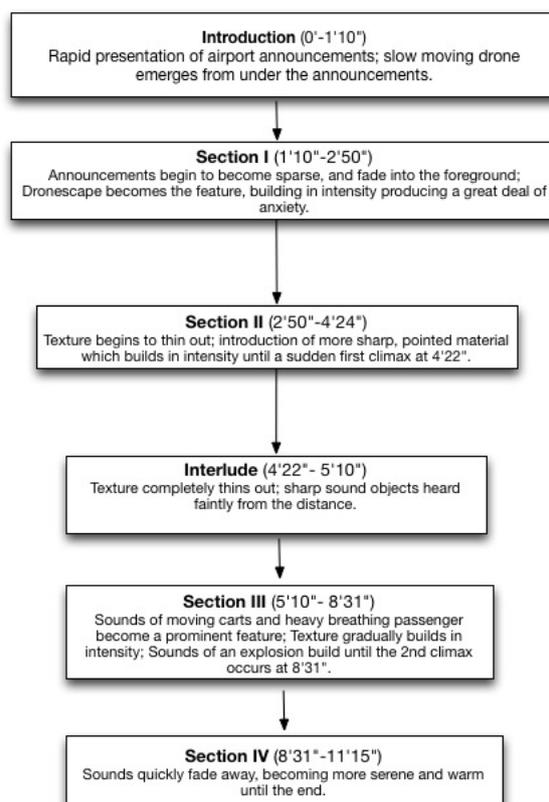
3.6 *airport fragments*

Background

airport fragments is based on a series of samples of airport announcements collected over the last 10 years at various airports in the USA, Canada, Australia, the Netherlands

and the UK. The idea of the piece was conceived during a three day airport delay, when I was stuck listening to announcements. I was overwhelmed by the amount of anxiety and stress which one is subjected to in airports, especially after the constant threat of terrorist attacks and announcements to be on guard at all times.

airport fragments is loosely informed by Brian Eno's concept for his album *Ambient 1: Music for Airports.* The album was conceived while Eno was stuck in Cologne Bonn Airport in Germany sometime in the mid 1970s where he was constantly irritated by the "uninspired sound atmosphere" (Baskas 2008). Similarly, *airport fragments* uses the unwanted, anxiety-ridden airport announcements, in order to sonically realise the fear and anxiety felt in post-9/11 modern airports worldwide.

Introduction (0'-1'10")
Rapid presentation of airport announcements; slow moving drone emerges from under the announcements.

Section I (1'10"-2'50")
Announcements begin to become sparse, and fade into the foreground; Dronescape becomes the feature, building in intensity producing a great deal of anxiety.

Section II (2'50"-4'24")
Texture begins to thin out; introduction of more sharp, pointed material which builds in intensity until a sudden first climax at 4'22".

Interlude (4'22"- 5'10")
Texture completely thins out; sharp sound objects heard faintly from the distance.

Section III (5'10"- 8'31")
Sounds of moving carts and heavy breathing passenger become a prominent feature; Texture gradually builds in intensity; Sounds of an explosion build until the 2nd climax occurs at 8'31".

Section IV (8'31"-11'15")
Sounds quickly fade away, becoming more serene and warm until the end.

Fragments1.jpg

Figure 3.4: Structural outline of *airport fragments*

Compositional Processes

The piece opens with a series of overlapping airport announcements, calling for passengers to board their planes and to pick up their baggages. As the announcers speak, a slow drone emerges, interspersed with breathing, increasing in tension until around 4'22", when the climax of the piece occurs. After the climax, the piece's texture becomes quite sparse. A lone passenger is heard breathing heavily in a panicked state, as they try and run toward their boarding gate. Sounds of airplanes are heard overhead and announcements can be heard in the distance, as the passenger is once again being bombarded with sounds, until it all dissipates at 8'31". The remainder of the piece is comprised of a single ambient drone, with intermittent noises moving in and out of the space without purpose, until the end of the piece.

