A Hole in the World, for electric guitar and MAX

by

David Gordon Wall

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Music

Department of Music

University of Alberta

Abstract

A Hole in the World is an open composition for prepared electric guitar, archival recording, and audio programming. Text-fragments culled from my father's recorded autobiography serve as the focal point of the piece. Transformations of these text-fragments within the audio programming language Max are created using the Kinect motion sensor camera, and through use of the computer keyboard. Invoking my father with the use of computer technology highlights the relationships between myself and my father, between human and machine, between composer and performer, and between the real and the virtual. These relationships are played out over the course of three movements. Each of the three movements is conceived of as a unique "memory-space." Each contains related texts, and each constructs sonic relationships between electric guitar textures and Max patches. The goal of the project is to begin to define a method of composition that allows for the acceptance of non-human others as part of a collaborative process. In order to do this, I use a process of decentering to explore ideas of multiplicity, boundary dissolution, non-human centric composition, and connection with nonhuman others.

Dedication

For Nicole

for always believing

Acknowledgements

Dr. Mark Hannesson

for his generosity and sense of humour

The University of Alberta Department of Music

for continuing to function admirably under great duress

Contents

List of Figures

Introduction | Memory, Post-humanism, and Music Composition

"...a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints." (Haraway 2003, 166)

Post-humanism, like any *grande idée,* has been used in a variety of contexts: Nietzche's "undetermined animal" (Miah 2007,17), Donna Haraway's technoscience and animal ethics (Haraway 2003), Frances Fukuyama's dystopic visions (Fukuyama 2002), Katherine Hayles's information-body (Hayles 1999), Andrew Pickering's cybernetic brain (Pickering 2011), Stelarc's cyborgism[1], Elaine Graham's monsters (Graham 2002), and a general search for what it means to be human (Miah 2007, 15). In a sense, post-humanism has always been with us. It can be seen historically in its emphasis on becoming, and its commitment to transformation (Miah 2007, 17).

The present work extracts two key features that I feel define post-humanism as it applies most cogently in relation to music composition: decenteredness, as implied in an open system with malleable boundaries; and connection with others as implied in machine collaboration. Decenteredness, described above by Donna Haraway as a state of "permanently partial identities and contradictory standpoints," is a condition that accepts uncertainty. It is a shift from an established centre or focus, and a disconnection from assumptions of origin or essence.[2] Composer intention is no longer at the centre of the work, as performer intention is given more latitude than it would be for a conventional score. The score becomes a set of suggestions rather

---

[1] Stelarc. "Zombies and Cyborgs: The Cadaver, the Comatose, and the Chimera." http://stelarc.org/documents/zombiesandcyborgs.pdf

[2] (Miriam Webster. "Decenter." http://www.merriam-webster.com/dictionary/decenter).

than a prescriptive document. This is reflected in *A Hole in the World* by the use of improvisation and a graphic, semi-open score that involves the performer in the creation of the piece (Eco 2007, 167). The open work, while preceding posthuman theorizing, nonetheless reflects the latter's effort to equalize a previously hierarchical relationship. While both performer and composer are human the score is rooted in both the composer's and the performer's open and collaborative relationship to software. The open work, in relation to the present piece, implies an open, non-hierarchical relationship between machine and human.

This relationship extends to subsequent performances, in which the score is used as a guide for constructing unique pieces that make use of different materials. This may include: modifications within the programming environment, the use of different text, the construction of soundfiles in a digital audio workstation, and the use of guitar effects not specified in the score. In effect, the performer becomes composer, choosing materials that best communicate what he/she wishes to express. The score is a template into which the performer inserts his/her chosen sounds. Put another way, the score can be used a compass. How one uses it to travel through the piece is up to the traveller. By taking this approach, the project de-emphasizes the initial performance's position at the top of a hierarchy by making its sound-world just one of many.

Connection to machines implies collaboration, both in the compositional process and in live performance. In the act of composition, the composer asks the machine questions regarding possible outcomes of compositional decisions; the machine "listens" and provides an answer; the answer suggests a path, or paths, that the composer might take. This is my experience when coding in a programming environment. Creating sound in this environment entails trying different strategies in a process of discovery. The feedback loop created by this process involves the machine and the composer in a collaborative framework.

Exploring compositional possibility in the context of this collaborative relationship is an exploration and construction of myself as post-human. As I adjust to the machine's process and accept its input, I augment my modes of thinking. My cognitive system extends to my environment (Clark 2011), comprising the components of the performance system that I have built.

I do not conceive of the components of the system as tools, but rather as collaborators. In the composition and performance processes, I am trying to change the relationship that normally exists in these processes from one of human/tool to one of collaborative partners. This requires a shift in my way of considering the components, which involves accepting them as sharing equal status with me. To do this, I engage in an ongoing process of decentering the binary opposition of human/machine.

Doing this changes the way that I compose. Instead of considering myself as making the first compositional move, I engage in a process of decentering by recognizing the first move as being made by the machine. It does this by suggesting a way of proceeding based on what I know of its potentials and constraints. This implies extended cognition mentioned above, as my cognitive processes become integrated with the machine's. The emphasis on this particular type of relationship between human and machine is what makes this piece post-human. Simply having a human and a machine in the same performance space does not.

Memory is accessed most obviously in *A Hole in the World* by the use of a sound recording of my father's autobiography. Single phrases are culled from this recording and subjected to transformations via audio programming. Transformation of that recording allows the dismantling and reconstruction of my father's voice as an expression of the workings of memory. Surrounding this with guitar textures that are sonically related to sounds created with Max allow

for a conversational call-and-response between my father and me. Issues of memory that arise

through the use of autobiography in this work include the presence of absent loved ones; the ways

in which we communicate with the dead; and how we use memory to inform our present lives.

More generally, music and sound-art are phenomena of time and memory. They are built

by memory the composer from the memory of other composers' works, and by the listener from

the of material within the piece as the piece is played. Like the software created for this piece,

music is an information processing technology. Channeling these through another information

processing technology - the human performer - creates a three-way informational circuit

necessary for the performance of the piece described here. Memory - in the form of

autobiography - adds another informational layer, functioning as an archive of information that

shifts in meaning over time.

As the technologies of prostheses, implants, and synthetic biology are internalized by the

human body, boundaries between human and machine are redrawn. That which has been defined

as normatively human is redefined, revealing the categories of humanity, nature, and culture as

highly malleable (Graham 2002, 5). This aspect of post-humanism is seen in the structure of *A

Hole in the World* as expressed in mutable boundaries that allow for re-novation - making the old

new (Peters 2009, 119) - from performance to performance. These mutable boundaries exist in a

structure that can be used to build any number of projects, much like John Cage's *Cartridge

Music* (Piekut 2011, 65). *A Hole in the World* is an idea and a set of materials with which to make

sound art. The idea: personal and collective memory can be accessed and enhanced through

human/machine collaboration in musical composition. The materials: Max patches that can be

used as is, or as a framework for elaboration; and electric guitar as an ambient sound producer.

Chapter 1 | Aspects of the Work

1.1 | General Description

This document is a description of the first performance of *A Hole in the World*. Salient aspects of the work include an open approach to performance and composition; the use of an augmented musical instrument (prepared electric guitar), interactive audio systems (Max[3], Guitar Rig[4]), electronically modified sounds (created in SPEAR[5], and Logic Pro X[6]), improvisation, autobiography, and memory.

The piece comprises three movements, each containing three Max patches separated by prepared electric guitar sections. The Max patches present and transform speech from my father's recorded autobiography. SPEAR - an application for audio analysis, editing and synthesis - is used to add noise and to adjust speed, adding a breathy, ghost-like quality in certain sections. In other sections, my father's voice is transformed in order to emulate its sound at the end of his life when he suffered from brain-stem deterioration. Logic Pro X is used to create soundfiles constructed with my father's voice, and three separate bell-sounds, each of which define one of the three movements. The guitar sections are intended as extensions/expansions of the bell sounds presented at the beginning of each movement.

The sound of bells perform the function of marking time and place. Time is not marked as clock-time, but rather as perceptual time; place is conceived of as the beginning of a new movement. Each new bell-sound marks a temporal boundary. This is analogous to bells as markers of the spatio-temporal boundaries of communities in the nineteenth century (Boutin

---

[3] Max. https://cycling74.com
[4] Native Instruments. *Guitar Rig Pro 5*. http://www.native-instruments.com/en/products/komplete/guitar/guitar-rig-5-pro
[5] Spear: Sinusoidal Partial Editing Analysis and Resynthesis. http://www.klingbeil.com/spear/
[6] Logic Pro X. https://www.apple.com/ca/logic-pro

2002, 267). In addition to its relation to the bell, the guitar sound acts in some places as transitions to and from sounds created in Max. Speech is electronically modified before being inserted into a limited number of Max patches.

1.2 | The Open Nature of the Work - General Comments

On repeated listenings, *A Hole in the World* is experienced as an entity defined by living form, which in turn is defined by material that contains the potential for drastic change from performance to performance. To call form living is to ascribe to it possibilities of movement and change (Leighton 5). Rather than a fixed shape, *A Hole in the World* is a shaping activity, "morphologically greedy for substance" (Leighton 2007, 6). This results in a piece whose form is an unfixed idea, and arises out of a balance between changeability and permanence perceived from performance to performance. This is reflected in a graphic score that is intended as a mnemonic aid in performance, rather than a definitive version of the work (Borgo 2005, 63).

A Hole in the World's permanence is defined by energy, and by changeability of musical material. By energy, I do not refer to energy produced by elements present in the piece. I refer to a qualitative visceral reaction in the listener in anticipation of the piece. This reaction is produced by the changeability of the sonic experience of the piece from performance to performance. Since aspects of the piece such as guitar presets, and materials within Max patches are changeable from performance to performance, specific sounds do not define the piece. Paradoxically, this changeability is what creates its permanence. It remains what it is because it changes. The idea of impermanence present in the piece matters more than the reality of the piece. Whatever importance is attached to *A Hole in the World* lies in its expression of an idea. Sound is used in

service of the expression of that idea. The piece exists, then, as a site for creation as much as a stand-alone piece.

1.2.1 | The Open Nature of the Work: Specific Comments

A Hole in the World is semi-open with regards to performance. Each of the three movements comprises three sections of guitar sounds and three Max patches. These six sections are unfixed, or mobile. The performer chooses the order in which they are played, providing many possible formal interpretations for the piece. One of the clearest definitions of the use of mobile form in music can be found on Universal Edition's website.

> The term mobile is borrowed from sculpture, where it describes a particular kind of work. The artist creates a number of constituent shapes but stops short of fixing a final overall form for his work. Instead he arranges it in such a way that the component parts move individually, providing a constantly shifting pattern. The sculpture is in a sense "finished" since all the component parts themselves are complete but it has no fixed form. The musical equivalent has a number of completed sections whose order is left to chance in some way. Normally this is done by dividing the music into squares or areas, whose ordering is left to the performer. He may need to plan this in advance, or in consultation with the other players, or it may be left to the spur of the moment. Some pieces in mobile form impose restrictions on which parts may be played together or even make the manner of performing a given part dependent on the particular part which preceded it (Universal Edition.http://www.universaledition.com/Roman-Haubenstock-Ramati/composers-and-works/composer/291/work/5884/work_introduction)

The use of mobile form has precedents in the work of a number of composers, most notably Roman Haubenstock-Ramati, Earle Browne, Morton Feldman, Pierre Boulez, and Karlheinz Stockhausen. I present two examples by Haubenstock-Ramati. Figure 1 displays Haubenstock-Ramati's *Mobile for Shakespeare* for ensemble. The score has three fields described by Marina Pereverzeva as external, middle, and internal. Performers are assigned fields and can start anywhere. They then read them in either a clockwise or counter-clockwise direction at any tempo (Pereverzeva 127).
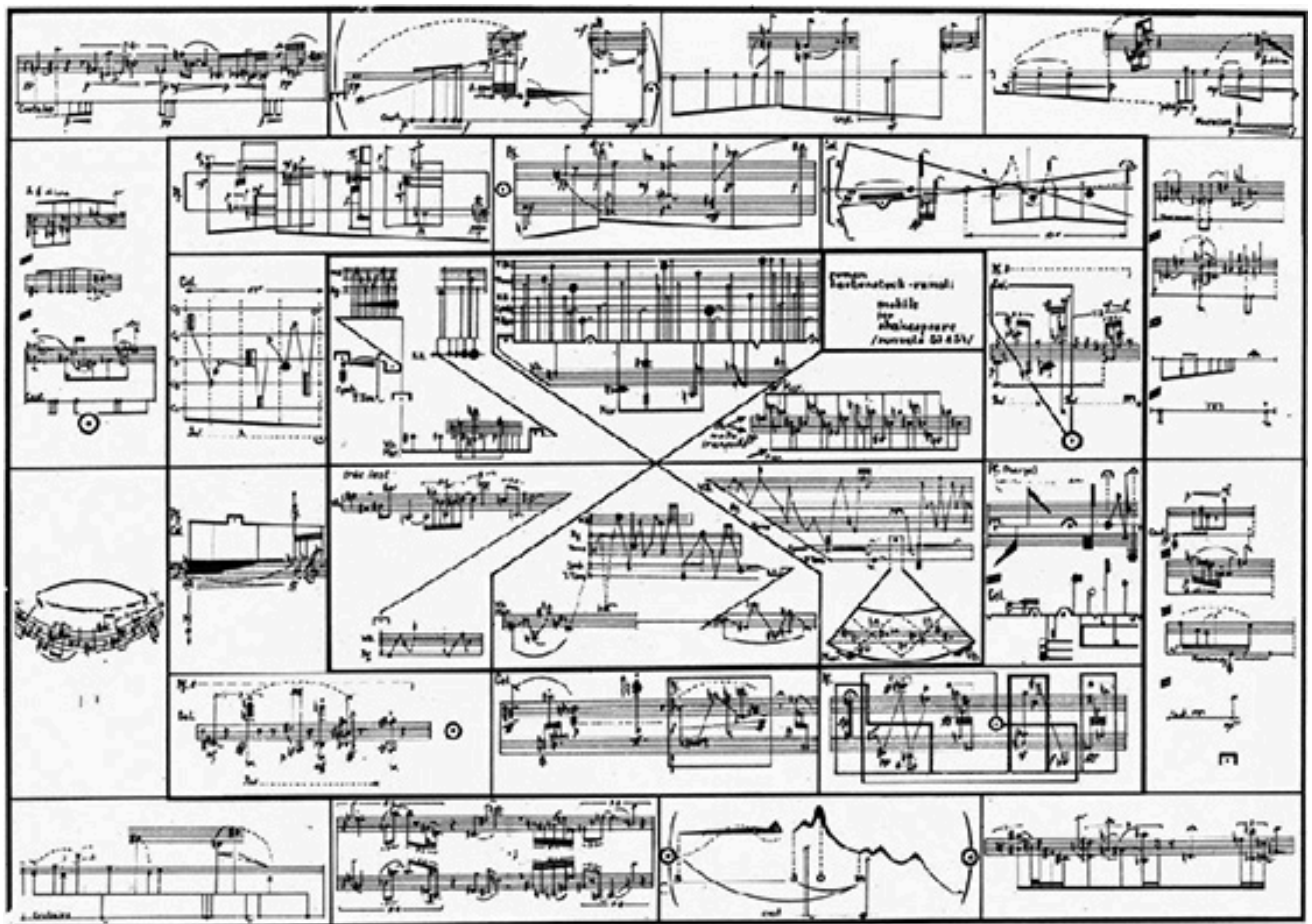

Fig. 1 *Mobile for Shakespeare*

Interpolation for 1, 2, or 3 flutes connects musical units (called formants) by dotted lines. The formants can be played in original form or retrograde, and the performer can move in either direction on the dotted lines (Pereverzeva 2013, 126).

Fig. 2 *Interpolation*

In contrast, *A Hole in the World* simply allows the performer to order the three movements as he/she desires. Of the six sections in each movement, the prelude is always first, leaving the remaining five sections to be freely ordered. This results in 120 possible section-combinations, and six possible movement-combinations.

A Hole in the World is mobile at the level of structural material as well as formal material. Since material within each section is ultimately interchangeable - soundfiles (recorded text) used in Max patches can be replaced with new ones, and guitar effects can be substituted for other guitar effects - the piece is more openly mobile than Haubenstock-Ramati's. Each type of sound unit can move to any other sound unit of the same type. In the case of Max sections, this involves the conceptual use of virtual mobiles superimposed on the existing one.

Figure 3a represents a single Max section that uses three soundfiles. Each soundfile is placed in a particular temporal location - 1, 2, or 3 - within the Max patch. Each of the three soundfiles can be re-ordered to any of the three locations (i.e. 2, 3, 1; 3, 1, 2, etc.), and each of these three soundfiles can be replaced with a different soundfile (i.e.1a, 1b, 1c). Figure 3b provides one possible example in which each of the original soundfiles has been replaced. Each unit of the mobile, then, contains one of any number of possible soundfiles, and any combination of three soundfiles creates a mobile. Examples of other possible orderings might be 2c, 3b, 1a; 3c, 1b, 2a, etc.
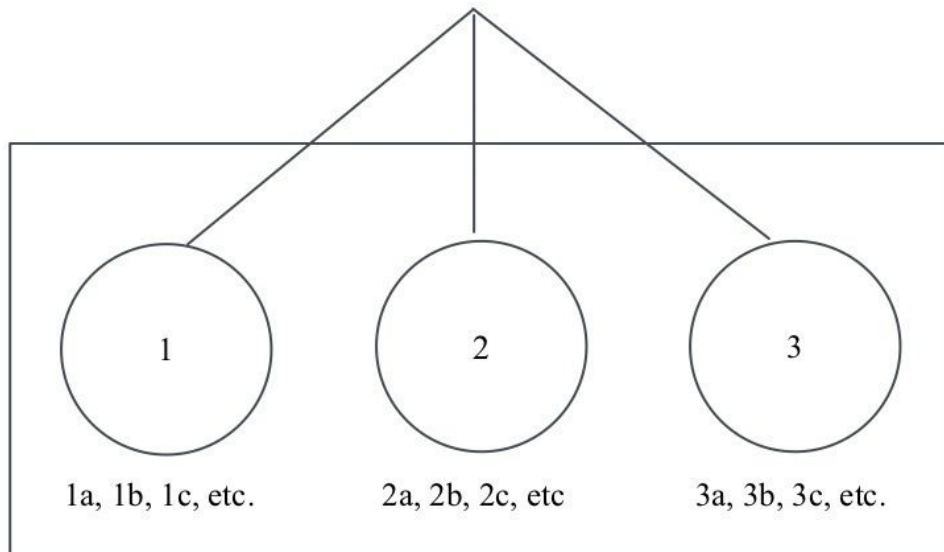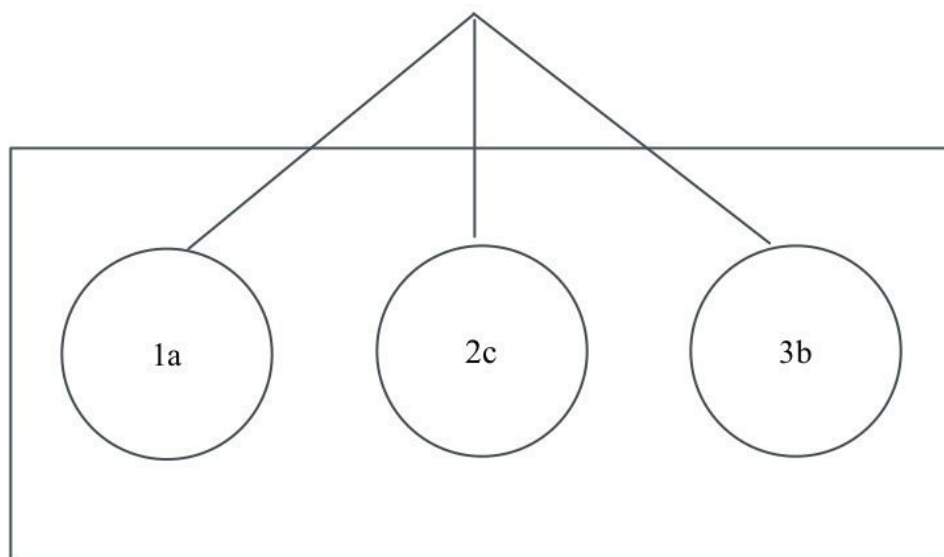
Fig. 3a

Fig. 3b

Mobile form enhances the existence of feedback loops between the interaction of code, language, and human improvisation that are present in this piece. It does this by introducing the possibility of changing existing relationships into other relationships by the change of material. This challenges linear causality by realizing a system which entails distributed agency as each iteration of the piece is created anew by each performer/composer; by emergent processes which

occur as the performer/composer improvises with divergent material; and by unpredictable coevolutions through interactions between code and human (Hayles 2005, 31).

A Hole in the World is open with regards to composition. Each iteration of the piece can be re-composed using the type of materials - Max patches, text, and guitar sounds - provided in the first performance. In other words, while there are specific indications in the score for what guitar effects to use, it is possible to substitute these with other guitar sounds depending on the performer/composer's interpretation of the score symbols. Digital effects units other than Guitar Rig 5 - as well as analog effects - may be used. Max patches may also be changed. Consistency from performance to performance lies in the use of electric guitar and the transformation of text.