The sound material used in *airport fragments* ranges from recorded airport announcements, as previously mentioned, to synthesised sounds created in Max/MSP and SuperCollider. I added heavy effects to the recordings, processing them with SuperCollider, as well as adding reverb and echo to the announcements in Logic Pro. Sounds were then layered on top of each other to create a rush of loud drones until the climax at 4'22". Until this point, sounds are chaotically colliding with each other, creating an anxious environment.

Ultimately, the piece explores the idea of sensory overload, which many of us experience while attempting to navigate public transportation, particularly in airports and train stations. The constant bombardment of announcements and sounds often go unnoticed, many times act as annoying and unwanted background noise. *airport fragments* attempts to draw out these annoyances, bringing them to the forefront, in turn overwhelming the listener.

3.7   *spheres*

spheres is a dark ambient-inspired piece, which was conceived using SuperCollider and the *ixi quarks* software by Thor Magnusson (Magnusson 2005). The piece was created in the studio as a live laptop improvisation, with further mixing and editing of sounds occurring after the recording.

Compositional Processes

Created by Thor Magnusson, *ixi quarks* began as a response for the dissatisfaction with the way commercial music software companies were building their products (Magnusson 2005). *ixi* offers a program which is built on top of SuperCollider, allowing the user the opportunity to create their own custom interfaces (Magnusson 2005). I found this to be an interesting means of processing the sounds in this piece.

As previously mentioned, the piece was recorded in the studio as a live laptop improvisation. I allowed the piece to run, unaltered, and then did further editing and processing for the purpose of this thesis. The sound material used to compose *spheres* is extremely minimal: I used a one minute sample of a sound created in a Max/MSP patch. It was then heavily processed in *ixi quarks*. I used a combination of various instruments included in the program, such as the "Sound Scratcher", and "Grain Box". The final sound product was then processed further in SuperCollider using reverb, echo, comb filter, and further granulation. The sound file was then further edited in Logic Pro and with a patch created in Max/MSP, created for use with BiLE, for a piece by Charles Celeste Hutchins called *Partially Percussive*, a live sampling piece based around listening and gesture (Hutchins 2013) and the patch allows for sampling and processing of the sound material.

At the time of composing *spheres*, I had been listening to a great deal of drone metal music. Drone metal, which is also known as "drone doom "(Stosuy 2008) and "power ambient" (York 2008), is a type of heavy metal music that uses slow tempos and extremely heavy texture, which is reminiscent of the drawn-out tones heard in drone music. Bands such as Sunn O))) which been cited as the pioneers of this genre (Wray 2008), perform

Figure 3.5: Live processing patch used in the composition of *spheres*

music that uses large quantities of reverb and feedback via the electric guitar and bass. This music has been described by novelist John Wray as "listening to an Indian raga in the middle of an earthquake. It's hard to imagine any music being heavier or, for that matter very much slower" (Wray 2008). On a similar note, Jan Tumlir describes it as "sustained infra-sound rumble of sub-bass" (Tumlir 2006).

I wanted to create a similar sound in *spheres*, only using synthesised sounds instead of electric guitars and bass. The entire piece is based on a single sound sample, approximately one minute in length. This sound was processed using the above mentioned techniques. The material, as in drone metal music, is heavily drenched in reverb in order to create a dense layered effect where the sounds are woven into each other, gradually blurring and building in intensity. In many ways, *spheres* is stylistically quite similar to *suddenly, there is*. Both pieces are based on the use of long lines of drones, moving in and out of a space.

3.8 *Lichten*

Lichten is informed by a combination of Electronic Dance Music (EDM), glitch, ambient and minimalist compositional techniques. The piece is also inspired in part by Paul Lansky's *Idle Chatter* and Nico Muhly's set of four pieces entitled *Mothertongue*.

Background

At the time of composing *Lichten*, I had begun to be very interested in EDM, in particular, Minimal Techno and Intelligent Dance Music (IDM), both subgrenres of the aformentioned genre. German techno producers such as Byetone, Phon.o and Apparat, whose music specialises in the use of repetition and understated development, as well as the German glitch group Oval, have all had a direct influence on the composition of *Lichten*.

At the time of composing the piece, I had just finished reading Kim Cascone's 2000 article *Post Digital Tendencies: The Aesthetics of Failure*, spurring on a newfound fascination with the aesthetics of technological failure and what this meant for my own work. In his article, Cascone writes " [Failure] has become a prominent aesthetic in many of the arts in the late 20th Century, reminding us that our control of technology is an illusion, and revealing digital tools to be only as perfect, precise and efficient as the humans who build them" (Cascone 2000, 13). Inspired by this quote, I wanted to highlight this intentional imperfection in *Lichten*, overlapping the glitches with beautiful, ambient drones, and crisp slightly off-beat rhythms.

Compositional Processes

Lichten is divided into four sections, moving continuously between fast and slow. It is meant to be continuous in structure, with the beginning material returning near the end, albeit briefly. The piece is based on rapid, repetitive rhythmic fragments, all of which have gone through significant processing. The original sound material was created using a combination of patches made in Max/MSP and SuperCollider, with the exception of the opening material which is processed human speech.

One of the main features in this piece is the use of pulsating, beat-based sound material. These sounds occur throughout the piece, often in combination with speech samples or a drone. The piece moves between these two states, often overlapping and creating several lush textures. The beats in *Lichten* rarely lock together, as you might hear in a minimal techno track: there is always a sense of the unexpected and irregularity which does not make it particularly danceable.

The piece also features recorded human voice, which is heavily processed. This is reminiscent of Muhly's *Mothertongue* suite, which incorporates fast, cut up vocals, singing seemingly random things (for instance, reciting numbers from a telephone book), and Lanky's *Idle Chatter* which also uses speech as the main focus. *Idle Chatter* was made using a process called linear predictive coding, which is an analysis tool that breaks down digitally recorded human voice into sibilance (a manner of articulating consonants) and plosives (which refers to the release of the consonant) (Deng et al. 2003). Both pieces have had an influence on the processed vocal parts in *Lichten*; I used recordings of my own voice which I then manually spliced and reversed in Logic. The sound was then processed in a Max/MSP patch until it sounded extremely scrambled and unrecognisable.

Another feature of the piece is the subtle use of glitch. Glitch is a style of electronic music and visual art practice which arose in the early 1990s. Music in this style is typically produced by deliberately "ruining" a musical sample, so that the scratches and hiccups are an integral part of the sound. Glitch is often thought of as the surge of "the real world into the orderly transmission of electronic signals, resulting from a sudden change in voltage in an electrical circuit.... glitch reminds of the analog roots of digital information" (Marks 2013). Sources of glitch in music have typically included the use of skipping CDs, electric hums, analogue or digital distortion etc. In his article, Cascone lists the following as the fundamental techniques of digital experimental glitch music (Collins et al. 2013, 143):

- Test tones and stark landscapes

- Buffer skipping

- Time stretching and bit reduction

- Microsound - manipulating tiny grains of sound

- Data transformation - from image files to audio

There is a particular proximity (in terms of aesthetic qualities) between *Lichten* and the music of the German trio Oval. Oval, a key player in developing the digital glitch scene between 1991-5, uses many of the above mentioned glitch techniques, in particular looping "scratched shards of sound" in order to create new and complex textures (Collins et al. 2013, 143). Their musical style tends to drift across a multitude of genres, including reversed songs and ambient soundscapes, to more rhythm-based techno, with an emphasis on the unwanted, undesirable sonic artefacts, often created by mutilating CDs, then processing the fragmented sounds to create the above mentioned highly rhythmic electronic style (Collins et al. 2013).

In *Lichten*, I focused on creating glitchy rhythms by means of digital technique. I constructed a patch in Max/MSP, which added subtle glitch to sounds. I then time-stretched some of the rhythmic material and performed a bit reduction in order to give it a rougher sound, which would contrast with the lush ambient drones on top. Some of the sound material was reversed, making it even less recognisable. I also used some SuperCollider code to add even more subtle glitch to the rhythms, layered on top of the existing sound material.