1.3 | The Electric Guitar

I think of the electric guitar broadly as an electronic sound-producing interface. This has two goals: 1) to eliminate a guitar-centric idiomatic language, and 2) to subvert preconceived notions inherent in the conventional image of the electric guitar. Four tactics form a performance strategy designed to achieve these two goals: 1) the guitar is laid on a table; 2) various materials are used to prepare the guitar, thereby changing its conventional timbral identity; 3) the guitar is run through digital effects processing software; 4) sound is produced mainly through the use of various beaters or exciters (devices with moving parts used to excite the strings), rather than fingers or plectrum. The first tactic eliminates an idiomatic guitar-based gestural language; the second involves foreign objects woven through, laid on top, or placed underneath the guitar strings; the third tactic allows for deep editing of the guitar sound; the fourth is related to number 2 in the use of foreign objects not normally used for sound production with the guitar. Figure 3 displays preparations, beaters, and exciter used in *A Hole in the World.* This strategy is intended

to bring the sound created with the guitar closer to the sound created in non-guitar sections, while maintaining a distinct sonic profile.

Fig. 4 Prepared guitar

The relevance of the electric guitar to the present historical moment lies in its post-humanness. The electric guitar is a prosthetic device extending the human body, creating informational patterns flowing from organic entity through electronic machine. This enacts a collaborative, post-human relationship. In this relationship, the machine achieves equal importance; the human performer is decentered as the machine is de-marginalized. The idea of prosthesis is extended further when used in conjunction with digital environments. The sonic weaving of guitar and software creates a situation in which the performer embodies digital code by communicating it aurally through bodily and musical gesture, thus invoking the image of the cyborg.

Donna Haraway has used the cyborg as a metaphor for the contemporary experience of boundary dissolution between human and non-human. The coupling of human and machine demonstrated in *A Hole in the World* points to "the reconceptions of machine and organism as coded texts through which we engage in the play of reading and writing the world" (Haraway

2003, 518). This cyborg coupling of human and machine has led to an open category of human/information coupling. As Katherine Hayles puts it, "…the post-human implies a coupling so intense and multifaceted that it is no longer possible to distinguish meaningfully between the biological organism and the informational circuits in which it is enmeshed" (Hayles 1996, 266). The performer/machine is one such informational circuit, a circuit that produces sound on the electric guitar. The recognition of a performer/machine relationship applies to all musical instruments, but in the electric guitar the relationship is more salient given its history as a tool for integrating a diverse range of machines - sound processing units, amplifiers, tape players - in live performance.

1.3.1 | Prepared Guitar

Prepared guitar is a combination of guitar and non-guitar for the purpose of arriving at sonic results not possible in conventional guitar practice. The performer inserts foreign objects under, between, and on top the strings of the guitar. In the case of *A Hole in the World,* the guitar is then played through digital effects, looper, and amplifier. The fusing of guitar and non-guitar is a practice of boundary dissolution, implying a post-human approach to sound production. This approach has consequences for improvisers.

As an improvising musician, I have a desire for interaction and surprise. As a soloist, this is difficult. Since musicians are trained to play what they hear, it is difficult to be surprised by one's own playing. Surprise in solo work is possible, however. I achieve this in *A Hole in the World* by preparing the guitar, and by using a looper. The use of digital effects in conjunction with these, produces sounds that are less predictable. I ensure this by changing the preparations every time that I play the piece. This can be as simple as moving an object that is woven through

the strings to a different location on the neck. Alternatively, an object itself may be substituted for another. Digital effects are changed on a regular basis.

Manner of playing may change to produce surprise; options here include tapping, rubbing or scraping with an array of objects, and plucking. Scraping refers here to movement along or across a wound string or strings with a rigid object. Rubbing refers to movement along or across the strings using a soft object. Using a looper in conjunction with this approach enhances the possibility for surprise if used in a particular way. Creating loops past a certain time limit makes them difficult to remember in detail. Using multiple overdubs creates more complex sound in which particular elements used to construct the sound are subsumed in the larger sound. Related to complexity of sound are the combinations of digital effects. Single effects in a sound that has multiple, layered effects can be added or subtracted immediately prior to performance to produce unfamiliar, but related sounds. Using these sounds with constrained dynamics is important because sounds that leap out of the texture become predictable in a loop. All of these techniques - changing preparations, manner of playing, looping, constrained dynamics, and use of digital effects - help the solo performer to surprise him/herself during performance.

1.3.1.1 | Historical Background

The search for new sounds from instruments is not new. Muting, glissandi, harmonics and even certain percussive devices (as applied to non-percussion instruments) are instrumental techniques common to the late Romantics, the Impressionists, the Expressionists, and most certainly including the Neo-Romantics (Read 1979, 3). In the early nineteenth century, some pianos were provided with what was called a reed stop, which lowered a piece of paper onto the

strings. Eric Satie's piano version of Piege de Méduse focussed on time-lengths and prepared piano.[7]

John Cage would have been aware of these techniques, but would take them further. In 1948, he completed *Sonatas and Interludes,* a collection of twenty pieces for prepared piano. Although he had written work for prepared piano before this, *Sonatas and Interludes* was much more complex with forty-five notes prepared, "…metal screws, pencil erasers, and other homely devices between the piano strings" (Taruskin 2010, 59). Figure 5 shows the table specifying material and location used in preparing the piano. Figure 6 shows the actual preparation.

---

[7] http://www.aud.ucla.edu/~jkies/AwardsDay/Paper6.pdf

Fig 5 Table of preparations for *Sonata and Interludes*

Fig. 6 A piano prepared for *Sonatas and Interludes*[8]

The constant drive for more new and fascinating sound has led many guitar players to adopt the example of Cage's prepared piano. Three in particular that I have found to be influential to my own development are Keith Rowe, Fred Frith, and Bill Horist. Rowe, credited with developing the method of preparing the guitar[9], engages in a type of maximalism, emphasizing the use of drone, and eliminating the conventional sound of the guitar. In doing so he develops an entirely new language for the guitar[10]. Both Frith's[11] and Horist's [12]approach are not so concerned about eliminating the conventional sound of the guitar as augmenting it. All three make extensive use of looping technology.

A Hole in the World makes use of two different preparations.

---

[8] John Cage's *Sonatas and* Interludes for Prepared Piano – Performed by Adam Tendler. http://jazztruth.blogspot.ca/2012/02/john-cages-sonatas-and-interludes-for.html
[9] Prepared Guitar. http://en.wikipedia.org/wiki/Prepared_guitar
[10] Keith Rowe: Prepared Guitar http://www.youtube.com/watch?v=HnUVpiFHhmM
[11] Fred Frith – Solo concert at MOZG. http://www.youtube.com/watch?v=M2WSeZZV6iQ
[12] Bill Horist – Live at Good Shephard Center 7/19/12. http://www.youtube.com/watch?v=zRLKnAQs3HE

Fig. 7 Preparation for Movement 1

Fig. 8 Preparation for Movement 2 and Movement 3

1.3.1.2 | Possibilities for Preparing the Guitar

The following is taken from Elgart's and Yates's excellent book on prepared guitar, *Prepared Guitar Techniques.* Preparing the guitar involves four basic techniques:

1.Fasten an object directly to the string. This can involve:

- attaching an alligator clip or paper clip

- wrapping putty around the string with or without other objects

- wrap wire, tinfoil, or any flexible material you can find around the strings

2. Weave the object among three or more strings. This can involve:

- Wire

- String

- Shoe laces

- Paper

- Wooden or metal ruler

- Plastic

Any flexible material will work here.

3. Attach the object to some part of the guitar and let it lie against the string by force of gravity.

4. Pin an object between a string and the nut, fretboard, or saddle. The list here could become quite long. Suffice to say that you need to distinguish between hard and soft material. Some objects may not be large enough to cover the space between fretboard and string and will need to be attached to something that is.

1.4 | Max

Max is the audio programming environment used in this piece. It is a graphical programming language that provides a user interface, and a variety of "objects" - or self-contained programs - for creating different types of data-flow. Programs are created by connecting objects with virtual patch cords on a visual canvas called a "patcher." A patcher can be thought of as a blank document. The code that is written into the patcher is called a patch, and this code is used as means of creating music and/or audio.

The patches that I have created function as an interactive system, defined here as a system that requires "interaction to realize the compositional structure and potentials encoded in the system" (Drummond 2009, 126). Note that I did not use the term interactive *musical* system, implying musical input. The system discussed here responds to gestures, not sound. Its responses, however, are defined by sonic transformation. This system senses gestural input, responding to motion sensor camera, computer keyboard, and mouse. This sensing is accomplished through the performer's use of computer keyboard and Kinect motion sensor camera. The keyboard triggers events; Kinect transforms them.

I have chosen Max for its utility in creating performance patches that can be controlled in real time. This capability is necessary for the piece at hand since it requires a programming language that can be used as a musical instrument. The musical instrument(s) that I am creating for this piece focusses on three Max objects:

1. Buffer
2. Groove
3. Audio Filters

The buffer and groove objects affect the speed and length of the sound files. The filters affect the timbre of the sound files.

1.4.1 | Buffer and Groove

Buffer and Groove are the names of two Max objects that are used to play audio files. The buffer object is used to store audio, and the groove object is used to play the audio that resides in the buffer object. The groove object allows the programmer to loop the given audio file; to change the speed of the audio file; and to change the starting and ending times of the audio file. This allows the truncation of phonemes and syllables to create complex counterpoint. Transformations that occur as a result of changes in speed are present in the following patches:

- Homestead Ghost.maxpat

- Mother, Father, House.maxpat

- Edmonton.maxpat

- Remember Johann.maxpat.

Transformations that occur as a result of truncation are in the following patches:

- Remember Johann.maxpat.

- Body in the Box.maxpat

- Family.maxpat

- WWDepressed.maxpat

- Alberta.maxpat

- Cochrane.maxpat

Speed, in the context of this piece, refers to two things: the pitch of the recorded voice; and the relative amount of time that it takes for an utterance to occur. Pitch descends to a lower register as the voice slows down; at higher speeds it ascends to a higher register. Speech can also maintain its pitch and simply move at different rates.

Speed is used in *A Hole in the World* for the purposes of expression. Slowing the voice down foregrounds vocal nuances, and this facilitates emotional weight. Since the autobiography presents as a recitation of objective fact rather than subjective revelation, it was necessary to stay alert to subtle shifts in tone of voice. These are heightened by adjusting the speed of an utterance.

Using these two techniques, text fragments can be layered, accelerated, and slowed down. In this way, the performance space is filled with information, and voices are made to vie for attention. From this activity, one clear voice emerges in one moment, and is swallowed up in the next. This type of text manipulation alludes to the working of memory, and is made possible with the groove object. These are essential tools since I am using excerpts from my father's recorded memoir as one of the main parts of the piece.

1.4.2 | Audio Filters

Audio filters are designed to amplify or attenuate sound frequencies. These enable the programmer/composer to adjust the timbre of the sounds in a given piece. For *A Hole in the World,* this means transforming the sound of my father's voice. My use of audio filters in this piece is entirely exploratory. My ultimate decisions regarding their use in each of the sections in which they appear vary. In some, they help to convey specific meaning; in others, I simply liked the sound they helped to create. I explain below.

There are six different types of filters use in the piece. They are:

1. High pass

2. Low pass

3. Biquad

4. Resonators

5. Comb filter

6. fffb~

Section 1, movement 1 uses the resonators filter bank, a lowpass filter to modify one text-fragment, and a comb filter to modify the other. In this patch the resonators object takes an impulse, and applies frequency, gain and decay rate values to create a bell sound. The comb filter is used to create a hollow sound for the "We've got to remember" text, and the low pass filter in conjunction with a metro and counter objects creates filter sweeps for discrete syllables of the "Johann Wall" text. These filter sweeps create a sonic weaving effect between the syllables of my father's name. This is intended to emphasize the idea of the different facets of his personality. The hollow sound is associated with sound-at-a-distance, which emphasizes the fact that the owner of the voice is not present. This supports the invocation to remember.

Section 2, movement 1 uses the fffb~ object - a bank of bandpass filters implemented in parallel - to create an alarm sound in conjunction with a third-party object called vs.dust (Cipriani and Giri 2009, 408), which creates a granular sound. The bank of bandpass filters transforms the granular clicks into tiny bell sounds.

Biquad is used in section 2, movement 2. This filter is used for both phrases found in this section, and allows the composer to choose between a number of filters. For this section I use

two: a bandpass filter and a resonant filter. The bandpass filter allows for the natural sound of my father's voice; the resonant filter creates a monotonal voice devoid of emotion. When using the bandpass filter with one phrase and the resonant filter with the other, the two phrases are separated by a different emotional quality as much as by rhythmic and melodic aspects.

Low pass filters and high pass filters are connected in series in section 3, movement 2. Adjusting the frequency range allows the foregrounding of particular phrases in the same way as section 1, movement 1. Here, the effect is not automated. Instead, the frequencies of each of the four phrases are adjusted manually. This allows for more performer control, and creates a slower sense of change. The vs.dust object first seen in section 2, movement 1 is used here to create a bell-sound similar to that found in the former movement.

The reson~ filter is also used in this section. Like the fffb~ parallel filterbank described below, the reson~ filter allows for the adjustment of gain, center frequency, and Q (resonance of the center frequency).

Fffb~ is used in section 1, movement 3. Kinect is routed to the gain parameter of the fffb~ object. Frequency and Q are sent pre-established values. While the text-phrases play, the performer is able to place each phrase in the foreground, middle-ground, or background by using gestures communicated to Kinect. In this way, the performer is able to communicate the related ideas of depression and war.

Fffb~ is also used in section 3, movement 3 with the phrase, "My family", which has been transformed electronically by adding noise and lowering the pitch. This is intended to convey a ghost-like quality. This phrase is routed through a bank of four filters used in two ways. First, a sense of presence is gradually increased by sequentially clicking messages boxes that send frequency values to each of the four filters. After these frequencies values are sent, they can be

26

returned to zero by clicking on message boxes that send envelope values to the four filters. This has the effect of increasing and then diminishing the presence of my father's spirit.

1.4.3 | Speech and Language

Max is used primarily to manipulate speech and language. These cannot be approached without also approaching an interior life of "individual desire, memory, and the urgencies of speaking, writing, and hearing" (Labelle and Migone introduction). Language expresses this interior life while standing in the way of fully knowing it. The emotional weight of language is realized in the noise[13] inherent in speech, the guttural, breathy, throaty sounds that Barthes calls the grain of the voice (Barthes 1977, 181). The experience of that weight, however, is subverted by the semantic nature of speech. Feeling is set aside by ignoring the noise of speech in order to acquire semantic meaning, while the perception of noise activates emotions, providing another level of meaning. The treatment of speech and language in *A Hole in the World* addresses both of these domains.

A Hole in the World uses speech verbatim in order to emphasize semantic meaning, and manipulates speech in order to emphasize emotional meaning and noise. Semantic meaning is sometimes obliterated, other times recognizable but distorted. Manipulations include slowing down speech, phrase truncation, timbral changes through the use of filters, and the addition of noise. Slowing down speech both amplifies and transforms the emotional weight of language, obscuring semantic meaning in the process. The nuances of inflection become more closely observed, and attention shifts from exterior to interior.

---

[13] To paraphrase John Cage, noise becomes fascinating when we attend to it (Cage 2007, 25-26). In doing so, we isolate a quality of the voice, what Frances Dyson refers to as the "breathy, noisy materiality" (Dyson 2009, 19) of the voice. Rather than acting as interference, this noisiness delivers the body to the listener, what Barthes refers to as the "physique" of the voice.

27

Phrase truncation also amplifies emotional meaning. Isolating individual words and phrases removes context, forcing the listener to attend to personal imagery related to particular words or phrases. This triggers a unique emotional response in each listener. Words like "mother", or "father" hold a set of meanings and images related to human relationship. Phrases like "I was pretty depressed", and "I belong" hold meaning related to the interior life of the individual. Isolating syllables and phonemes abstracts language completely. Rapid repetition of these creates musical pitch. Changing the timbre of the voice through filter manipulation allows for multiple perspectives. An emphasis on a particular frequency range brings out nuances of emotional meaning not obvious in other frequency ranges. Speed manipulation and truncation are ways in which composers can closely observe the emotional weight of sound, rather than simply tinker.

Surrounding speech with music introduces a cultural practice bounded by parameters that often determine its production - performance practice, public space, listening habits (Labelle 2001, 63). These parameters place the daily reality of language and speech in a rarified space. In doing so, it becomes less ordinary, more open to second looks. This allows the listener a different awareness of the experience of speech, and this awareness spills over into life outside the performance space.

Recorded speech heightens the audience's awareness of the machine. Our intimate relationship with speech creates a greater level of awareness, and the transformation of that speech in the programming environment is more meaningful than transformation of other types of sound. Within this environment the human performer is inserted as a switch that both activates the system, and contributes intuitive sonic responses to the situation being created. The audience is conscious not only of a machinic structure, but of the human performer as part of that structure. . .

Semantic meaning is important in the piece. Each section contains texts that are thematically related, and designed to provoke remembrance in the listener. Because of this, the audience must grasp the semantic meaning either before transformation occurs, or at the end of the transformation process. Transformations can occur at any point in the life of a text, but the text must be presented clearly at some point. This leaves room for a variety of text placement, resulting in varying relations of sense and non-sense (N.S.). See figure 9.

Sense — ---N.S.

N.S.——————————————————— ——————————————sense

N.S.————————————————sense——————————————————N.S.

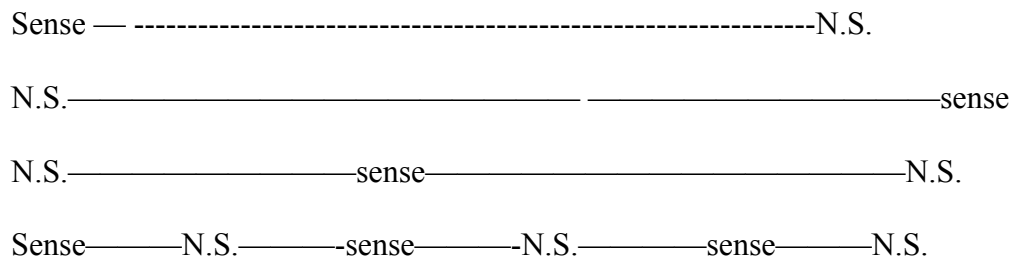Sense————N.S.————-sense————-N.S.—————sense————N.S.

Fig. 9

The variety of oscillations between sense and non-sense creates a middle-ground rhythmic profile in each text section. As demonstrated in figure 11, the oscillation between sense and non-sense can be slow or quick. The movement of consistently slow transformations in the guitar sections creates another middle-ground rhythmic profile. Transformation speed in each guitar section is similar. This creates an oscillation of movement-types: quick and uncertain (text), and slow and predictable (guitar). Having said this, the inverse is true as well. Predictability is built into the text sections with recognition of semantic meaning and the familiar sound of the voice. Uncertainty is built into the guitar sections because of the abstract nature of the sounds.

Given the difference between guitar sections and text sections, there is the possibility of a collage-like listening experience. In order to mitigate this, transformations of the guitar sounds and transformations of the text-fragments are created in such as way as to generate clear aural relationships between the two. Guitar sounds are intended to sound like an extension of the text sections.

1.5 | Improvisation

A Hole in the World exists, as all composed pieces do, on a continuum between improvisation and composition. Composition is a command structure based on particular symbols; it does not produce sound. Performance, of which improvisation is always a part, is that which is not encoded in those symbols (Mazzolla et al 2011, 234); it is responsible for producing sound. Some aspects communicated by this score are required, while others are not. Because of this, improvisation plays a significant role.

Those aspects communicated by the score are:

- The linear placement of sounds.

- The sounds themselves.

- Relative volume levels.

- Relative registral levels.

Those aspects not communicated by the score are:

- The specific temporal placement of sounds.

- The specific density of sounds.

- Specific volume levels.

- Specific registral levels.

Placement of sounds is prescribed temporally along the x axis in terms of before and after. Figure 10 shows a representative score page for one of the Max patches.

Fig. 10

Circled numbers indicate events. These include sound on, sound off, initiation of text, and initiation of text manipulation.

Score pages for guitar also indicate temporal placement on the x axis. In contrast to Max pages, they also indicate relative density, volume, and registral levels. Density is indicated by number of images on the page; amplitude is indicated by size of image; and register is determined

by placement on the y axis. All of these parameters are indeterminate. The performer improvises within these limits. Figure 11 demonstrates. In the box labelled Loop 1, the images are all relatively small, indicating quiet sounds of similar amplitude. A variety of registral levels are indicated as is a fairly sparse texture.
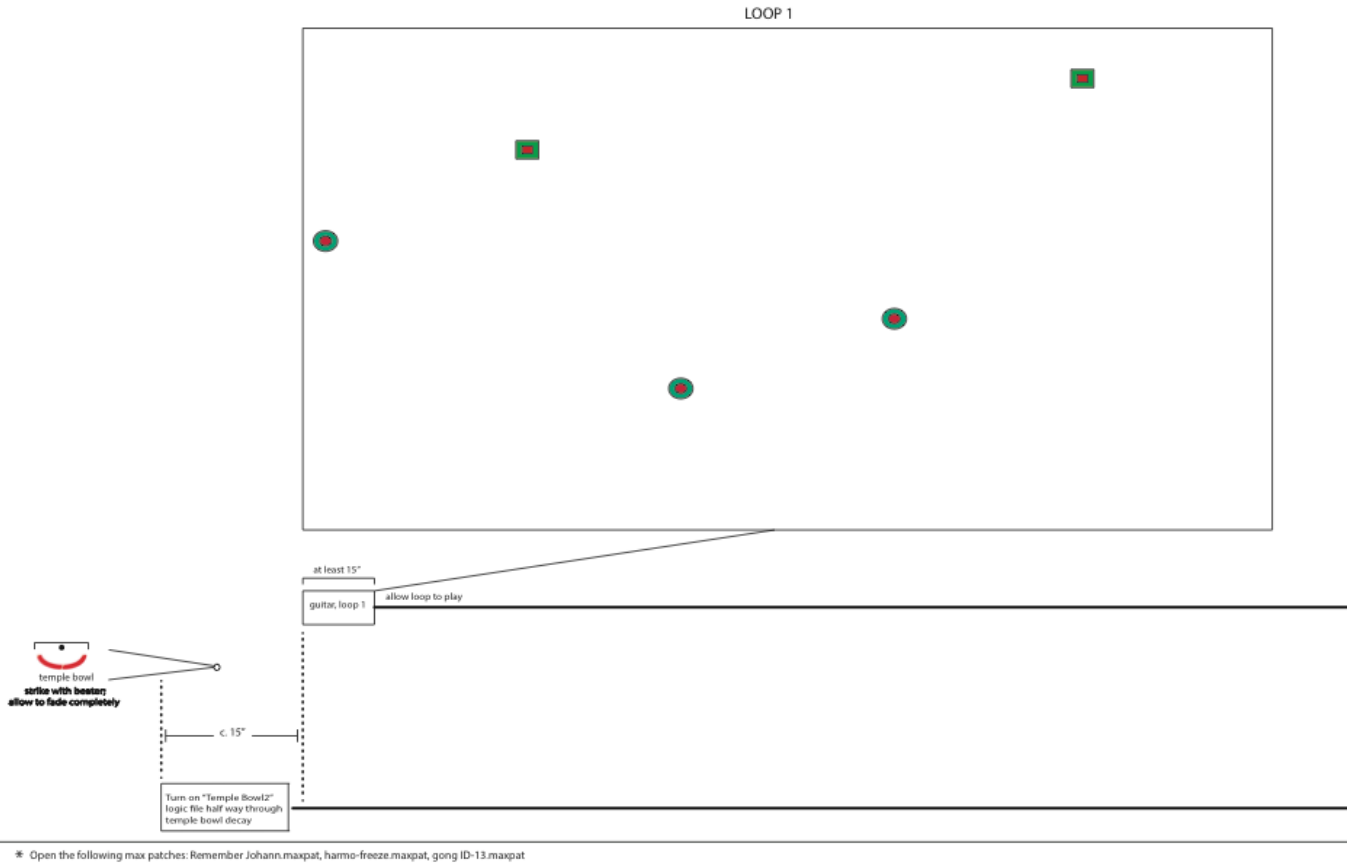

Fig. 11

Given the indeterminate nature of the score, then, improvisation is an integral part of *A Hole in the World.* In performance, the score's suggestions of linearity may be sacrificed for a sonic gesture more appropriate for the moment. In other words, the way in which the sounds evolve override the dictates of the score. This is true of both the guitar sections and the Max sections. This attitude of openness in the score is intended to create a temporal effect of becoming

(Cox 1999, 170) and duration[14] rather than a fixed being and divisible time (Cox 2011, 81). In other words, the ontological status of the piece is not bounded by a score that acts as a performance regulator of strictly defined events within a specific temporal field. It does not exist as a singular thing, nor does it exist within a specific period of time. It becomes what it will be in the act of performance.

A Hole in the World, then, is a complex system based on becoming rather than being. As such, it has the potential for emergence, which arises from the presence of improvisation. A conventionally notated score is also a complex system, but without the uncertainty inherent in improvisation. Uncertainty is an aspect of chaos, which, in turn, is a necessary aspect of emergence. Peggy Holman describes emergence as a "higher-order complexity arising out of chaos in which novel, coherent structures coalesce through interactions among the diverse entities of a system."[15] Without the uncertainty of improvisation, the possibility for chaos and becoming, and hence for novel structures, is lost. I draw a distinction here between the uncertainty/chaos of the composer's initial move towards making a piece, and the act of making something in the moment of performance. Composition of a determinate piece of music is an act of drawing order out of chaos. Once completed, however, its continued growth - its becoming - is in question. *A Hole in the World* is an attempt to ensure continued growth through improvisation.

Sounds used in the piece are clearly constructed and catalogued. In the case of the electric guitar, digital effects and preparations are prescribed. As well, the tools and actions necessary for producing the desired sounds on the guitar are given. Dynamics are, in most cases, relative. Rhythm is not given. Since proportional notation is used, temporal placement of sound is

---

[14] Duration (philosophy) http://en.wikipedia.org/wiki/Duration_(philosophy)
[15] http://peggyholman.com/papers/engaging-emergence/engaging-emergence-table-of-contents/part-i-the-nature-of-emergence/chapter-1-what-is-emergence/

approximate. These are the requirements for the first performance of the piece. Different

requirements are determined for each iteration of the piece prior to performance, if desired. The

performer can either use the score and materials as set out here, or re-compose the piece.

The nine Max patches in *A Hole in the World* can be thought of as a collection of sound-

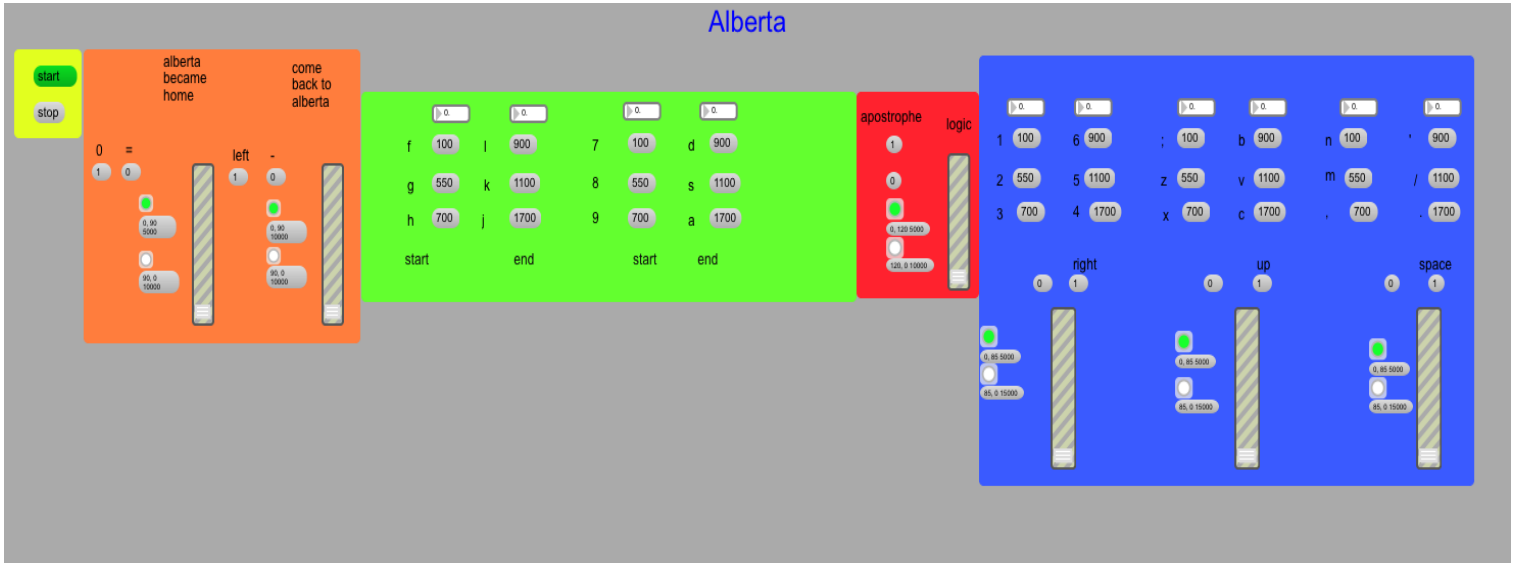producing instruments. Each patch has buttons and sliders for facilitating performance.

Fig. 12

The layout of each control panel reflects the procedure for moving through the section;

within that procedure, the performer is free to improvise. The blue box at the right is the most

open section in this patch. In this section, the performer can adjust gain sliders as desired, as well

as freely click on the grey message boxes in the upper part of the box. All of the patches are

composed in this sequential way as a strategy for moving through the patch. Once sound is

activated, however, the performer is free to make procedural choices that deviate from those

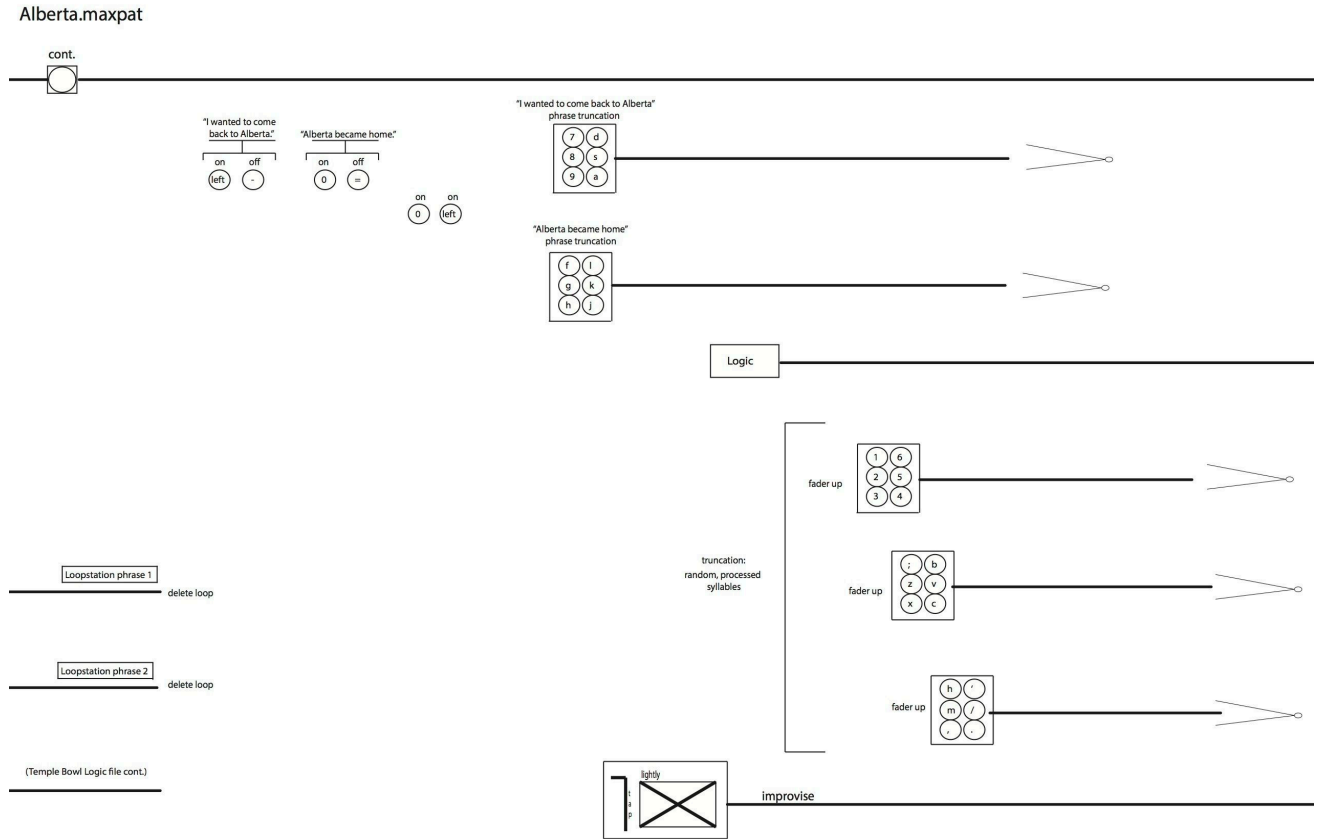given. The score page associated with this patch is shown below.

Fig. 13

1.5.1 | Gesture: General Comments

Movement that conveys meaning is called gesture (Godoy and Leman 5). This project makes use of the Kinect motion sensor camera to control sound with gesture. Since gesture reshapes our conceptions of music and sound in general (Godoy and Leman 4), it needs to be addressed. Attached to gesture is the concept of embodied cognition, which recognizes that knowledge arises from perception of how movement is used in relation to particular environments, and the way that the motor system informs cognition. Rather than base real-world meaning on abstract symbols (such as those found in a musical score), embodied cognition grounds cognitive contents in embodied experience. We learn by doing, an idea integral to

improvisation. The act of controlling sound through movement, then, adds meaning to that sound. In *A Hole in the World,* particular movements transform sound in a particular way, thus creating a gestural language for the production of sound.

A portion of the gestural language - key presses and mouse-clicks - initiate sonic results. As they are quite small gestures, these are not necessarily recognized as sound-producers by the audience. The loss of the 'links of causality' experienced in this case can cause a loss of engagement between the audience and the way in which the sound is being produced (Emmerson 91). In those parts of the piece which use the Kinect motion sensor camera, however, sound is clearly transformed by gesture. In the contrast between these two extremes, *A Hole in the World* makes gesture a salient issue in the production of sound. In a live performance certain questions arise: What are the responsibilities of the performer toward the audience when communicating sound? Is gesture a necessary component for a positive overall experience of music? What are the audience's expectations in terms of gesture? Is it necessary that they be fulfilled? Does lack of gesture in live performance imply an acousmatic experience?

1.5.1.1 | Kinect

Using the Kinect motion sensor camera to communicate with a programming environment requires that the programmer map movements on the x, y, and z axes. In doing so, the programmer can determine the distance that the body moves in order to produce sound. All three axes can be mapped onto a single limb, or a single part of a limb. For example, the x axis can be mapped to the hand, the elbow can be mapped to the y axis, and the z axis can be mapped to the shoulder. This can be implemented on each limb as well as hips and torso. Possibilities for

a non-haptic, collaborative choreography between machine and performer are extensive. I am thinking of collaboration here in the sense of human/technology co-evolution.

Control of sound within the Max patches of *A Hole in the World* occurs in two ways: initiation and expression. In order to initiate sounds, the mouse and computer keyboard are used. The Kinect motion sensor camera is used for expression. The gestures used in the piece are experienced by the performer as aurally and physically sensual. As the sound is changed by moving the body, the performer has the distinct impression of "moving" the sound. By this, I refer to both the idea of sonic movement within sound - pitches that go up and down, rhythm that speeds up and slows down, for example - and the sensation of weight being moved through the air. The idea of weight may seem tenuous. However, music is an art of touch; we feel it in sound waves moving air against our bodies. When we move our hands in a space that contains music, the air seems to have more weight.

Human movement is defined in *A Hole in the World* by the following taxonomy:

A. With the guitar

1. Striking with implement (chopstick, skewer, jeweller's awl, temple bowl beater). With the hand in front of the body, the elbow bends upwards to a 45 degree angle. At the top of the motion the wrist bends upwards. The forearm then describes an arc downwards until the implement strikes the string.

2. Plucking. The strings of the guitar are plucked with the fingers.

3. Friction. The strings are excited by rubbing them with implements (paint roller, pocket sharpener, chopstick, glass jar, plastic ruler).

Striking and friction convey more information to the audience than plucking, given their large-muscle movement.

B. With the computer

1. Pressing keys on the keyboard.

2. Mouse-clicks

C. With Kinect

1. Moving either hand or elbow in front of the body along the x axis.

2 Moving either hand or elbow up or down along the y axis.

3. Moving either hand or elbow backward and forward along the z axis.

1.5.1.2 | Gesture and Time

Gesture shapes time. Cooperrider and Nuñez draw attention to saggital temporal gestures - temporal reference made on the front-to-back axis of the body - and to transversal temporal gestures (temporal reference made along the left-to-right horizontal axis in front of the body) (Cooperrider and Nuñez 2009, 181). These two axes are the z and x axes respectively. Temporal reference of the z axis seems to be based on embodied experience, such as walking, having objects approach from the front (Cooperrider and Nuñez 2009, 202), or leaving things behind us in the past.

The x axis seems to correspond - at least in North American English speakers - to the direction in which we read. The future is always to the right, the past to the left. In this case the future is also down (the page), and the past up (the page), corresponding to the y axis. In these instances, the temporal meaning of the gestures is locked in the listener's cultural understanding of them. Because of the strength of temporal meaning along the x and z axes, most of the gestures used in *A Hole in the World* occur there. This enables the performer to provide the audience with an experience that is both sonic and temporal.

If the performer moves a hand across his/her body, the audience marks a beginning and an end of that movement, and that movement takes up a portion of time. In this way, movement partitions time, much like the hands on a clock. The performer affects the audience's experience of time by adjusting the lengths of his/her gestures, and by stopping (or not) the motion. Continuous movement along all axes implies duration; stopping and starting implies clock-time. Improvisation allows the performer to present movements of different lengths within a particular section of music. This creates the possibility of multiple temporal experiences for that section, emphasized by the attachment of sound to gesture.

Composers construct abstract time-points to which performers conform. In constructing these time-points, composers conform to "counting the score" while composing (Mazzolla et al 2011, 253). Onset time is dictated not by gesture in performance, but by the score. This disregards change. It is unlikely that music performed on Tuesday will be the same as that same music performed on Wednesday. All conditions outside of the score change as time passes. The performer's response to the score will be different, based on changing physical and emotional conditions, and on the performer's changing perceptions and actions (Borgo 2005, 44). These conditions are disregarded by the score, even while they determine its ultimate realization. The shaping of time in sound, which would naturally be different at different times, becomes trapped by the score. *A Hole in the World* takes an improvisational approach in order to avoid this condition.

1.5.1.3 | Embodied Cognition

Cognition, in the case of *A Hole in the World* and of music in general, is tied directly to sound and movement. More specifically, it is tied to gestures that produce sound. Since we derive

39

information from both gesture and sound, embodied cognition is relevant since it involves the transmission of information from body to brain. Margaret Wilson has defined the different aspects of embodied cognition. Most relevant for the purposes of gesture and improvisation are the ideas of situated cognition, cognition as time-pressured, action, and the act of off-loading cognitive work onto the environment.

Situated cognition posits that knowing is inseparable from doing, that all knowledge is situated in activity bound to social, cultural, and physical activities, and that cognition happens in a context of physical inputs and outputs relevant to the task at hand. Interaction with the thing that the cognitive activity is about - in this case sound - is necessary (Wilson 2002, 626). The performer learns by performing; the audience learns as they listen and observe the movement. Conditions within the environment must be dealt with as they arise, creating time-pressure. During improvisation, decisions must be made without the benefit of considered thought. Appropriate action occurs as an immediate response to the environment. Cognition is distributed across the entire interacting system within a particular environment, and awareness of the environment is used to solve existing problems (Wilson 2002, 629). In *A Hole in the World,* the performer interacts with a sonic environment comprising interactive systems, soundfiles, and electric guitar. Interactions within this environment create feedback and influence the performer's responses. These responses create new feedback and new responses, creating a cycle of interaction.

Embodied cognition leads us to consider cognition in terms of adaptive activity. In terms of memory, this leads to "the encoding of patterns of possible physical interaction with a three-dimensional world" (Wilson 2002, 631). In this context, the embodied memory patterns of short-term memory are not seen as a system, but as a deployment of action skills, resulting from the

perceptuo-motor patterning that comprises the contents of memory (Wilson 2002, 632). In other words, our short-term memories are based on movements that determine subsequent movements; each sound I make teaches me how a particular sound is made, and an idea of the movement needed to make the next sound. Within this paradigm, gesture is more than movement. It changes the way that the brain develops, and it engages memory. These are issues that come to the fore in a consideration of the contrasting gestural components of *A Hole in the World.*

1.5.1.4 | Post-humanism and Gesture

Gesture implies a transfer of information. This thought allows for a consideration of the post-human move of privileging informational pattern over the body, which leads to Hans Moravec imagining the separation of information from the medium in which it exists (Davis 2002, 115). In response, I take N. Katherine Hayles's contention "that for information to exist, it must *always* be instantiated in a medium" and that removing information from the medium instantiating it "constructs a holistic phenomenon as an information/matter duality" (Hayles 1999, 13). Production of sound via human gestureis an example of this holistic phenomenon, combining body and information. I understand this as information in the form of musical expression originating in the human body and communicated to and with a machine by physical gesture. This expression emerges from both the musical instrument and from the performer's direct connection to the machine through hardware – motion sensor technology - and software. This connection challenges Cartesian anthropocentrism, in that machines become as important as humans in the production of the piece because of collaboration, and a type of understanding (Badmington 2003, 18). In the collaborative context I am thinking of, understanding in the machine is demonstrated by the options it provides when dealing with human requests. Understanding is programmed into

41

the software, and the boundary between human and non-human blurs (Badmington 2003, 19). Gesture, then, is a mechanism by which the human body both maintains its integrity in relation with machines, and creates connection.