3.9   *Sleep Cycle*

- *higher* (2012) 11'31"

- *i've had dreams like that* (2012) 7'01"

Sleep Cycle is a set of two stereo pieces which are an aural depiction of dreams. The pieces explore texture and space, in particular the contrasts and interactions between distant environments and closer spaces.

Compositional Processes

The first of these pieces, *higher*, juxtaposes a cold and distant soundworld with one which is much closer and warmer. Incorporating field recordings of announcements

recorded at various New York City tram and subway stops, the piece is reminiscent of the airport announcements used in *airport fragments*. However, unlike in *airport fragments*, the announcements in *higher* are not the key element of the piece, but rather a part of the general stream of events occurring in the dream.

The beginning of the piece uses very dense textures, building in intensity after 38", directly following the announcements. Various sounds are introduced at this point, many of them produced in SuperCollider and ixi quarks. Underlying the often raucous sounds is a drone, which remains present throughout most of the piece. The sounds eventually draw closer together, building to a climax at around 7'10", where all the sounds used in previous portions of the piece collide, creating a dense texture of lush sound.

INTRODUCTION (0'-0'37")
Rapid presentation of subway announcements and quick transition into distant sound material (drones).

Section I (0'38"-2'45")
A dark drone-scape is introduced; various sound objects float in and out of the space. Brief rhythmic development occurs.

Section II (2'45"-4'35")
Train sounds become main feature of this section, moving around the space. More brief rhythmic developments occur here, preparing for a transition in sonic material.

Section III (4'35"- 7'10")
Sound material begins to shift to a warmer, melodic environment. Pitch becomes a more prominent feature at this point in the piece, as pitch sound objects

Section IV (7'10"-9'45")
Piece reaches the climax at this point, with a warm wash of sound building in intensity throughout this section.

Section V (9'45"-11'30")
Soundscape gradually becomes more distant and cold; sound objects become more sparse, eventually fading away.

Figure 3.6: Structural outline of *higher*

higher is in part informed by shoegaze music, popularised by the Irish group, My Bloody Valentine, characterised by the heavy use of effects pedals, whereby the performers would be "looking down at their feet during concerts" (All Music 2011) hence the name shoe gazer arose. The band would use a combination of heavy distortion, pitch bending and digital reverb to create a "wall of sound" from their noisy guitars. The term "wall of sound" is a pop music production technique developed by Phil Spector at Gold Star Studios in Los Angeles in the 1960s. He used heavily layered reverberation that would be heard well over jukeboxes and AM radio (BBC 2009). My Bloody Valentine re-popularized this technique in their 1991 album, *Loveless*. I wanted to create a similar type of sound in *higher*, particularly near the climax, where sounds collide into a heavily reverberated melodic drone, growing in intensity, in turn creating a heavy wall of sound.

i've had dreams like that is reminiscent of dark ambient and drone metal music, as discussed in *spheres*. Structurally, it is slightly less free-form than *higher*, but still maintains a certain amount of dreamlike freedom. As in *higher*, reverb is an important feature of the piece. In terms of sound material, there is an even balance between recorded and artificial sounds: I recorded the sounds of pipes being struck with metal bars, elevator generators and the low hum of a furnace revving up. Other sounds were produced through means of synthesis in SuperCollider and Max/MSP, using the interface mentioned in the discussion of *spheres*. I also applied a heavy amount of reverb, which in turn produced a drone heard throughout the piece.

The piece is ultimately a mixture of harsh metallic pulses juxtaposed against soft drone-like material. Unlike *higher*, which explores cold and warm sound worlds, *i've had dreams like that* is far more terse and sharp and does not float around in a dreamy state like the other piece.

Both *higher* and *i've had dreams like that* were particularly enjoyable to compose. I enjoyed the free-form nature of both pieces, mixing different sounds sources together at random, and discovering the myriad of sound combinations which can be produced. I use a similar compositional process in the creation of *blur:spin*.