My coding decisions mark my presence in the machine and create a situation in which I collaborate with both myself and with the machine. My physical presence in the performance of the piece situates me as a cog that exists to keep the performance-machine running through the use of physical gesture. Through gesture, I activate a non-physical, informational self that exists in code that I have created. This non-physical self operates as a communication node that exists to receive, process, and transmit information. My performance self is a physical communication node that performs these same actions. The audience is a third communication node which, again, performs these same actions. These nodes represent bodies that are "not about fixed locations in a reified body, but about nodes in fields, inflections in orientations…" (Halberstam and Livingstone 1995, 2). Each node - performer, code, audience - exists as a set of possibilities, a network of relations, fed by each other within the performance space. These three nodes together can be conceptualized as a living, autopoietic system considered as a unity (Varela, Maturana, Uribe 1974, 187).

1.5.1.5 | Listening and Resonance

In section 1.2.1, I addressed the aspect of surprise in performance, and the number of ways that technology and performance technique can facilitate this. Specifically, "All of these techniques - changing preparations, manner of playing, looping, constrained dynamics, and use of digital effects - help the solo performer surprise him/herself during performance".

Having said this, there is a logical endpoint at which the performer becomes familiar with the vast majority of sonic possibilities. It is at this point that the performer must engage a practice of deep listening - if s/he hasn't already - in order to clearly experience each individual sound. Doing this results in an awareness of how subtle changes of energy result in subtle changes in sound. Regardless of how much the performer is able to control his/her movement - and hence the amount of energy communicated - in the act of producing sound, it is never certain that intention will become reality. Results are always contingent. More force is used than intended, and pianissimo becomes piano; a string is attacked a centimetre away from the intended target resulting in an unexpected timbre. Every physical act in the production of sound holds within it the possibility for surprise. Listening with intent reveals this, and facilitates improvisation.

The post-human quality of boundary dissolution is found in listening. If we hear a barking dog, we think "dog." If we listen to that dog-sound, we discern a shape to the sound, a resonance reflecting a deeper sense of the affect of the sound. "Dog" disappears, to be replaced with resonance, considered here as a collapsing of boundaries between perceiver and perceived (Erlman 2010, 10). The listener is no longer separated from the sound by the thing that creates it. This deeper sense of listening, sensing the underlying feeling/form of the sound, allows for an interaction between human and sound that can produce something beyond simple understanding of what produced the sound. Instead, phenomenological meaning emerges based on a particular type of connection associated more with acceptance of sound than with cognition.

Listening to a human voice naturally invokes a body (Dyson 2009, 23). The presentation and dismantling of my father's voice dismantles his body, and encourages the development of listening-for-resonance. In other words, the source of the voice disappears, and we are left with nothing but sound. In *A Hole in the World*, language is broken into syllables and phonemes,

presented at different speeds, and changed timbrally. In this process, semantic meaning disappears along with the body. We know that it is speech that we are hearing, but it assumes an abstract shape, achieving resonance, and a collapsing of boundaries. Re-assembling this broken language at other points, *A Hole in the World* demonstrates the contrast of the two different types of meaning: cognitive and phenomenological.

In considering the phenomenon of resonance, it is helpful to consider the composer Pierre Schaeffer's modes of listening which he identified in 1966. These are:

1. *Écouter* – treating sound as a sign for identifying a source. Also known as causal listening.

2. *Ouïr* – hearing passively without listening or understanding, as in continuous traffic sound that one is not aware of.

3. *Entendre* – aural discrimination, or showing the intention to listen, and choosing what particularly interests us.

4. *Comprendre* – understanding, or grasping a meaning and communicating this meaning through language. Also known as semantic meaning (Hugill 2008, 19).

Of these four modes, entendre is the closest to resonance, and points to Schaeffer's idea of reduced listening, derived from Husserl's phenomenological concept of bracketing out knowledge of the external world in order to in order to focus on the process of perception. Schaeffer uses a two-part process to achieve this effect: removal of visual cues; and disregard for perceived sources[3] (Demers 2010, 27).

1.6 | Memory

One of my primary interests lay in exploring the relationship between sound and memory. If physical space transforms lived experience (Lefebvre 1984, 93), then sound within that space

constitutes energy that helps to create that transformation (Smalley 2007, 38). From this, and from a variety of research on memory and its effects on the present (Harris, Rasmussen, & Bernsten, 2013; Brewin, 2013; Lane & Parry, 2006; Vogelin, 2006), it follows that sound from previous eras has an energy that can be accessed to activate the present moment. This energy is expressed in *A Hole in the World* by involving the simultaneous placement of the listener in three space-time events: the event of listening to the recording in present time (a confluence of past and present); the event of my father making the recording (a single point in time); and the events that the recording describes (an opportunity for the listener to imaginatively enter the past, and to activate their own memories).

A Hole in the World manipulates the latter space-time in order to transform present lived experience. To effect this transformation, the sound of my father's voice is altered in various ways through audio programming in order to aurally communicate the vagaries of memory. These alterations entail different levels of distortion, from absolute clarity of the text fragment to its complete distortion. I am using "distortion" in the sense in which it is used in information theory, not as a description of musical sound (i.e. guitar distortion). In other words, the sound of my father's voice will be distorted in various ways, all intended to obscure the sense of the words to one degree or another. In this way, the sound-image of my father will disappear at one point in time, only to reappear at another. This represents the ongoing activity of forgetting and remembering.

The use of recorded autobiography blurs the boundary between sound art, poetry and *musique concréte* (Lane 2006, 4). The chosen text is submitted to a range of audio transformations and places these texts into the domain of sound art. The transformations, along with the overlaying of texts in each section, add layers of meaning to the text in the form of aural

and semantic color. Semantic colour refers to the way in which meaning is transformed by manipulating the timbre of the words, and this transforms mundane utterances into poetry by expressing meaning beyond the words themselves. In the experience of listening to the sound of transformed speech, the source of that sound often disappears, providing an experience of *musique concrete.*

These techniques engage what Salome Vogelin calls 'pathetic' engagement (understood as an emotional or sentimental involvement with the work) through memory (Vogelin 2006, 13). This is available most intensely to me as performer of my father's voice. It is available to the audience in the experience of a connection to their fathers through my own connection. Pathetic engagement is created by text manipulations, and by the memories the text itself evokes.

Text manipulations are created in a number of ways. These include:

1. Building up the overall sound by overlaying different texts. Fragmenting and mixing them communicates multiple memories.

2. Dissolution of semantic meaning through processing.

3. Dismantling the text by splitting it into component parts. This is a common technique in the last section. It is intended to present a rhythmic language not present in the other two sections.

4. Accumulation of meaning by massing of texts, which reinforces a total picture. This is related to number 1 above.

5. Suggestion of human presence without foregrounding text

The use of recorded text to suggest human presence is an important component of the piece. My father exists nowhere but in memory. But his body is collected in his voice and made real in our imaginations. His entire body is thrown into our ears (Dyson 2009, 19) by what Roland Barthes called the grain of the voice, "…a whole presence of the human muzzle…" (Barthes 1975, 66-67). My father's voice and presence is transformed in the present as it evokes the past. Semantic sense is destroyed and rebuilt. In the process, my father's body is dismantled and reconstructed, resembling the way that memory works.

We now know that we do not record our experiences the way a camera records them. Our memories work differently. We extract key elements from our experiences and store them. We then re-create or reconstruct our experiences rather than retrieve copies of them. Sometimes, in the process of reconstructing we add on feelings, beliefs, or even knowledge we obtained after the experience (Ferneyhough 2012, 7).

Memory, then, is as much about transforming the present as it is about retrieval of the past (Lane and Parry 2006, 12). Our present lives are necessarily constructed by memory through constant comparison with the present. *A Hole in the World* represents an opportunity for the listener to re-create this experience. Using sound to do this physicalizes the experience of memory in a way that the photograph cannot. Sound, being immersive, gives us a more profound experience of the phenomena discussed here.

The tape on which the autobiography was housed contains tape hiss. I have made no effort to eliminate this, partly because of its invocation of the past, partly as a sonic resource. In the second movement I use it to create a variety of textures using recording software. This allows me to employ sonic transformation strategies and/or to play the tape hiss as is.

The tape hiss also provides a resource for foregrounding the idea of noise as a metaphor for memory. Christoph Cox uses Leibniz's example of the noise of the sea to make this clear. The sound of the sea exists as a mass; individual waves cannot be distinguished, but they must be heard or the aggregate would not exist. Each wave is therefore distinct, but in an unconscious, obscure sense. Like waves, individual memories can be pulled out of an unconscious reservoir of memory against which our present experience takes place (Cox 2011, 21). As these memories emerge into actuality, the total 'reservoir of memory' is briefly illuminated.

This virtual field has, for Leibniz, a truly cosmic significance. Each of the 'minute perceptions' that unconsciously determine conscious perception is itself the effect of causes that ramify out to infinity…The reservoir of memory contains not only particular memories or experiences…but everything to which those experiences and memories are connected - namely, the entirety of the past (Cox 2011, 21).

A Hole in the World attempts to connect to the "reservoir of memories" by pulling specific text fragments from my father's autobiography. These fragments contain images of childhood, family, place, and time. All of these represent powerful memory triggers that relate not only to their specific context, but to images and feelings that reach into the aforementioned "reservoir."

1.6.1 | Autobiography

The text that my father recorded in 1992 is properly considered an autobiography, since it recounts an entire life chronologically. Memoir, in contrast, is considered the recounting of a particular portion of a life (Couser 2012, 23). My treatment of the text can be considered as a number of micro-memoirs since it makes use of single phrases culled from the entire text. Each refers to a particular point in time and/or place. Some span a life: "It was important then, and it's

still important today" Some describe a precise point in time: "in spring of 1944…" Some describe a place at a particular time: "At that time, the city extended to 122 Ave." Some refer to place without reference to era : "I rode the bus for two days and three nights to get to Cochrane." Some refer simply to memory: "I also remember going with my mother to get water."

Texts used in the piece

Time and place

"In early 1949, dad had gone to Cochrane to find work."

"I rode the bus for two days and three nights to get to Cochrane."

"In March 1953 I returned to Edmonton after a month at Churchhill."

"At that time, station Edmonton was on 118 Avenue and about 97 Street."

 "I arrived in Edmonton near the end of June and reported to Namaio."

"By the middle of January in '52, I was pretty depressed about my situation."

"I had a great childhood on that homestead."

"This was during the years of World War II."

Place

"Within a half an hour, I felt I had come to the place I belong."

"At that time the city pretty well stopped at 122 Avenue."

"Alberta became home."

"I wanted to go back to Alberta."

Memory

"Unfortunately, we have lost track of them years ago."

"I remember very little about my father those first years."

"I also remember going with my mother to get water."

"Here are some of the things I remember of this house."

"It was important then and it's still important today"

Imagery

"Put the body in the box."

"A nice, clean skeleton in the box."

"My family."

Chapter 2 | Aesthetic Approach

I have organized *A Hole in the World* using human utterance and timbre. Both are inherent in source-bonding and acousmatics. I outline my aesthetic approach here with regards to these two streams of thought, and their relationship to post-humanism.

2.1 | Timbre, Bell, *Kyotaku*

A Hole in the World is built from direct contact with sound by attending to timbral details. In practice, this involves creating a clearly defined sound by playing the guitar, and adding and subtracting effects. For example, I may know that I want a metallic sound, but the precise nature of this sound is discovered through play and experimentation. With the recorded voice, it means adjusting partials, and applying filters. In both cases, this involves a process of discovery. This is

in contrast to the construction and implementation of algorithms in the creation of a piece for well-defined timbres, say a string quartet.

There are three categories of timbre in *A Hole in the World.* These include 1) my father's voice, and the processing of that voice using filters, speed and pitch manipulations, and the manipulation of partials; 2) guitar sounds created with prepared guitar and digital processing; 3) three types of bell-sounds: a) a field recording of a temple bowl in Movement 1; and b) a gong-sound and used in Movements 2 and 3. This gong-sound is processed in a different manner for each of these last two movements.

Each of these three bell-sounds are unique, and each is constructed by either manipulating its sound spectra, by using it in its original form, or by a combination of these two approaches. The original sound and/or its manipulation is transferred to recording software where it is layered and processed in varying degrees. The result is used in the piece as a backdrop for the text, and is augmented with guitar timbre designed to enhance the particular bell-sound of each movement. Along with their use as backdrop, bell-like sounds are written into a number of Max patches. The first two movements - Remember Johann.maxpat and Homestead Ghost.maxpat - have similar bell-sounds, though the attack is removed in Homestead Ghost, and the sound itself is attached to speech. Mother, Father, House.maxpat has tinkling, granular-type bell sounds which appear again in the second movement with Edmonton.maxpat. These strategies allow for integration and variation of bell-sounds throughout the piece, and creates a network of relationships between sections.

Like the voice, the bell places us in a social context. Our experience of both is found in a variety of daily contexts, the voice only marginally more prevalent, depending on our daily activities. The bell is present in alert sounds, and emanates from church towers, government

buildings, electronic tablets, cell phones, door bells, vehicles, elevators, and clocks. Unlike the voice, the bell indicates place and time (Boutin 268). In the context of *A Hole in the World,* three different bell-sounds indicate three different places and times represented by the movements of the piece.

Bell Sounds for Each Movement

The opening movement uses the sound of a temple bowl recorded and layered in recording software on fourteen separate tracks**.** Pitch shifting is used on each track to create beating between notes. Continually offsetting the beginning of the bell-sound, eliminating the attack, and creating crescendos and decrescendos, create the illusion of a very long, dynamic, sustained sound that evolves over time. This treatment of the temple bell points to a form of shakuhachi music called *Kyotaku*, which is meant to imitate the sound of a bell. This style effectively stretches the sound temporally, creating a sonically detailed expansion of the bell-sound.

The second movement begins with a dry gong sound. The source sound is electronically processed, and both the processed sound and the source are further modified electronically. Both the original sound and the processed sound are used in this movement, and continue past the first Max section into the proceeding guitar section where it is imitated with the guitar timbre found there. The detailed processing of the gong is intended as a closely observed exploration in the manner of *Kyotaku,*

The third movement begins with the gong sound from movement 2 processed more extensively; the sound is extended temporally, noise is added, and pitch is adjusted. The intention is to "get inside" the bell sound and, in some sense, to get inside what I think of as the noisy, "dirt-y", mineral materiality of the bell itself. This sound is layered electronically to create the

complexity that I associate with this image. This implies a process in which, again, the sound is closely observed and drawn out in the style of *Kyotaku.*

The image of the bell carries a number of symbolic references. Relevant for this piece are extremes of death and immortality; the sound of creative power; and a call to prayer or meditation. Recorded sound implies a type of immortality. Using my deceased father's autobiography brings him into consciousness, and inserts him into the physical world as sound. I have argued elsewhere (chapters 1.6.3 and 1.7) for the presence of the physical body in the sound of the voice. The creative power necessary for this type of reconstruction is accessed in the concentration found in the performance of the piece.

2.2 | Source-bonding

Aside from their emulation of bell sounds, guitar textures are also used to create relationships with speech sounds used in the piece. The connection of guitar to speech-sound can be thought of as communication between my father and I**.** This makes use of Dennis Smalley's idea of source-bonding – the concept of the listener identifying a sound with a particular environmental source (Smalley 1994, 37) - in two ways. First, the bell provides a clear source that the listener can identify. Second, when combined with the guitar, speech manipulations provide an intrinsic base identity - a specific sound (guitar/voice) - identified with a specific site - *A Hole in the World*. On its own, the voice provides an extrinsic base identity - a generic category of sound with no specific site (Smalley 1993, 285).

This discussion of source-bonding is somewhat problematic concerning my father's voice. Smalley assumes an existing, physical source in his concept of source-bonding (Smalley, 1994 37). Does my father's voice point to my father's physical presence if my father no longer exists

physically? Or does it simply point to a recording? Does source-bonding include internal reality (memory of sound as constructed reality) as well as external reality? How does a listener not familiar with my father experience his voice?

In answering these questions, it is helpful to think of *A Hole in the World* as representing a relationship between the presence and absence of loved ones. Simply by thinking about a person in concentrated way, we feel their presence. Introducing recorded speech of the dead brings that person's physical presence into imaginative reality. Frances Dyson makes this clear when speaking of the telephonic voice: "…the body speaks. And somehow its speaking occurs through a voice that - in its breathy, noisy materiality - also delivers the body to the listener" (Dyson 2009, 19).

This is true if the recording is of someone known. Our memory of that person's bodily presence is evoked through the sound of the voice. If the voice intrinsic to the piece is one we don't know, we compare it with extrinsic voices we have heard (Smalley 1993, 285). *A Hole in the World* brings this issue to the fore, and answers the above question - do we receive a physical presence? - with a qualified "yes." My father's voice points to my father's physical presence if the listener has known my father. If not, then the listener will invent an imaginative physical presence - the extrinsic voice(s) they have heard elsewhere - based on what the voice suggests to them. In this way, source-bonding includes internal, constructed reality. Semantic meaning communicate by the voice is at times highly obscured, but becomes that way through a process that leads from semantic meaning in such a way that the listener is aware of the source of the sound. The sound of the obscured voice, which on its own might be taken as an *objet sonore,* is source-bonded to semantic meaning.

Mechanical sources are a category of Smalley's source-causes. Yet another is musical instruments. In the context of this piece, the electric guitar occupies both categories. It is undeniably a musical instrument, but it is perceived as a mechanical source since its idiomatic use and iconography are subverted by its physical placement in the performance space. Since it is laid flat on a table, it becomes more difficult to clearly perceive it visually as a guitar. As well, the manner of sound-activation - various beaters, hand massager - further obscures the source of the sounds. It no longer looks or sounds like a guitar, and the listener begins to hear it as a mechanical source.

Human utterance, being memorable, provides a good starting point for transformation (Smalley 1993, 281). Because we are familiar with the sound of the voice and the meaning of its words, we can effectively follow its transformations. The sound of the prepared guitar in conjunction with digital effects processing is less familiar. As such, it presents a less solid base for recognizable transformations. I am, therefore, using a limited number of basic sounds. These are, broadly speaking, bell and noise. Both of these sounds are transformed during the course of the piece.

Transformation implies a change of identity. In the case of guitar sounds, this means moving from one bell-sound or noise-sound to another. Each sound must be given time to be identified as a particular entity, creating a slow moving progression of sound. My father's voice, however, is immediately identifiable as a human voice. As such, there is no need to linger on any aspect of its intrinsic identity before moving to another aspect. Transformations can occur at a quicker rate without loss of coherence.

2.3 | Acousmatics

Along with the importance of close listening in the performance of *A Hole in the World,* there is an acousmatic listening experience for anyone not acquainted with my father. For those listeners, my father is a disembodied voice; no image emerges unless it is constructed from the imagination. Similarly, the image of the guitar is subsumed in non-guitar-like textures. In this sense, the guitar is hidden and becomes part of an acousmatic listening experience. Listening in this context provides a particular type of cognitive experience that involves an emotional response, followed by an analytical one (Emmerson 2007, 18). An emotional response is triggered by uncertainty regarding the source of the sound. Analysis involves a search for meaning that is found in the imaginative connection to meaningful events in the past and present that the sound provokes. By recording sounds and playing them back, we create something that is both absent and past, and at the same time heard in present time and space (Dyson 2009, 9). This confluence of past and present is integral to *A Hole in the World.* The idea of absence is integral to acousmatics.

2.4 | Post-humanism.

As stated in the introduction, *A Hole in the World* is organized by using the post-human qualities of decentredness and connection. I will go into more detail here.

Post-humanism in its most straightforward incarnation opposes humanism's species specific logic (Wolfe 1995, 36), and offers a world "…in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints" (Haraway 2003, 145). When considered alongside art, this interpretation of post-humanism is used to represent an organism-based intersection between creativity and technology.

Technology, as well as being a form of mediation between self and world, becomes both an imaginative and a physical tool with which the performer extends her/himself creatively, enabling different methods for organizing and creating work. The electric guitar and the computer are two such tools, and each can be used as a prosthesis for encountering the world.

Gregory Ulmer, stating that computer interface design is a prosthesis that augments the human mind (Ulmer 2002, 162), expresses one aspect of post-humanism, that of the machine as an extension of our central nervous system. In terms of *A Hole in the World,* this applies to the computer, as well as the electric guitar. In speaking of extension, I am not thinking of Clive Lawson's definition, in which "…technical objects are conceived as some kind of extension of the human organism by way of replicating, amplifying, or supplementing bodily or mental faculties of capabilities" (Lawson 2010, 208), which implies a transhumanist approach. Rather, I am thinking of Marshall McLuhan's idea of extension as related to electronic media, which he understood "…as extensions of the information processing functions of the central nervous system" (Lawson 2010, 209). Because of this extension, humans and machines have entered a relationship in which human response to the world has become unconsciously informed by the machine's response to human input. We respond to the world as an amalgam of organic and non-organic processes, and these processes are represented by a human connection to an electronic apparatus for the purposes of non-verbal communication.

N. Katherine Hayles connects prosthetic extension and information in characterizing post-humanism:

First, the post-human privileges informational pattern over material instantiation,
so that embodiment in a biological substrate is seen as an accident of history rather

than an inevitability of life. Second, the post-human view considers

consciousness…as an evolutionary upstart trying to claim that it is the whole show

when in actuality, it is only a minor sideshow. Third, the post-human view thinks

of the body as the original prosthesis we all learn to manipulate, so that extending

or replacing the body with other prostheses becomes a continuation of a process

that began before we were born. Fourth…the post-human view configures human

being so that it can be seamlessly articulated with intelligent machine (Hayles

1999, 2).

A Hole in the World organizes information in code - software and score - and

communicates it prosthetically through electric guitar and computer. In the process, consciousness

is "articulated with intelligent machine." Since consciousness - represented here by artistic intent

- is encoded in the computer, the human performer becomes part of the machine. This manner of

organizing information implies an aesthetic stance, aesthetics being defined here as organization

of materials according to a particular philosophy of art. In the case of *A Hole in the World,*

creation and organization of materials are closely related. As things are made, they are placed in

space. As more things are made, the first things are moved about in relation to the new things.

Organization occurs in the process of creation instead of by algorithm. This is an aesthetic based

on the transformation of spectral components, transcontextuality[16], and acousmatics. These can all

be grouped broadly under the heading of electroacoustic music. *A Hole in the World* links post-

humanism with the aesthetic of electroacoustic music by inserting the composer's intent into a

machine that can be used to express the aesthetic outlined here.

---

[16] Leigh Landy. Sound Transformations in Electroacoustic Music.
http://www.composersdesktop.com/landyeam.html#AESTHETICS

Chapter 3 | Form

"One could approach the unknown with a compass and a method, but to take a map would make it pointless to go there at all."

Derek Bailey (Borgo 2005, 126).

Mobile form and the use of autobiography introduce a type of non-linearity; autobiography and recurring sounds pull the listener backward and forward in time. Adaptability of material makes predictability from performance to performance difficult. While bounded by form, it is unbounded in terms of moment-to-moment phenomena; how the performer gets to locations in the score is indeterminate. Order arises out of local interactions. There is no centralized control in terms of a single composer. All of these characteristics point to a self-organizing system (Borgo 2005, 126).

The indeterminate approach I am taking implies that form is a shaping activity, not a fixed shape (Leighton 5). Henri Focillon, echoing Schiller's idea of 'living form', says:

> Form spawns life, change, movement. Far from being a finished object, integral to itself, abstract and finished, it is the start of change: the life of forms in the mind propagates a prodigious animism that, taking natural objects as the point of departure, *makes them matters of imagination and memory, of sensibility and intellect.* Between nature and man form intervenes (Leighton 2007, 17, my italics).

Form, then, takes objects in the mind as points of departure for the play of imagination. Form consists of all the metamorphic interactions the performer initiates through this play, and these interactions are matters of imagination and memory, of sensibility and intellect. Intervention of form implies a bridge between human and nature.

The life of forms, Focillon concludes, is simply the innumerable ways in which the artwork comes to life through interpretation/use of materials. In the case of *A Hole in the World,* the piece is interpreted in each performance by renewing the materials within general guidelines. These guidelines and materials are present in a set of formal expressions: symbolic representation on the page; sound in the air; and the performer's gestures in space. Each is a shaping activity either of perception, of interpretation, or of time. The performer perceives the symbols, his/her gestures interpret these symbols, and time is shaped through the shaping and placement of sound. Since sound-shaping is created through the use of given materials, a change in materials creates a change in form.

Timbre provides the main formal constraint and determines the piece's ultimate shape. I introduce a simple strategy for subverting this constraint, enabling the creation of a new piece with new timbres in each iteration: the individual sounds that constitute the form are changeable from performance to performance, although the guidelines outlined above are not. *A Hole in the World*, therefore, is form in search of itself. Form is created, or expressed, through the manipulation of a specified number of mouldable aural shapes that the performer takes up sequentially, and morphs over time through gesture. These aural shapes are the formal sections of the piece, and are ordered by the performer previous to the performance. Form, as conceived by Focillon through Schiller, becomes a mouldable object in the mind rather than a solid container. This implies form as informational pattern that is open to change, rather than fixed meaning.

Meaning is not "front-loaded" into the system as with an unchangeable formal construction, but is created in an environment marked by contingency and unpredictability. It is a form in which meaning is made possible by finding solutions within given parameters (Hayles 1999, 285).

In *A Hole in the World,* then*,* the ultimate shaping is done by the performer within the constraints set out in the score. It can be thought of as a bounded area - a map with locations, but no path. Due to its improvisational nature, *A Hole in the World* itself is a shaping activity that takes place in each of its instantiations. Form in *A Hole in the World* is always being built. In a sense it is never frozen yet always frozen. Its construction is never completely defined before it begins, but its procedure is.

This process can more specifically described in terms of Gilles Deleuze's and Felix Guattari's rhizomatic structure described in *A Thousand Plateaus* (Deleuze and Guatari 1987). A rhizomatic structure is non-hierarchical and heterogeneous. Any point of a rhizome can be connected to any other, and allows for multiple, non-hierarchical entry and exit points in data representation and interpretation. Rather than narrativize history and culture, the rhizome presents history and culture as a map, or as a wide array of attractions and influences with no specific origin or genesis. A "rhizome has no beginning or end; it is always in the middle, between things, interbeing, *intermezzo*" (Deleuze and Guatari 25). The idea of a map in which the performer can freely move from one location to another can be seen in the improvisational nature of the present work. The broad implication is that performer choice defines form in equal measure to the broad formal structure.

The use of the rhizome as a model for structuring this piece creates an assemblage. This is described as "a jumbling together of discrete parts or pieces that are capable of producing any number of effects, rather than a tightly organized and coherent whole producing one dominant

61

reading."[17] While the piece as I conceive it is organized tightly in terms of large scale formal design with clearly defined elements, how these elements emerge, and how they relate to other elements in performance is largely through improvisation. As such they bring about a multiplicity of effects as implied by an assemblage. The process I am thinking of here is what Deleuze and Guattari describe as a "becoming"[18].

In "becoming", elements are drawn into the territory of other elements, changing their value and bringing about a new perception. In terms of the present work, one text-fragment may be drawn into the territory of others. Text-fragments may be drawn into different territories of the Max patch of which it is a part, or into the territory of guitar textures. This is akin to the way in which atoms are drawn into an assemblage with nearby atoms through affinities rather than an organizational purpose. This process is one of deterritorialization, in which the properties of the constituent elements disappear and are replaced by the new properties of the assemblage[19]. Constituent elements in the context of *A Hole in the World* refer to syllables, phonemes, entire words and phrases, and various guitar sounds.

In *A Hole in the World* the performer's affinities with given sound elements on a moment-to-moment basis determine the form and meaning of the piece more than large-scale organizational purpose. Content created in performance produces form. *A Hole in the World* is not about a motionless boundary, but rather about the relationship of material to other material, and to the way in which these relationships create shape and express form.

---

[17] Glossary: Deleuze and Guatari. http://www.rhizomes.net/issue5/poke/glossary.html
[18] Glossary: Deleuze and Guatari.http://www.rhizomes.net/issue5/poke/glossary.html

[19] Glossary: Deleuze and Guatari. http://www.rhizomes.net/issue5/poke/glossary.html

3.1 | Movements - Overview

A Hole in the World contains three movements. Each movement contains six sections: a prelude comprising a soundfile of a particular bell sound, three Max sections and two guitar sections. Each movement makes use of mobile form, indicating that the performer is free to place each section wherever he/she chooses within each movement. The performer cannot place a section from one movement into another, however. Each movement is self-contained. The bell-sound soundfile lasts throughout the movement to which they are assigned.

Each movement for the first performance of the piece follows this structure: prelude, Max section, guitar section, Max section, guitar section, Max section. I am taking this approach to emphasize a call and response between software and guitar, implying a conversation between my father and me. This is not necessary in subsequent performances.

Movement 1 - Text Used in Max Sections

The opening section of this movement introduces my father, and serves as an invocation to remember. The second section emphasizes childhood, and the third section evokes images common to all listeners - mother, father, house. This third section implies a focus on childhood.

Movement 2 - Text Used in Max Sections

Movement 2 concentrates on place, specifically Alberta. Since the first performance is in Edmonton, this decision was made in order to more deeply involve the audience. Specific dates are used in the third section of this movement, linking it to the first section of the third movement.

Movement 3 - Text Used in Max Sections

Movement 3 invokes war and depression, death, and family.

The remainder of this chapter lays out the relationships and techniques used to create *A Hole in the World.* Techniques of truncation and superimposition, bell-sounds, thematically related text, and a distinct gestural language with the use of motion sensor technology serve to create a network that unites the entire piece.

3.1.1 | Movement 1

The sections in this movement contain phrases that communicate four things: the remembrance of my father, of his parents, of childhood, and of home. The bell sound and the guitar sounds surrounding these phrases is understated and ethereal, supporting a sense of reverence and ambiguity.

Prelude

The *Temple Bowls2* sound file is used as a backdrop for this movement. This consists of a single articulation of a temple bowl placed on fourteen tracks. In each of the thirteen iterations introduced after the initial articulation, the attack is removed, and dynamic swells and pitch-shifting are applied. This creates a continuous sound with a particular movement that appears to emanate from a single articulation. The inspiration for this comes from *Kyotaku,* a style of shakuhachi music in which the composer expresses the sound of the temple bell in wooden flute music. *Kyotaku* pieces are essentially timbral interpretations of the sound of the temple bell extended temporally. I think of this as close listening to the life of the sound as it dies. The *Temple Bowls2* sound file continues throughout the first movement. Added to this sound are

guitar sounds intended to complement the bell sound. These guitar sounds are looped and/or improvised.

First Max section: *Remember Johann*

There are two phrases used in *Remember Johann* - "We've got to remember," and "Johann Wall." "Johann Wall" used verbatim as a single sound file, and is truncated to create six iterations of its constituent syllables; each of these is played as a separate sound file. The syllables are introduced one at a time and played simultaneously before the entire soundfile is played. This has the function of creating a textural screen in front of my father's name. This screen is gradually removed, exposing the name. The name is then played in conjunction with "We've got to remember" before being faded out. A bell sound within the Max patch is used strategically, highlighting certain moments, and drawing the temple bowl sound into relationship. "We've got to remember" is played verbatim from one to three times at varying intervals. Toward the end of this section, it is truncated to "remember" and looped before being faded out. This creates a sense of urgency for the listener.

First Guitar Section

This section adds texture to the *Temple Bowls2* sound file with two new loops (loop 2 and loop 3) of prepared guitar. All three loops continue through Max section 2. This reinforces the bell-sound, which symbolizes the extremes of remembering the past in present time ("I still remember…"), and the past itself ("I had a great childhood…") found in Max section 2.

Max Section 2: *Homestead Ghost*

There are two phrases used in *Homestead Ghost* - "I still remember that as being very important to me," and "I had a great childhood on that homestead." Both are transformed electronically. For "I still remember that as being very important to me", partials are time-stretched and transposed upward, creating a bell-like sound. The entire phrase is also slowed down. This lends an otherworldly quality to the phrase that relates to the treatment of "I had a great childhood on that homestead." Noise is added to this latter phrase, and partials are gathered closer to the fundamental, creating a quasi-whispered ghost-like sound. As in the first section, these soundfiles are played simultaneously. Unlike the first section, there is no truncation, and each phrase's intelligibility remains intact. The Harmo-freeze.maxpat initiated at the end of this section comprises low pitches exclusively in order to support the ghost-like phrase. Guitar loops 2 and 3 are faded out and erased.

Second Guitar Section

Harmo-freeze.maxpat plays throughout this section, extending the relationship to the phrase "I had a great childhood on that homestead", and holding a trace of that phrase in the listener's memory. Two new guitar loops are created improvisationally. These elements continue throughout Max section 3.

Max Section 3: *Mother, Father, House*

There are four phrases used in *Mother, Father, House:* "I also remember going with my mother to get water"; "I remember very little of my father these first years"; "Here is what I remember of this house"; and "Unfortunately, we lost track of them years ago." The first three are

played in their entirety and obscured by playing them simultaneously, by changing speed, and by distorting them. This creates a texture in which semantic meaning is largely destroyed, although recognizable words and entire phrases emerge unpredictably from the texture. This relates to the first section in which discrete syllables are played simultaneously, destroying semantic meaning.

Each of the first three phrases is played once in its entirety as a clearly audible and coherent statement over a backdrop of chaotic, superimposed text. The phrase, "Unfortunately, we lost track of them years ago" is used at the end of the section and subjected to speed manipulation, gradually speeding up and slowing down in the manner of a continuous, slow-motion glissando. At its slowest, this phrase is unrecognizable, becoming gradually recognizable as it speeds up. The oscillation between clarity of semantic meaning and obsfucation mirrors the treatment of the material that comes before it. The section ends with loops of the phrase-fragments "my father" and "mother". Superimposition here communicates a coming together and pulling apart - in contrast to the destruction of meaning - as amplitude is adjusted so as to foreground first one, then the other. The superimposition of text found in this section is a variation of the same technique found in this movement's Max section 1. There, the superimposition is used with discrete syllables created through truncation. The lack of truncation and the use of superimposition without obscuring the text in Max section 2 marks section 2 as unique and creates an ABA[1] form in this movement.

3.1.2 | Movement 2

The sections in this movement contain phrases that refer to Alberta. Backing tracks created using text from my father's autobiography are used in all Max sections in this movement. These soundfiles form a base over which the texts used to create them are played

improvisationally as discrete, clearly articulated entities. This use of backing tracks occurs only in this movement.

Prelude

This movement begins with ID-13 gong.maxpat. The *Section 2 - gong* soundfile layers a single articulation of the gong sound from ID-13 gong.maxpat on four to six tracks. These are superimposed and each track is processed differently to create a composite gong sound. A number of different composite gong sounds are created and played at widely space intervals, creating a sense of open space that I associate with Alberta. Both the gong sound and the temple bowl sound from movement 1 are in the family of bell sounds. This creates a clear, large-scale sonic relationship connecting the two movements.

First Max section: *Alberta*

There are two phrases used in *Alberta*: "I wanted to come back to Alberta," and "Alberta became home." Both phrases are truncated into constituent syllables; these truncations are processed electronically and routed through three separate gain sliders. Each gain slider has different truncations associated with it, and these truncations are triggered improvisationally. Superimposition of truncations in this section is related to the same technique found in movement 1, section 1.

A backing track is created using the two phrases and played throughout this section as a base for the entire section. The truncations mentioned above are used to add texture to this soundfile.

First Guitar Section

ID-13 gong.maxpat continues along with the gong sounds from the *Section 2 - gong* soundfile. This extends the open space idea present in the prelude. The Speech Delay and Feedback.maxpat is used as a transition between Max sections 1 and 2. The effect produced by this patch presents a movement from clarity to obsfucation much like the treatment of the phrase, "Unfortunately, we lost track of them long ago" in section 3 of Movement 1. Text from both Section 1 and Section 2 are used in this patch as a way to connect the two sections.

Max Section 2: *Cochrane*

There are three phrases used in *Cochrane*: "In a half and hour, I knew I had come the place I belong,"; "I rode the bus for three days and two nights to get to Cochrane"; and "In the summer of '49, dad had gone to Cochrane to find work." All are used to create a backing track that acts as a base for this section. In a separate part of the patch, the first phrase is truncated to "I belong", and the second is truncated to "three days and two nights." The Kinect motion sensor camera is used to adjust speed and frequency of these phrases. Two prepared guitar loops are created at the end of this section to complement the gong sound, and to create a transition to the second guitar section.

Second Guitar Section

The two prepared guitar loops begun at the end of *Cochrane* continue, and new sounds are improvised on prepared guitar. These complement ID-13 gong.maxpat and the *Section 2 - gong*

soundfile. The emphasis on the gong sound is intended to set up a relationship with the muted bell sounds that occur throughout Max section 3.

Max Section 3: *Edmonton*

There are four phrases used in *Edmonton* - "I returned to Edmonton in 1953 after a month at Churchill"; "I arrived in Edmonton at the end of '52 and reported to Namaio"; "At that time station Edmonton was on 118 Avenue and about 97 Street"; and "At that time, the city pretty much stopped at 122 Avenue." Glissandi are applied to all four phrases, relating to Movement 1, Section 3. This section begins with granular bell sounds that emerge out of the guitar sounds from the previous section, and which are related to the bell sounds from Movement 1, Max Sections 1 and 2. The guitar sounds gradually fade out, and a soundfile is initiated based on the text from this section. While the soundfile plays, the four phrases are shortened and lengthened improvisationally with the Kinect. These are faded out leaving the granular bells and ID-13 Gong.maxpat.

3.1.3 | Movement 3

The sections in this movement contain phrases that communicate war, depression, death, and family. Guitar preparation remains the same. Guitar Rig 5 presets are changed.

Prelude

The granular bells and ID-13 Gong.maxpatcontinue here and are cutoff violently by the entry of the *Latticgong* soundfile. The *Latticegong* soundfile is created by electronically processing ID-13 Gong.maxpat. The upper partials of the sound are transposed down to lower

partials, the sound is slowed down, and noise is added. This sound is processed with EQ and pitch-shifting, much like Movement 1. The ethereal nature of Movement 1 is replaced here by violence and an underlying sense of darkness, supporting the textual themes. The preludes of all three movements present a different type of bell-sound, creating a through-line, and providing a unifying structure for the entire piece.

First Max section: *WW Depression*

There are two phrases used in *WW Depression*: "This was during the years of World War II," and "By the middle of January in '52, I was pretty depressed about my situation." The patch contains two iterations of each. "By the middle of January in '52, I was pretty depressed about my situation." is played verbatim once, then truncated. The second iteration of this phrase is played verbatim along with its truncation, and then "This was during the years of World War II" is played, first verbatim and then truncated in the same manner as the other phrase. Harmo-freeze.maxpat is faded in as these play to create a mood of darkness. The Kinect motion sensor camera is then used to change the frequencies of the phrases in their truncated form. This creates the effect of text disappearing and reappearing within the overall texture, much like the first Max section in Movement 1. The phrases are faded out one by one leaving the backing track and Harmo-freeze.maxpat.

First Guitar Section

A hand-massager is placed on the strings of the guitar, and the potentiometers on the guitar are adjusted freely to create a roar that crescendos and decrescendos. This extends the

71

sound of Harmo-freeze.maxpat, and adds texture to the *Latticegong* soundfile, maintaining the mood set up in the prelude.

Max Section 2: *Body in the Box*

There are two phrases used in *Body in the Box* - "Put the body in the box," and "A nice, clean skeleton in the box." Each phrase is routed to two gain sliders for a total of four phrases (i.e. two each). Metro and counter objects are routed to the end points number box of the groove objects for each of the four phrases to create moving endpoints. This creates a variation of the truncation technique which is dynamic rather than static as in other sections.

The effect is that the phrases gradually get longer and shorter, creating cross-rhythms between the four phrases. Harmo-freeze.maxpat is faded out and reset. Blocks.maxpat (Cipriani and Giri 2014, 97) is turned on at the end of this section; this patch uses the "Put the body in the box" phrase, and creates a stumbling, disorienting rhythmic profile. The intent here is to create a disturbing quality which correlates with the theme of death. To my ear, it also correlates with the jaunty delivery of the text.

Second Guitar Section

This section adds texture to the *Latticegong* sound file. The Guitar Rig 5 preset is changed, a hand-massager is turned on and placed on the strings, and the potentiometers on the guitar are adjusted freely. This creates a direct link to the first guitar section in this movement. A limited number of pandiatonic pitches between F#5 and B6 in the key of G major are played into Harmofreeze.maxpat. Additional pitches are then added to create a sense of growth, complexity,

and poignancy. These pitches play throughout Max section 3, colouring the utterance used in that section.

Max Section 3: *Family*

There is one phrase used in *Family*: "My family." This phrase is used in two ways. One iteration is electronically transformed by adding noise to create a raspy, ghost-like sound related to Movement 1, Max section 2. The second iteration is played as three phrases simultaneously, but offset, creating an out-of-focus quality. The raspy, ghost-like iteration is truncated to "family", and faded out. The second iteration is reduced to one phrase -bringing the idea of family into focus - and faded out. When all text is faded out, Harmo-freeze.maxpat is reduced to one pitch using the denoiser, and then faded out.

Chapter 4 | The Score

The creation of *A Hole in the World* involves a tension between the representation of symbolic time - the score - and the representation of physical time - the performance. This is present in any scored music, but in a score used as a guide for improvisation, the issue becomes more salient. A listener's familiarity with a piece lies in predictable presentation of content in temporal space. If that space is not defined we experience uncertainty. If placement of material within that space is not defined, we experience uncertainty. If content is not defined, we experience uncertainty.

A Hole in the World explores all three types of uncertainty. Each page represents an indeterminate temporal space. Placement of content on the page implies a linear progression, but since temporal placement is not precisely indicated, events will always occur at different times

within a time-length that changes from performance to performance. Content is defined by guitar presets, by preparations used with the guitar, and by audio programming. Since guitar sound and programming can change from performance to performance, the listener cannot know what, if anything, will be aurally familiar on a second listening. The piece exists in an environment of uncertainty.