3.10 *blur:spin*

blur:spin is a piece for solo laptop, utilising the Just in Time Programming library (JITLib) in SuperCollider and custom- made performance interface in Max/MSP. The piece was performed at various events, notably: InterFace Symposium in Birmingham UK in June 2012; Code Control, Max/MSP festival in Leicester in March 2013; at an Algorave on the MS Stubnitz, in London in April 2013; at EARZoom festival in Ljubljana, Slovenia at in October 2013; and INTIME Symposium at Coventry University, in October 2013.

The piece ranges from being 15 to 20 minutes long, adaptable depending on time constraints given by the event organisers. It is mainly improvisational in nature, with some key pre-planned elements. It combines live coding, live processing, and performance interfaces with use of gestural controllers. I was able to integrate some of the performance interfaces which I created in BiLE, namely the interface shown in Fig 2.1, in Chapter 2, which was designed for use with an iPad.

The piece is heavily informed by my experience working with BEER. As discussed in Chapter 2, one of BEER's primary activities is live coding laptop performance, using JiTLib. Live coding is a musical practice centred on the use of improvised interactive programming. In SuperCollider, there is a class library which allows for several different options for modification of a running program, thus making it an ideal tool for on the fly programming (live coding). This library called JITLib was developed by Julian Rohrhuber and Alberto de Campo and facilitates this sort of activity within the SuperCollider programming environment.

Compositional and Performance Processes

blur:spin is comprised of three elements which are combined in performance. These include live coding using JITLib in SuperCollider; a sound file, which is played back through a buffer unprocessed in SuperCollider; and finally, a motion capture device via a custom performance interface made in Max/MSP.

The live coding portion in *blur:spin* relies predominantly on creating and altering node proxy definitions (Ndefs) in SuperCollider, during and right before the performance. In JiTLib, an Ndef refers to a proxy, and thus stores the object and returns the instance: it is essentially a language reference for the processes that are running on the server in SuperCollider. A proxy is a placeholder for potential redefinitions (Rohrhuber et al. 2011). Ndefs can be used in a number of ways in a live coding performance. For instance, they may be used recursively:

```
Ndef(\a, { SinOsc.ar([500, 535], Ndef(\a).ar * 10, LFNoise1.kr(2).max(0) * 0.2) });
Ndef(\a).play;
```

Figure 3.7: Example of a recursive Ndef

The above example can be considered to be recursive due to the fact that there is a feedback delay, allowing the calculation to essentially repeat over its own outputs (SuperCollider Help File 2013).

In a live performance situation, multiple Ndefs can be mixed and controlled using the "NdefMixer(s)" graphical user interface (GUI) which allows for separate amplitude control over each of them. On-the-fly alteration of each Ndef is possible and is taken into account within the mixer (Rohrhuber et al. 2011).

This sort of interaction between sounds allows for a smooth transition between material allowing the performer to make coding and musical decisions "on the fly" in a more streamlined manner.

During a performance of *blur:spin* I set up some boilerplate (pre-prepared) code beforehand, comprised of three or four Ndefs which are crucial to the structure and sound of the piece. The code then is further manipulated and altered throughout the performance. During a performance, I also write more Ndefs "on the fly". These will help to either accentuate or add meaningful contrast to the sound world. Depending on the venue, I will decide whether or not it is a good idea to project the code. As discussed in Chapter 2, this allows the audience members to view the compositional processes, even if they do not have the prior knowledge to allow them understand what is going on the

Figure 3.8: Screenshot of a typical performance setup in SuperCollider for *blur:spin*

screen. For instance, I decided to project the code at Code Control Festival, which was a predominantly Max/MSP users festival: this yielded some interesting comments from the Max users took interest in what a live coder using SuperCollider might do during such a performance.