All of this indicates a score that is spatially, rather than temporally, defined. Graphic symbols in the score indicate sound-producing gestures and placement of sound in the context of proportional notation, establishing a direct relationship between time and horizontal space. The placement of symbols indicates sounds that occur in relation to the given horizontal time frame (Cope 1997, 94). This is often done by placing time in seconds over a series of sound-events to indicate their placement and duration; in the case of *A Hole in the World,* page duration is indeterminate. The sound as it is being produced determines its appropriate duration; the score determines sequence. The placement of sound, then, is entirely subjective and depends on many things. These include the performer's state of mind on the day of performance; the physical and acoustic properties of the performance space; the reliability of the equipment; and audience response. The score presents a linear progression, but the performer is free to re-visit previous material on the page that he/she is playing. The experience of time in *A Hole in the World* is unpulsed, and ideally exists outside of clock-time (Cox 84). The performer loses a sense of temporality, and instead experiences a space that expands or contracts depending on the performer's state of being during performance. To facilitate this shifting experience, it is helpful for the performer to imagine the physical score page as larger or smaller than it actually is, which in turn expands or contracts the temporal dimension. Space becomes the determining factor for

placement in time. Further, the score-space creates an energy which the performer communicates, and which modifies physical space (Lefebvre 1984, 177).

The score is quite specific, but functions only for my version of the piece. Subsequent performers using the score can cross out text and soundfile names that are specified there, and insert their own. The score, then, becomes a template for writing a different piece. Following the score will produce a particular version, but it will not produce mine.

A Hole in the World is not made for re-living a past experience, but for changing the present through connecting it with memory. Because the material and the sound change more broadly in repeated performances than in a conventional piece, the process of listening is more consciously active. As well as engaging the present moment more profoundly through conscious comparison with the past, the listener engages the future by considering what might change in subsequent performances. This implies creative engagement on the part of the listener. Conventionally scored pieces are generally experienced by the listener as something that ideally remains the same from performance to performance. Even though subtle changes occur, most listeners are there to hear the piece as they know it, and awareness of change is experienced as it happens, but not necessarily anticipated. The cognitive experience of *A Hole in the World* is one of conscious comparison and preparation.

Bibliography

Alan Turing.net
http://www.alanturing.net/turing_archive/pages/reference%20articles/connectionism/Turing%27s%20n
eural%20networks.html (Accessed February, 2014).

Amelar, Chris. *The Guitar F/X Cookbook: The Ultimate Source for Guitar Tricks, Effects, and Other Unorthodox Techniques*. Milwaukee: Hal Leonard, 1996.

Anderson, Michael L. "Embodied Cognition: A Field Guide." *Artificial Intelligence* 149 (2003).

Artificial Neural Networks. http://www.psych.utoronto.ca/users/reingold/courses/ai/nn.html (accessed February, 2014).

Ashline, William L. "The pariahs of sound: On the post-Duchampian aesthetics of electro-acoustic improvisation." *Contemporary Music Review* 22, No. 4 (2003).

Badmington, Neil. "Theorizing Post-humanism." *Cultural Critique* 53, Winter 2003.

Barthes, Roland. *The Pleasure of the Text.* New York: Hill and Wang, 1975.

Barthes, Roland. *Image-Music-Text.* New York: Hill and Wang, 1977.

Beilharz, Kirsty. "Tele-touch embodied controllers: post-human gestural interaction in music performance." *Social Semiotics* 21, Issue 4 (September 2011).

Bill Horist – Live at Good Shephard Center 7/19/12.
http://www.youtube.com/watch?v=zRLKnAQs3HE (accessed November 10, 2014).

Borgo, David. *Sync or Swarm.* New York: Continuum, 2005.

Boutin, Aimée. "Ring Out the Old, Ring in the New: The Symbolism of Bells in Nineteenth Century French Poetry." *Nineteenth Century French Studies,* Numbers 3 &4, Spring-Summer (2002).

Brewin, Chris. "Episodic Memory, Perceptual Memory, and Their Interaction: Foundations for a Theory of Posttraumatic Stress Disorder." *Psychological Bulletin* 140, Issue 1 (January 2014).

Cage, John. "The Future of Music: Credo*." In *Audio Culture: Readings in Modern Music,* eds. Cox Christoph, and Daniel Warner. New York: Continuum, 2007.

Cecchetto, David. *Humanesis.* Minneapolis: University of Minnesota Press, 2013.

Chasalow, Eric. "Composing from Memory: the convergence of archive creation and electroacoustic composition." *Organised Sound* 11, Issue 1 (April 2006).

Chun, Wendy Hui Kyong. *Programmed Visions: Software and Memory.* Cambridge, Mass: MIT Press (2011).

Cipriani, Allesandro, and Maurizio Giri. *Electronic Music and Sound Design: Theory and Practice with Max/Msp, Volume 1.* Rome: ConTempoNet, 2010.

Cipriani, Allesandro, and Maurizio Giri. *Electronic Music and Sound Design: Theory and Practice with Max/Msp, Volume 2.* Rome: ConTempoNet, 2014.

Clark, Andy. *Natural-Born Cyborgs: Minds, Technology, and the Future of Human Intelligence.* Oxford: University of Oxford Press, 2003.

Clark, Andy. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension.* Oxford: University of Oxford Press, 2011.

Cooperrider, Kensy, and Rafael Nuñez. "Across time, across the body." *Gesture* 9, Issue 2 (2009).

Cope, David. *Techniques of the Contemporary Composer.* Australia: Schirmer, 1997.

Couser, Thomas G. *Memoir.* Oxford: Oxford University Press, 2012.

Cox, Christoph. "Music as Sound: Being as Time in the Sonic Arts." In *Sound.* Kelly, Caleb, ed. Cambridge, Mass.: MIT Press, 2011.

Cox, Christoph. *Nietzche: Naturalism and Interpretation.* Berkeley: University or California Press, 1999.

Davis, Joseph E. "If the Human is Finished, What Comes Next: A Review Essay." *The Hedgehog Review* (Fall 2002).

Dawe, Kevin. *The New Guitarscape in Critical Theory, Cultural Practice and Musical Performance.* Surrey: Ashgate Publishing, 2010.

Decenter. http://www.merriam-webster.com/dictionary/decenter (accessed March 25, 2014).

Deleuze, Gilles, and Felix Guatari. *A Thousand Plateaus: Capitalism and Schizophrenia.* Minnesota: University on Minnesota Press, 1987.

Demers, Joanna. *Listening Through the Noise: The Aesthetics of Experimental Electronic Music.* London: Oxford University Press, 2010.

Di Scipio, Agostino. Micro-time sonic design and timbre formation." *Contemporary Music Review* 10, Part 2 (1994).

Drummond, Jon. "Understanding Interactive Systems." *Organised Sound* 14, Issue 2 (August 2009).

Duration (philosophy). http://en.wikipedia.org/wiki/Duration_(philosophy) (accessed September, 2014).

Dyson, Frances. *Sounding New Media: Immersion and Embodiment in the Arts and Culture.* Berkely: University of California Press, 2009.

Eco, Umberto. "The Poetics of the Open Work*." In *Audio Culture: Readings in Modern Music,* eds. Cox Christoph, and Daniel Warner. New York: Continuum, 2007.

Elgart, Matthew, and Peter Yates. *Prepared Guitar Techniques.* California: California Guitar Archives, 1990.

Emmerson, Simon. *Living Electronic Music.* Hampshire, England: Ashgate, 2007.

Erlman, Veit. *Reason and Resonance.* New York: Zone Books, 2010.

Ferneyhough, Charles. *Pieces of Light.* Great Britain: Harper Collins, 2012.

Fred Frith – Solo concert at MOZG. http://www.youtube.com/watch?v=M2WSeZZV6iQ (accessed November 10, 2014).

Fukuyama, Francis. *Our Posthuman Future: Consequences of the Biotechnology Revolution.* New York: Farrar, Straus and Giroux, 2002.

Geertz, Clifford. *The Interpretation of Cultures.* New York: Basic Books Inc., 1973.

Github. https://github.com/timothybone/open-source-max-projects/tree/master/expo74-jeanfrancoischarles-patches (accessed January, 2014).

Glossary. Deleuze and Guatari. http://www.rhizomes.net/issue5/poke/glossary.html

Godøy, Rolf Inge, and Marc Leman. *Musical Gestures: Sound Movement, and Meaning.* New York: Routledge, 2010.

Graham, Elaine L. *Representations of the Post/human: Monsters, Aliens and Others in Popular Culture.* New Jersey: Rutgers University Press, 2002.

Halberston, Judith, and Ira Livingstone, eds. *Post-human Bodies.* Bloomington and Indianapolis: Indiana University Press, 1995.

Hansen, Mark. *Bodies in Code: Interfaces with Digital Media.* New York: Routledge, 2006.

Haraway, Donna. "A Cyborg Manifesto: Science, Technology, and Socialist Feminism in the Late Twentieth Century." In *The New Media Reader.* eds. Noah Waldrup-Fruin and Nick Montfort. Cambridge, Mass.: MIT Press, 2003.

Haraway, Donna. *Simians, Cyborgs, and Women: the Reinvention of Nature.* New York: Routledge, 1991.

Hayles, N. Katherine. "Virtual Bodies and Flickering Signifiers." In *Electronic Culture: Technology and Visual Representation,* ed T. Druckry. New York: Aperture Press, 1996.

Hayles, N. Katherine. *How We Became Post-human: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago: University of Chicago Press, 1999.

Hayles, N. Katherine. *My Mother Was a Computer: Digital Subjects and Literary Texts.* Chicago: University of Chicago Press, 2005.

Hegarty, Paul. *Noise.Music: A History.* New York: The Continuum International Publishing Group Inc., 2007.

Hegarty, Paul, "Full With Noise: Theory and Japanese Noise Music." *Ctheory,* article a097 (11/8/2001). http://www.ctheory.net/articles.aspx?id=314 [accessed November 14, 2010].

Holman, P. Chapter 1: What is Emergence? http://peggyholman.com/papers/engaging-emergence/engaging-emergence-table-of-contents/part-i-the-nature-of-emergence/chapter-1-what-is-emergence/ [accessed January, 2014].

Hugill, Andrew. *The Digital Musician.* New York: Routledge, 2008.

John Cage's *Sonatas and* Interludes for Prepared Piano – Performed by Adam Tendler. http://jazztruth.blogspot.ca/2012/02/john-cages-sonatas-and-interludes-for.html (accessed February, 2014).

Kahn, Douglas. *Noise, Water, Meat.* Cambridge, MA: MIT Press, c1999.

Keith Rowe: Prepared Guitar http://www.youtube.com/watch?v=HnUVpiFHhmM (accessed November 10, 2014).

Kelly, Caleb. *Cracked Media: The Sound of Malfunction.* Cambridge, MA: MIT Press, 2009.

Kifu Mitsuhashi: The Art of the Shakuhachi. http://cdn.alexanderstreet.com/dorp/linr/0/77aa/88d9/1002311003-liner.pdf (accessed March, 2014).

Labelle, Brandon, and Christof Migone. *Writing Aloud.* Los Angeles: Errant Bodies Press, 2001.

Landy, Leigh. Sound Transformations in Electroacoustic Music. http://www.composersdesktop.com/landyeam.html#AESTHETICS (accessed March 2014).

Lane, Cathy. "Voices from the Past: compositional approaches to using recorded speech." *Organised Sound* 11, Issue 1 (April 2006).

Lane, Cathy, and Nye Parry. "Sound, History and Memory." *Organised Sound* 11, Issue 1 (April 2006).

Lawson, Clive. "Technology and the Extension of Human Capabilities." *Journal for the Theory of Social Behaviour* 40, Issue 2 (2010).

Lefebvre, Henri. *The Production of Space.* Malden, MA: Blackwell Publishing, 1984.

Leighton, Angela. *On Form: Poetry, Aestheticism, and the Legacy of a Word*. Oxford: Oxford University Press, 2007.

Lichty, Patrick. "The Cybernetics of Performance and New Media Art." *Leonardo* 33, No. 5, Eighth New York Digital Salon (2000).

Logic Pro X. https://www.apple.com/ca/logic-pro/ (accessed November 6, 2014).

Mace, John H., Amanda M. Clevinger, and Ronan S. Bernas. "Involuntary memory chains: What do they tell us about autobiographical memory organization?" *Memory* 21, No. 3 (2013).

Martin, Bill. *Avant Rock: Experimental Music from The Beatles to Bjork."* Chicago: Open Court Publishing, 2002.

Max (software) http://en.wikipedia.org/wiki/Max_(software)#Language (accessed March, 2014).

Max. https://cycling74.com/ (accessed November 6, 2014).

Mazzola, Guerino, Joomi Park, and Florian Thalmann. *Musical Creativity: Strategies and Tools in Composition and Improvisation.* Heidelburg: Springer, 2011.

Mazzola, Guerino, and Paul B. Cherlin. *Flow, Gesture, and Spaces is Free Jazz.: Towards a Theory of Collaboration.* Berlin: Springer, 2009.

McSwain, Rebecca. "The Power of the Electric Guitar" *Popular Music and Society* 19, No. 4 (1995).

Miah, Andy. "Post-humanism: A Critical History." In *Medical Enhancements and Post-humanity,* eds. B. Gordjin & R. Chadwick. New York: Routledge, 2007.

Miranda Eduardo R., and Wanderly, Marcelo M. *New Digital Musical Instruments: Control and Interaction Beyond the Keyboard.* Middleton, Wisconsin: A-R Editions, 2006.

Native Instruments. *Guitar Rig Pro 5*. http://www.native-instruments.com/en/products/komplete/guitar/guitar-rig-5-pro/ (accessed November 6, 2014).

Nicholls, Bill. "The Work of Culture in the Age of Cybernetic Systems." In *Electronic Culture: Technology and Visual Representation,* ed T. Druckry. New York: Aperture Press, 1996.

Nierhaus, Gerhard. *Algorithmic Composition: Paradigms of Automated Music Generation.* Germany: Springer-Verlag/Wein, 2009.

NNs and Neurosolutions. http://www.nddownloads1.com/videos/nns_and_neurosolutions/nns_and_neurosolutions.html (accessed February 2014).

Nyström, Erik. "Textons and the Propagation of Space in Acousmatic Music."*Organised Sound* 16, Issue 1 (February 2011).

Pereverseva, Marina. "Musical Mobile as a Genre Genotype of New Music." *Lietuvos muzikologija, t. 14,* 2013

Peters, Gary. *The Philosophy of Improvisation.* Chicago: The University of Chicago Press, 2009.

Pickering, Andrew. "Brains, Selves, and Spirituality in the History of Cybernetics." In *H+/-: Transhumanism and its Critics*, eds. Gregory R. Hansell and William Grassie, Creative Commons Attribution-NonCommercial 3.0 United States License, 2011.

Piekut, Benjamin. *Experimentalism Otherwise: The New York Avant-Garde and its Limits.* Berkeley: University of California Press, 2011.

Prepared Guitar. http://en.wikipedia.org/wiki/Prepared_guitar (accessed March, 2014).

Read, Gardner. *Music Notation: Manual of Modern Practice.* New York: Taplinger, 1979.

Roland. RC-50 Loopstation. http://www.roland.com/products/en/RC-50/ (accessed November 6, 2014)

Roman Haubenstock-Ramati: Interpolation. http://www.universaledition.com/Roman-Haubenstock-Ramati/composers-and-works/composer/291/work/5884 (Accessed April 30, 2014).

Russolo, Luigi, "The Art of Noises," in *Audio Culture: Readings In Modern Music,* eds. Christopher Cox and Daniel Warner. New York*:* The Continuum International Publishing Group Inc., 2007.

Sangild, Torben. "The Aesthetics of Noise." Published by DATANOM Edited by Pelle Krøghol. Copyright 2002 by Sangild & DATANOM.

Sawday, Jonathon. "The Renaissance Cyborg." In *At the Borders of the Human,* eds Erica Fudge, Ruth Gilbert, Susan Wiseman. Great Britain: MacMillan Press, 1999.

Schafer, R. Murray. "The Music of the Environment." In *Audio Culture: Readings In Modern Music,* eds. Christopher Cox and Daniel Warner. New York*:* The Continuum International Publishing Group Inc., 2007.

Schaeffer, Pierre. "Acousmatics." In *Audio Culture: Readings In Modern Music,* eds. Christopher Cox and Daniel Warner. New York*:* The Continuum International Publishing Group Inc., 2007.

Shiffman, Daniel. *The Nature of Code: Simulating Natural Systems with Processing.* Creative Commons Attribution-NonCommercial 3.0 Unported License, 2012.

Smalley, Dennis. "Defining Timbre – Refining Timbre." *Contemporary Music Review* 10, Part 2 (1994).

Smalley, Dennis. "Spectromorphology and the Structuring Process." In *The Language of Electroacoustic Music,* ed. Simon Emmerson. London: Macmillan Press, 1986.

Smalley, Dennis. "Space-form and the acousmatic image." *Organised Sound,* 12, Issue 1 (2007).

Smalley, Dennis. "Defining Transformations." *Interface* 22, Issue 4 (1993).

Smalley, Dennis. "Spectromorphology: explaining sound-shapes." *Organised Sound,* 2, Issue 2 (1997).

Wikipedia, *Sonatas and Interludes* http://en.wikipedia.org/wiki/Sonatas_and_Interludes (accessed July, 2014)

Spear: Sinusoidal Partial Editing Analysis and Resynthesis. http://www.klingbeil.com/spear/ (accessed April 5, 2014).

Stelarc. "Zombies and Cyborgs: the Cadaver, the Comatose, and the Chimera." http://stelarc.org/documents/zombiesandcyborgs.pdf (accessed March 28, 2014).

Taruskin, Richard. *Music of the Late Twentieth Century.* Oxford: Oxford University Press, 2010.

Ten Hoopen, Christiane. "Issues in Timbre and Perception." *Contemporary Music Review* 10, Part 2 (1994).

Todd, David. *Feeding Back: Conversations with Alternative Guitarists from Proto-Punk to Post-Rock.* Chicago: Chicago Review Press, 2012.

Tofts, Darren, AnneMarie Johnson. "Introduction: I, Robot:AI, Alife, and Cyborgs." In *Prefiguring Cyberculture: An Intellectual History,* eds. Darren Tofts, AnneMarie Johnson, and Alessio Cavallero. Cambridge, Mass.: The MIT Press, 2002.

Terzidis, Kostas. *Expressive Form*. Routledge, 2003. 27 February 2014 <http://www.myilibrary.com?ID=4628>

Turkish Music (style). http://en.wikipedia.org/wiki/Turkish_music_(style). (accessed November 8, 2014)

Ulmer, Gregory. *Internet Invention: From Literacy to Electracy.* New York: Longman, 2002.

Vaggione, Horacio. "Timbre as Syntax: A Spectral Modeling Approach." *Contemporary Music Review* 10, Part 2 (1994).

Varela, F.G., Maturana, H.R. And R. Uribe. "Autopoiesis: The Organization of Living Systems, its Characterization and a Model." *Biosystems* 5 (1974).

Vita-More, Natasha. "Aesthetics of the Radically Enhanced Human." *Technoetic Arts: A Journal of Speculative Research* 8, Issue 2 (2010).

Vogelin, Salome. "Sonic memory material as 'pathetic trigger'." *Organised Sound* 11, Issue 1 (2006).

Wolfram, Stephen. *A New Kind of Science.* Champagne, IL: Wolfram Media, 2002.

Wilson, Margaret. "Six views of embodied cognition." *Psychonomic Bulletin and Review* 9, Issue 4 (2002).

Appendix A: Max Patches

Movement 1

Section 1
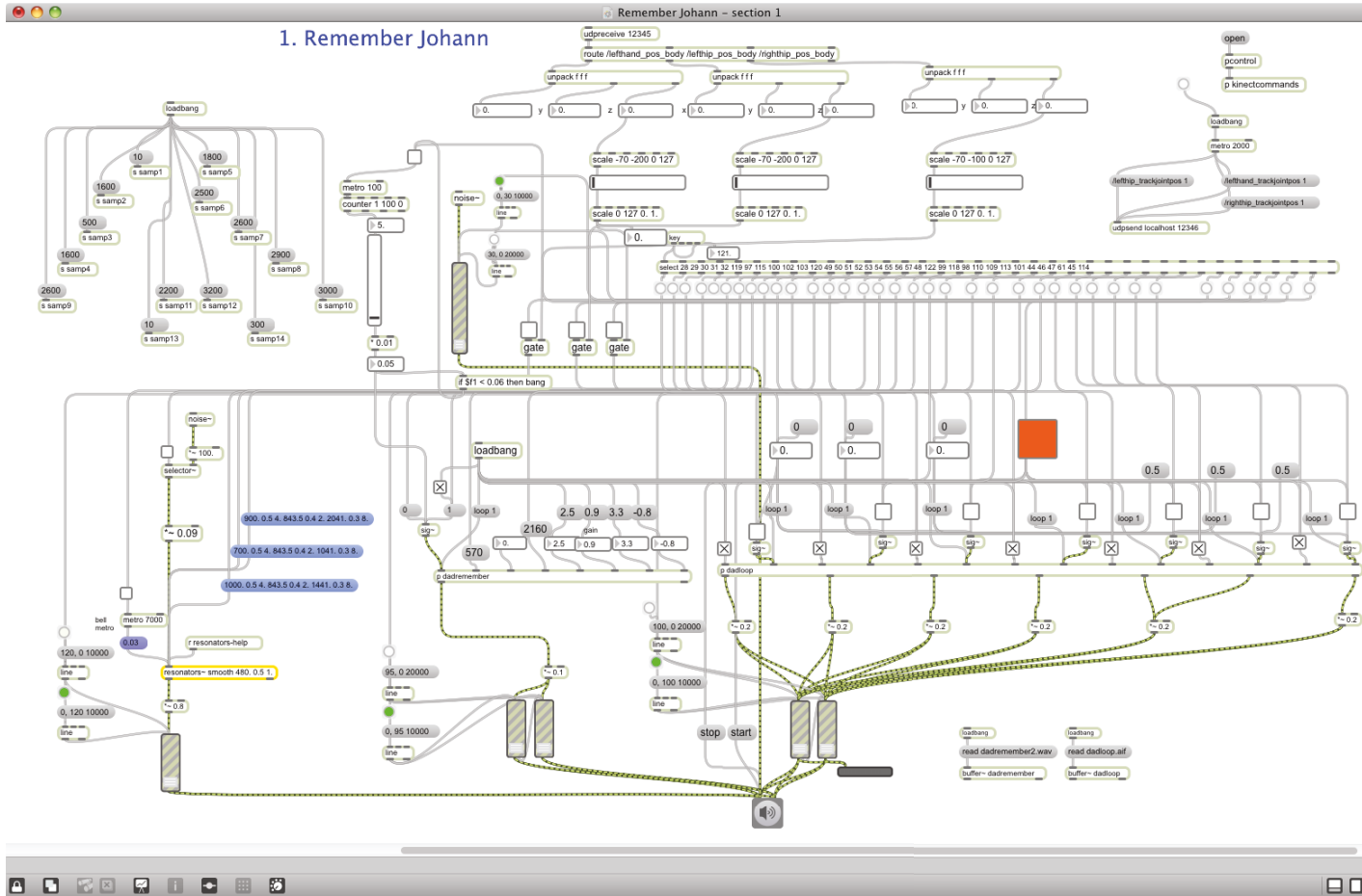
Section 1 subpatches

Subpatch: p dadloop
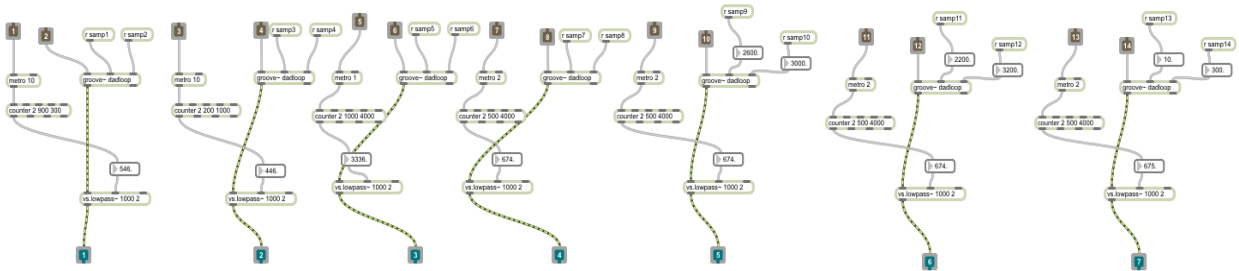
Subpatch: p dadremember
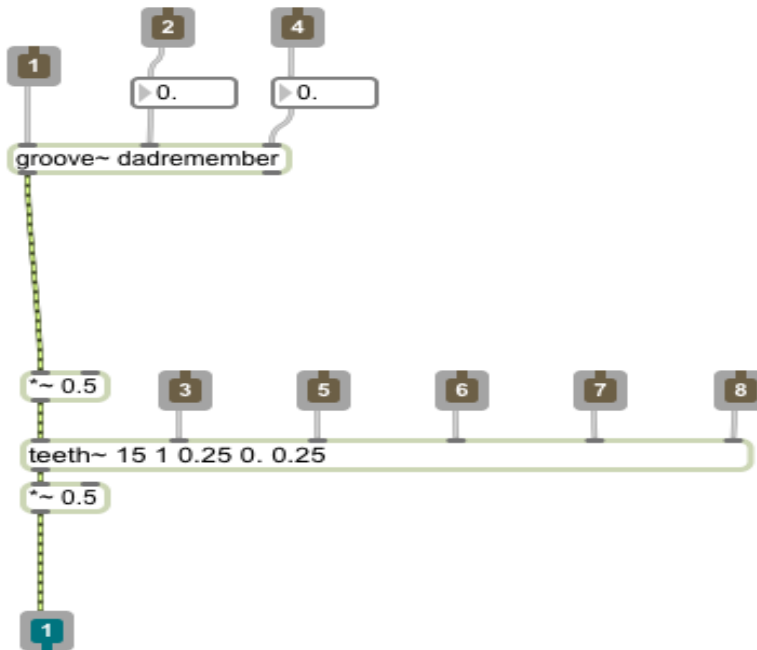
Section 2
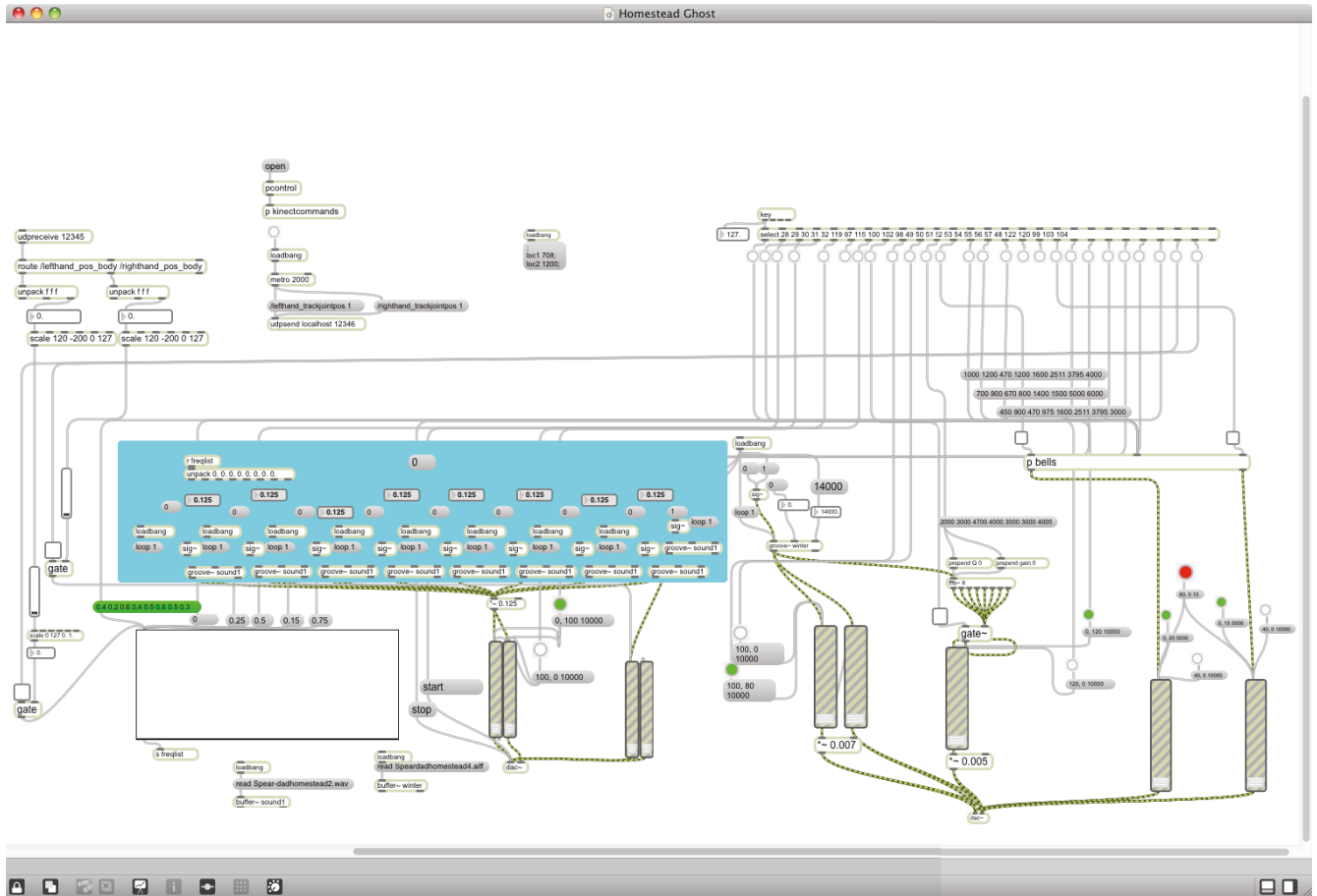
Section 2 subpatch: p bells

Section 3

Section 3 subpatch: p if

1 2 3 4 5 6 7 8

▸0. ▸0. ▸0. ▸0. ▸0. ▸0. ▸0. ▸0.

if $f1 == 10 then 2000 == 0 == 0 == 0 == 0 == 0 == 0 == 0

▸0.

if $f1 == 9 then 1500 == 2000 == 0 == 0 == 0 == 0 == 0 == 0

1

▸0.

2

if $f1 == 8 then 200 == 0 == 1000 == 0 == 1600 == 0 == 0 == 0

3

▸0.

if $f1 == 7 then 500 == 0 == 500 == 1000 == 0 == 0 == 1000 == 2000

4

▸0.

if $f1 == 6 then 300 == 1300 == 1600 == 0 == 1800 == 0 == 2000 == 0

5

▸0.

if $f1 == 5 then 300 == 2000 == 0 == 0 == 0 == 2000 == 0 == 0

6

▸0.

if $f1 == 4 then 1000 == 0 == 400 == 1600 == 1400 == 1200 == 1000 == 500

7

▸0.

if $f1 == 3 then 0 == 0 == 500 == 0 == 1200 == 0 == 0 == 1500

8
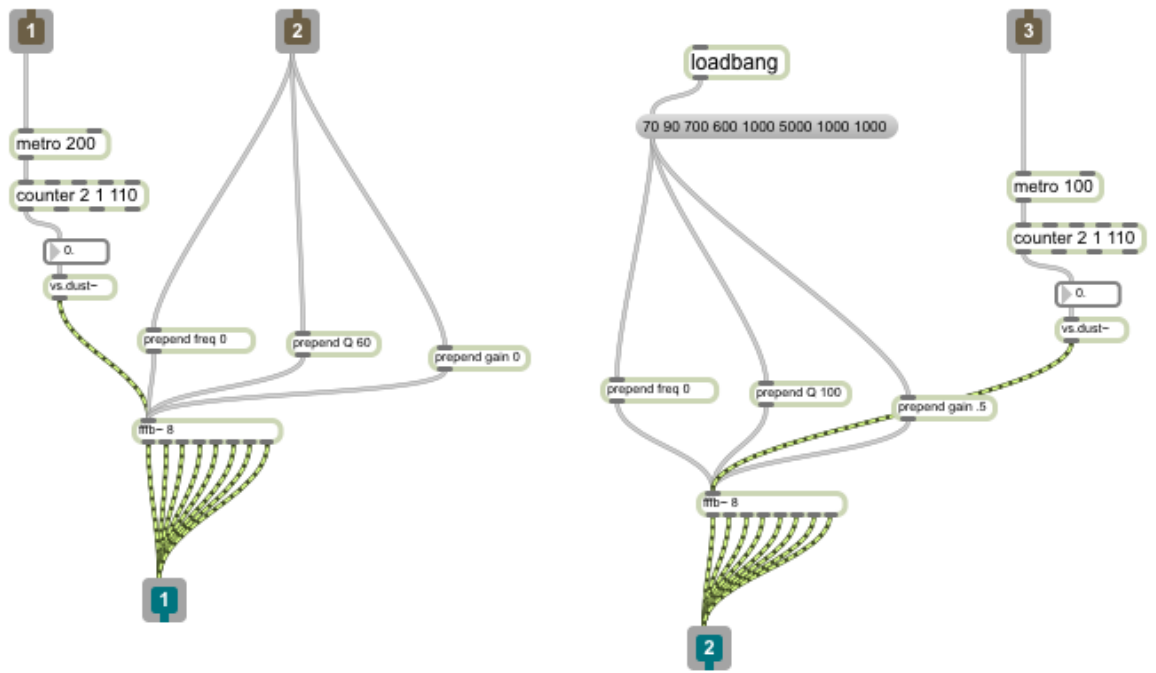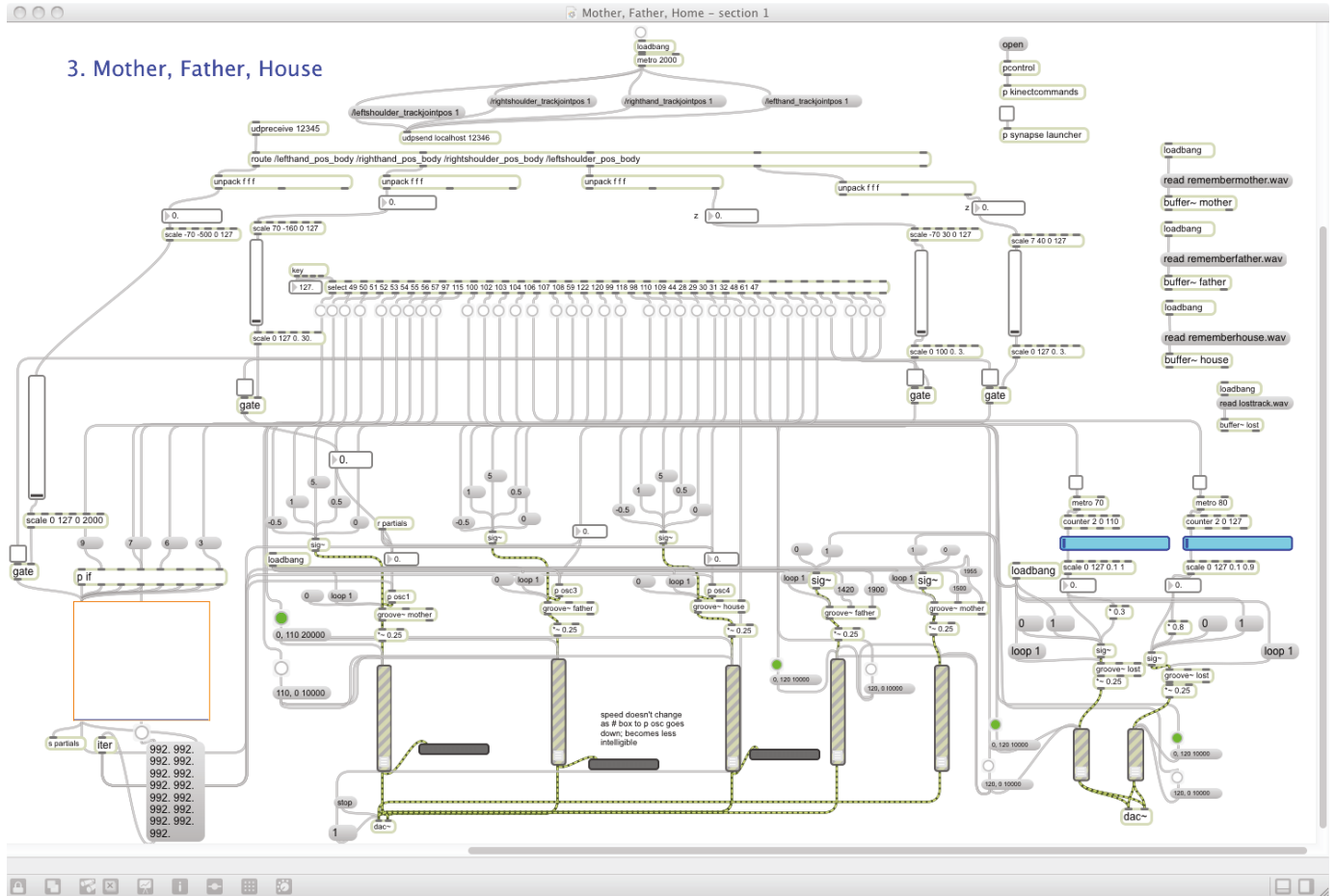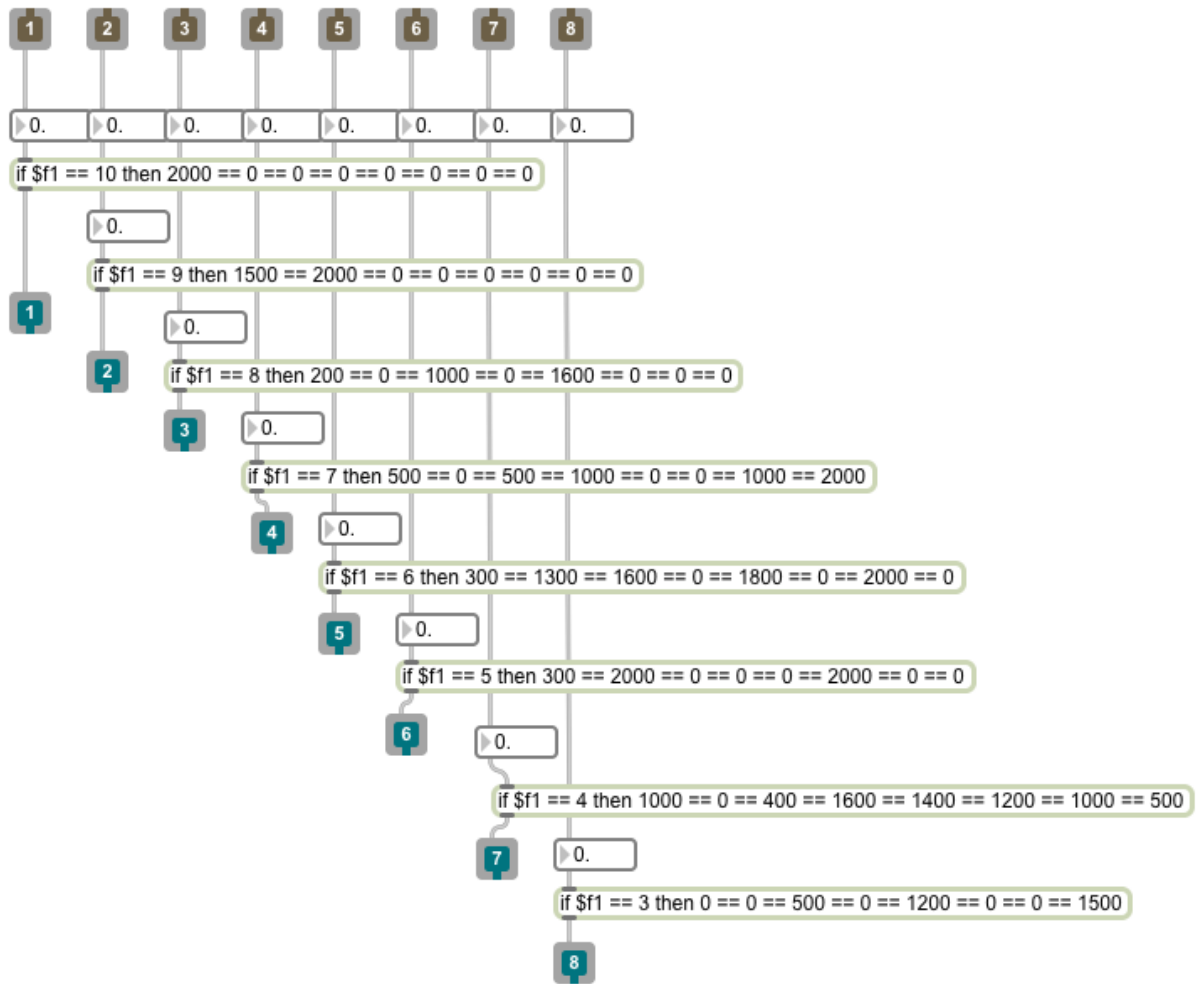
Movement 2
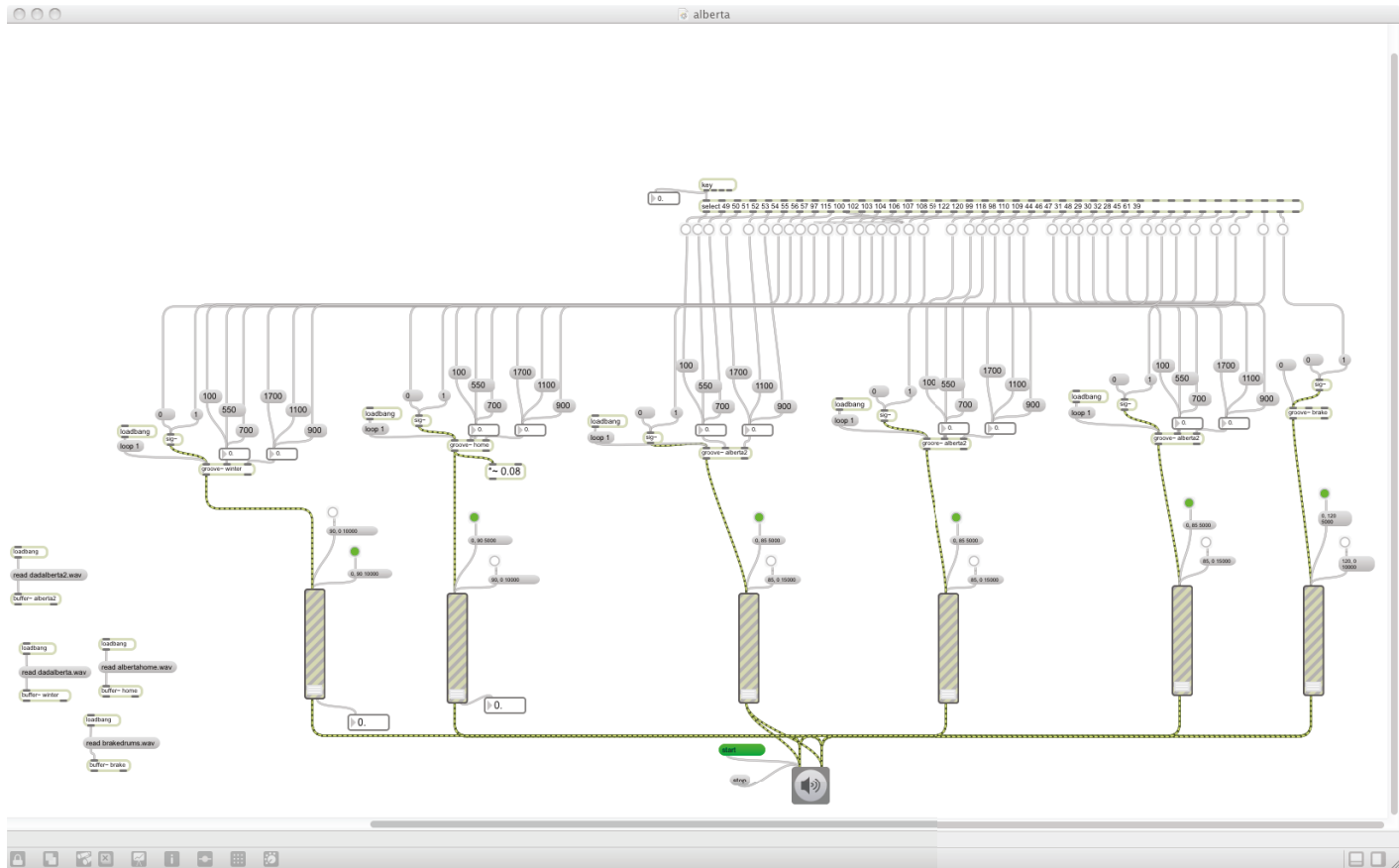
Section 1