The piece also incorporates some precomposed beat-based and ambient sound samples, all of which were created in SuperCollider prior to the performance. These are performed independently from the rest of the sound material, and exist as background sounds to complement the live coding. The beat-based material was played and processed live in SuperCollider while the ambient sound files were played in Ableton Live and faded in and out using a Korg nanoKONTROL 2 controller. Finally an ambient drone is controlled via a custom performance interface constructed in Max/MSP:

The interface at Fig. 3.9 uses the c74 Max object, created by a software company called *nr74*, to be used for building interfaces in Max for use with gestural controllers. The interface is controlled by an iPad, communicating through Open Sound Control (OSC) messages. The interface contains three accelerometers, which can be controlled
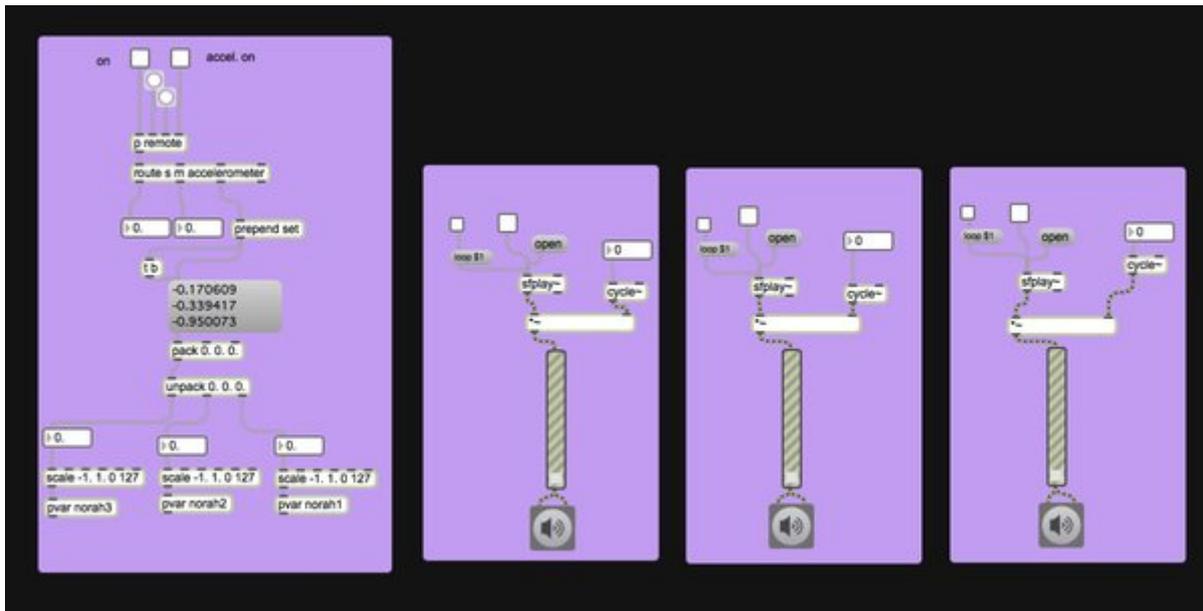
Figure 3.9: Max/MSP Interface used in *blur:spin*

either separately or together, by the iPad. Up to three sound files can be loaded and processed during the performance. Prior to a performance of *blur:spin*, the sound files are loaded into all three accelerometers, and the iPad is moved around at various points, creating unpredictable textures. As discussed in Chapter 2, using a motion capture added a performative edge, which allowed for more audience-performer communication and interaction.

In the submitted portfolio, I have included an example of the SuperCollider template, similar to that shown above, which I am likely to use in a performance of this piece. Subsequently, I have included a history of code from a recent performance to demonstrate the transformations which occur in the piece due to changes in code during a performance.

Stylistically, the piece was informed by various genres of electronic music. These include the rhythmic and minimalist electronic music of artists on the Raston-Noton record label, namely Alva Noto; Finnish techno group Pansonic; German techno group Stahlfrequenz; Detroit Techno, in particular that of Gerald Donald (member of the groups Arpanet, Drexciya and Dopplereffeckt) and dark ambient music by various artists on independent internet-based record labels (commonly known as "net labels"). Similarly,

being exposed to a large community of laptop performers and ensembles such as Slub, Benoit and the Mandlebrots, amongst others, have no doubt had a direct influence on my solo laptop performances.

Conclusion

At the University of Birmingham, my research was largely focused on the creation of musical works which combined the style of experimental electronic music genres (Collins et al. 2013, 136) with more traditional acousmatic techniques. I also explored laptop performance, both in terms of performance techniques and the development of software tools, which could be used for both performance and for processing sound material for my fixed media compositions. The works presented in this portfolio demonstrate a fusion of these techniques, which broadened my own compositional palette and encouraged me to create a set of tools to use and expand upon in future compositions.

Through this research I had the opportunity to explore various new technologies, in particular, working with motion capture devices such as the iPad. These technologies have allowed to develop new ways of musical thinking and compositional techniques which, I intend to explore further. In my future research I plan to do a project which will lead to the creation static and mobile networked-user interfaces for live laptop performance, using data captured from commercially available hardware. This project will fuse my interests in laptop performance with the use of gestural controllers, in order to facilitate more aesthetically accessible laptop music performances.

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APPENDIX A: Diagram of 8-Channel Surround Arrays

The 8-channel format used in *suddenly, there is* and *interrupt* as follows;

"BEAST 8", also referred to as the "French 8" (Carpenter 2013, 61)

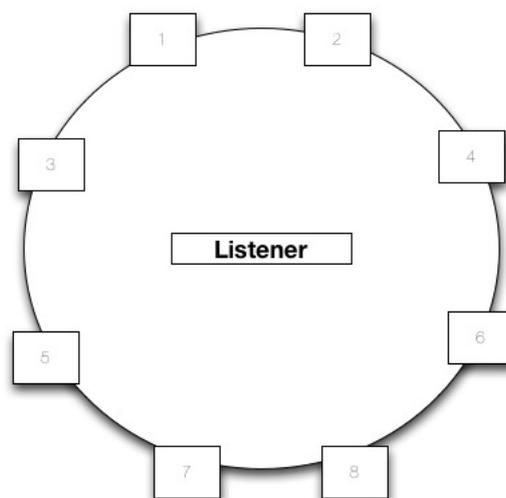This arrangement is formed of 4 stereo pairs which move front to back, around the listener:

Figure 3.10: The "BEAST 8" eight channel configuration

APPENDIX B: Supplemental Compositional Work

The following supplemental works were composed as either side projects or very early works during my Ph.D research period.

interrupt (2010) 6'45"

interrupt was one of the first piece written for this PhD. It uses eight channels and is based on the principles of meditation practice. The piece utilises a combination of Tibetan singing bowl and throat singing samples, as well as samples from analog and digital synthesisers.

The piece is based on samples of Tibetan throat singing and singing bowls which were recorded at various locations in Canada, including a Tibetan march in Calgary, Alberta, and at a Tibetan buddhist ceremony in Halifax Nova Scotia. The piece is based on the notion of stasis, and serves as a sonic representation of meditation.

Fade (2013)

Fade is a work for B-flat clarinet, sound file, and live coder. The piece was written to be performed by Canadian- born, German-based clarinetist, Heather Roche, and myself during the May 2013 BEAST "Vanishing Point" concerts, in Birmingham. The piece combines live coding, clarinet and sound diffusion performance to create a non-hierarchical hybrid, where one part or instrument does not rank higher in importance than the other. In other words, the electronics are not meant to be mere accompaniment to the clarinet, nor is the clarinet meant to be the spotlight: parts work together blending ambient, minimalism and algorithmic genres.

Selected Ambient Works (2010-2013)

Over the last four years, I have written a large quantity of ambient music, which I performed at various laptop performance events in coffee shops, pubs and art galleries. The works have inspired and have been inspired by pieces in the main portfolio. The works have been mostly released on my own internet-based ambient and algorithmic

record label, Xylem Records. I started Xylem in late 2012, and currently curate the music of over 15 artists from the UK, Russia, Canada, USA, Germany, Italy and Japan. The project began as an outlet for my own ambient music and then grew into a large scale endeavour. Other works included in this section were released on the Earthrid label, a UK-based net label which specialises in a variety of electronic music genres.

Selected pieces include *there it goes* and *i've had dreams like this*. All of these combine a mixture of algorithmically derived elements and recorded material. In *i've had dreams like this*, parts of *suddenly, there is* were sampled as the basis of the work. Other pieces, such as *there it goes*, use sampled piano sounds, played by myself. These sounds were heavily processed using techniques similar to those used in the creation of *you are here*.

APPENDIX C: SuperCollider Code History From a Performance of *blur:spin*

The following code is an excerpt from a performance of *blur:spin*. It is meant to show the progression of changes which occur while live coding during a performance. The code changes are from the first five minutes of the piece.

Please see the DVD entitled "Appendix" for the file containing the code, entitled "code history" located in the folder called "code".

APPENDIX D: Performance Information

The following information gives information pertaining to the performances of the portfolio pieces.

interrupt (2010)

- *Barber Summer Festival*: Birmingham, UK, June 2010

suddenly, there is (2010)

- *BEAST: States of Play*: Birmingham, UK, October 2010

- *Supersonic Festival*: Birmingham, UK, October 2011

- *Fierce Festival*: Birmingham UK, April, 2012

Alone Together: LOUDER (2010)

- *BEAST: Espaces*: Birmingham, UK, March 2011

- *Ancient and Modern*: Warwick, UK, April 2011

- *Toronto Electroacoustic Symposium*: Toronto, Canada. August 2011

Alone Together: What Will Remain (2011)

- *SOUNDKitchen: SONICPicnic*: Birmingham UK, July 2011

Alone Together: Hospital Suites (2011)

- *BEAST: Waves*: Birmingham, UK, November 2011

- *Colchester New Music: New Music Against the Grain concert*: Colchester, UK,

- December, 2011: *NoiseFloor Festival*: Stafford, UK, May 2011

blur:spin (2012-13)

- *InterFace Symposium*: Birmingham, UK, June 2012

- *Vivid: Revolution 2 Dirty Media Festival*: Birmingham, UK, March 2013

- *Code Control, Max/MSP Festival*: Leicester, UK, March 2013

- *MS Stubnitz Algorave*: London, UK, April 2013

- *Whispered Shout*: Croydon, UK, August 2013

- *EarZoom Festival*: Ljublijana, Slovenia, October 2013

- *INTIME Symposium*: Coventry, UK, October 2013

Lichten

- *BEAST: Waves*: Birmingham, UK, December 2012

- *BEAST at RedSonic Festival*: London, UK, April 2013

Sleep Cycle: I've had dreams like that

- *BEAST: Encounters*: Birmingham, UK, February 2013

Fade

- *BEAST: Vanishing Point*: Birmingham, UK, May 2013

APPENDIX E: Musical Works Consulted

Alva Noto

- *Unitxt (2008)*

Amacher, Maryanne

- *Sound Characters (Making The Third Ear) (1999)*

Andriessen, Louis

- *De Staat (1976)*

Apparat

- *Selected Works*

Bougaieff, Nicolas

- *Selected Works*

Byetone

- *Symeta (2011*

Drexciya

- *The Quest (1997)*

- *Grava 4 (2002)*

Dunn, Kyle Bobby

- *Bring Me The Head of Kyle Bobby Dunn (2012)*

Eno, Brian

- *Ambient 1:Music for Airports (1978)*

Ikeda, Ryoji

- *Dataplex (2005)*

- *Test Patterns (2008)*

- *Dataphonics (2010)*

Jean, Monique

- *Ladieu au s.o.s. (2003)*

Lansky, Paul

- *More Than Idle Chatter (1994)*

Lainhart, Richard

- *Selected works*

Muhly, Nico

- *Mothertongue (2008*

My Bloody Valentine

- *Loveless (1991)*

Oval

- *94 Diskont (1995)*

Phon.o

- *Selected Works*

Radigue, Eliane

- *Kyema, Intermediate States (1992)*

Reich, Steve

- *Selected Works*

Southam, Ann

- *Glass Houses (1980)*

Sigurosson, Valgeir

- *Draumalandir*

Sunn O)))

- *Selected works*

Truax, Barry

- *Selected Works*

Vega, Henry

- *Worm Songs (2011)*

Westerkamp, Hildeguard

- *Transformations (2010)*