Section 2
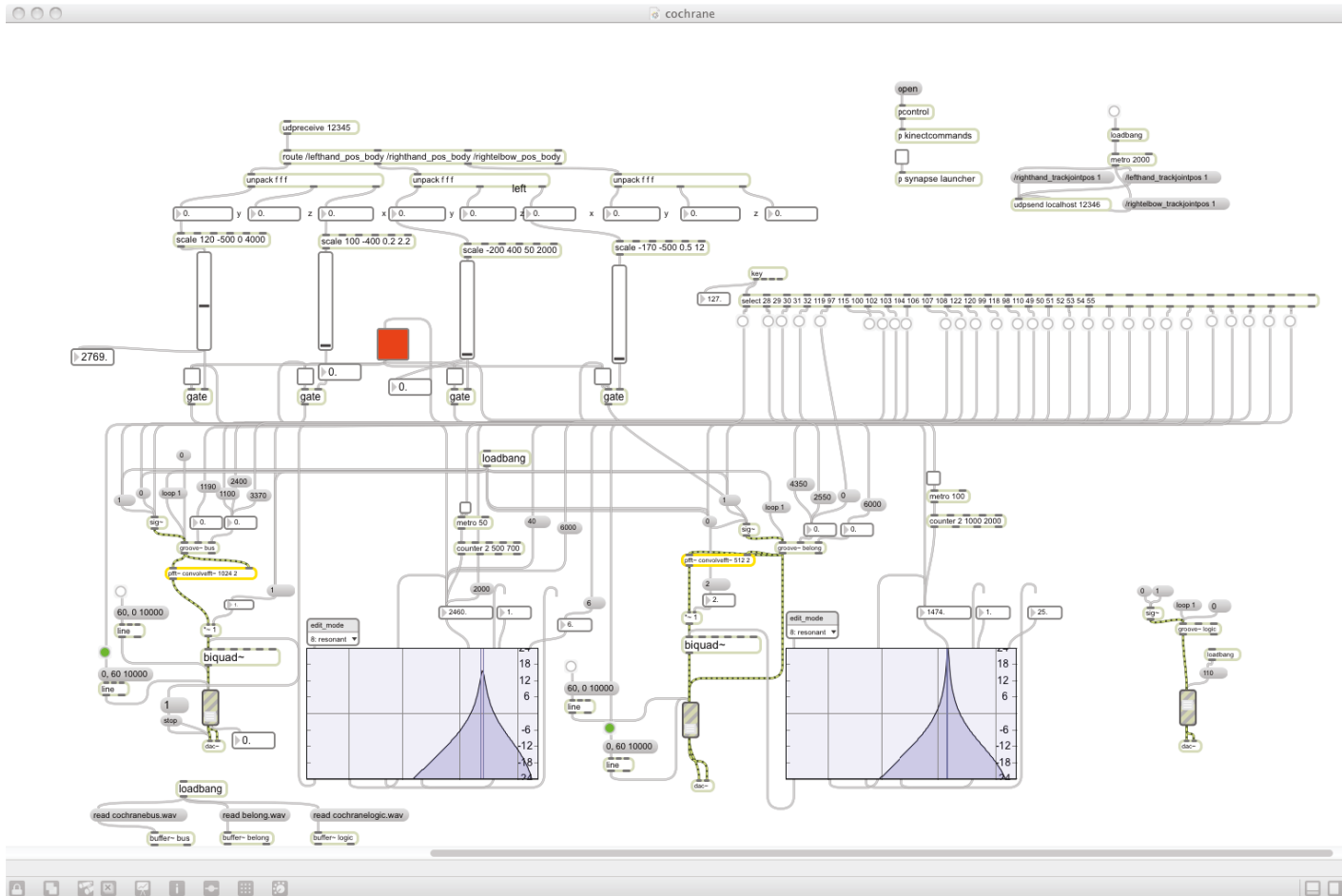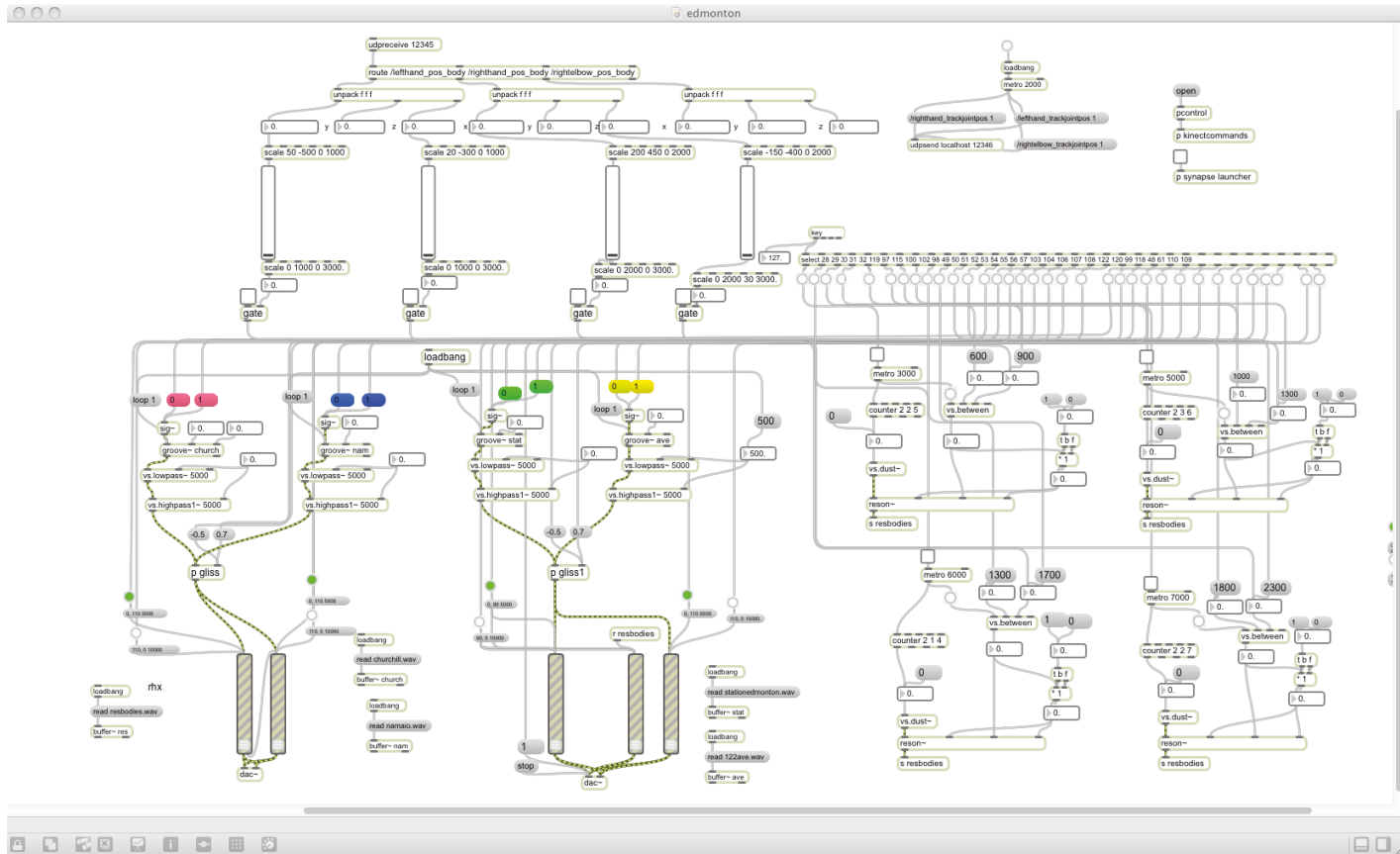
Section 3

Movement 3
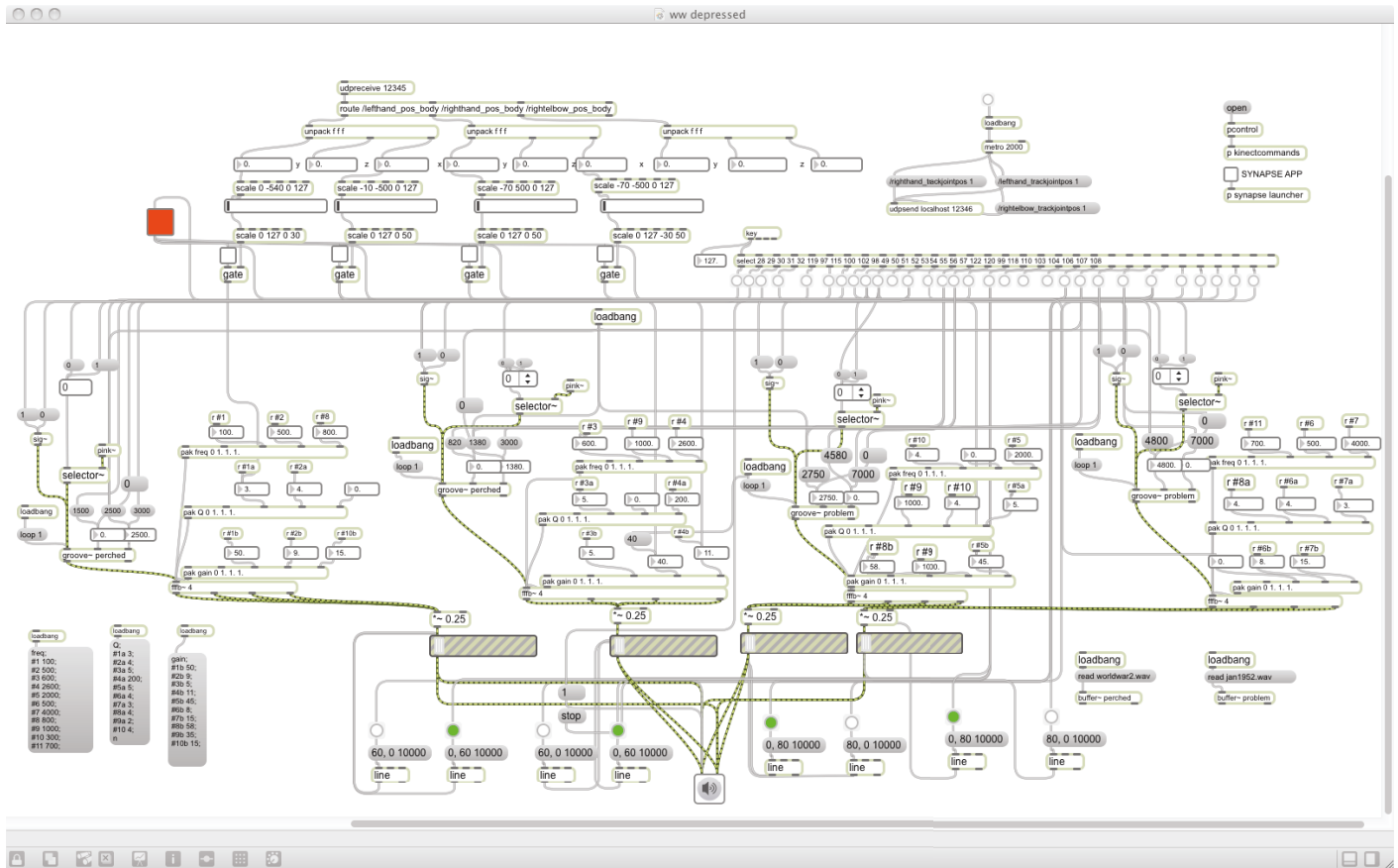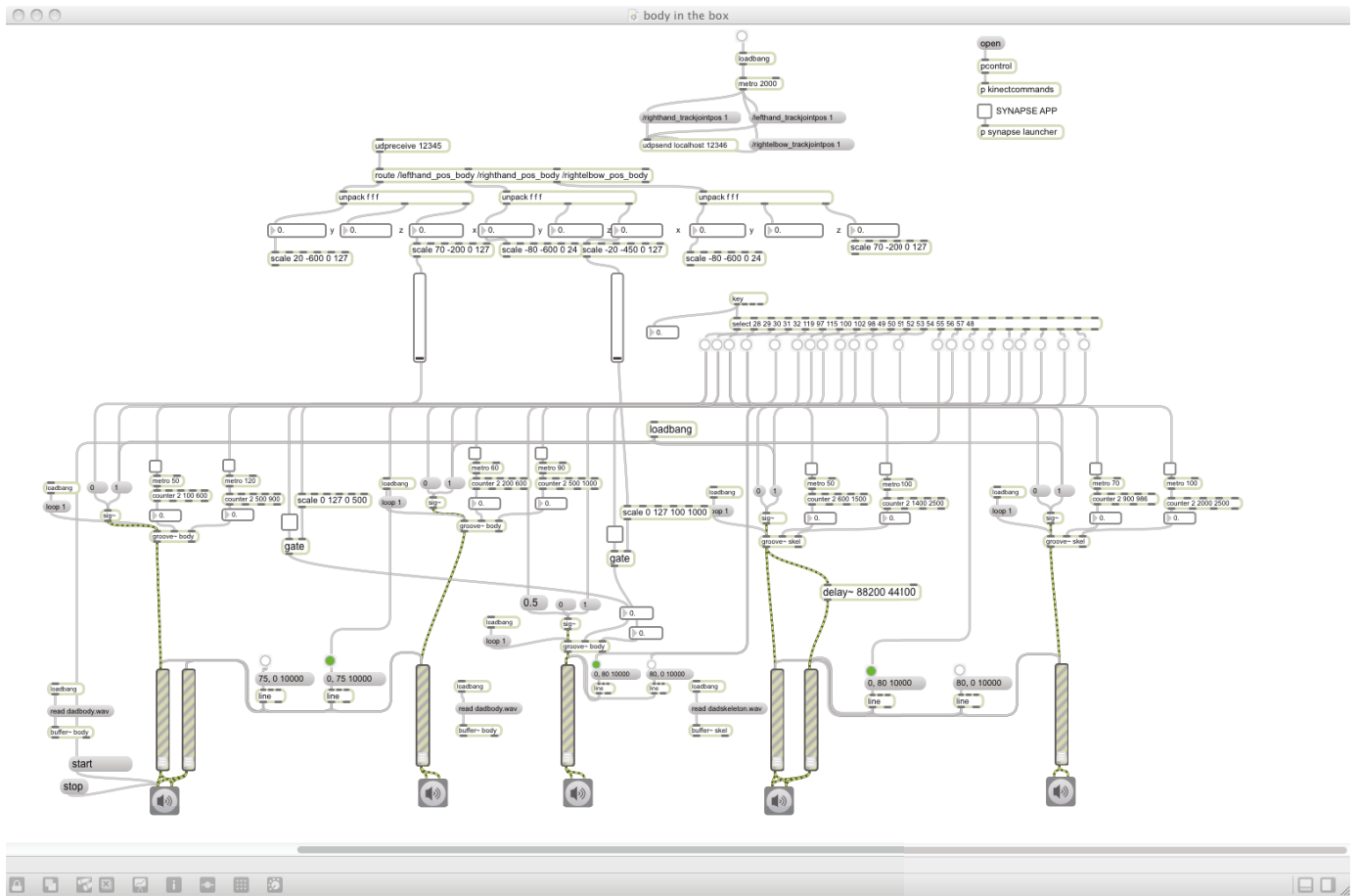
Section 1
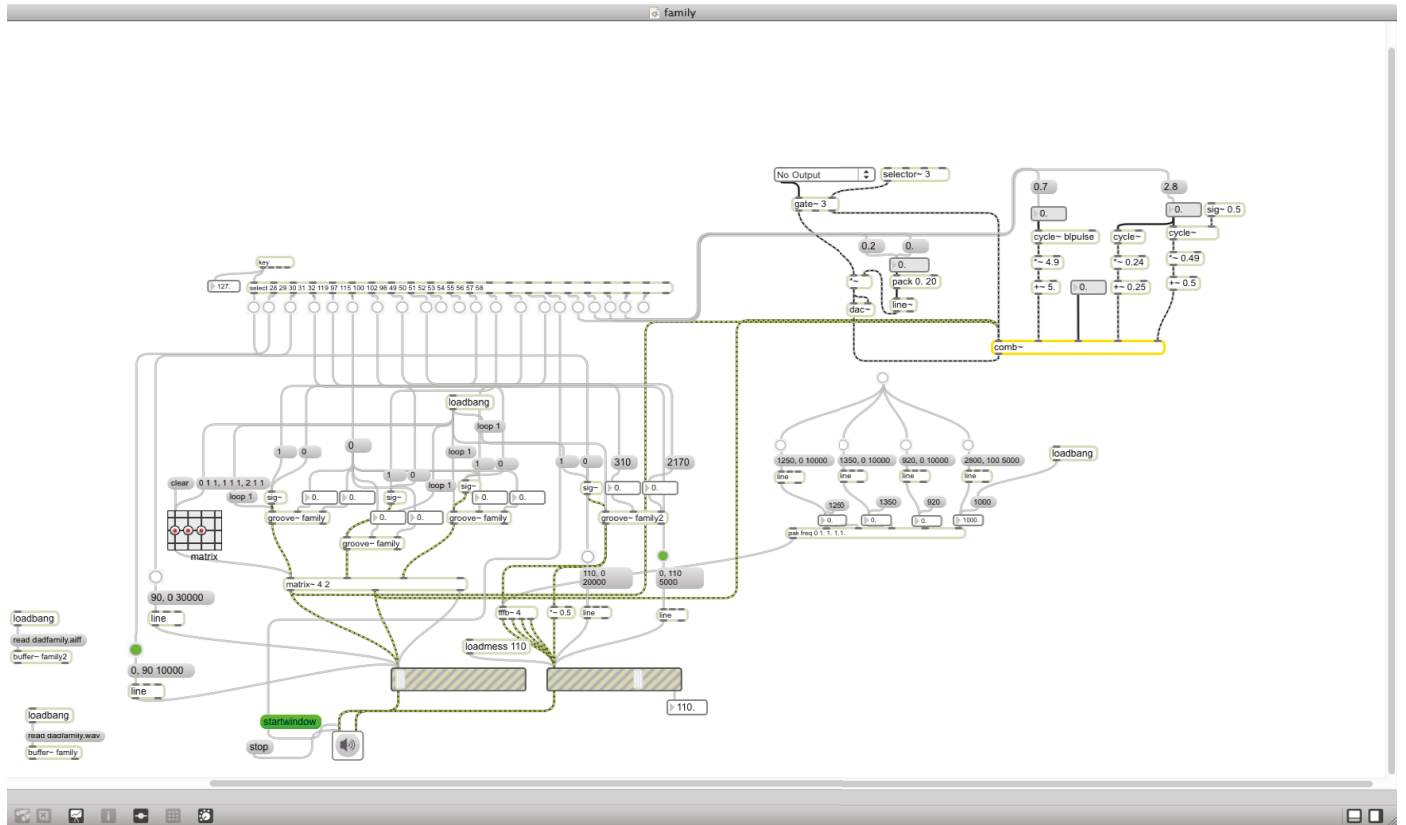
Section 2

Section 3

Appendix B: Max Control Panels

Movement 1

Section 1

Section 2

Section 3

Mother, Father, House

Movement 2

Section 1

Alberta

Section 2

Section 3

Movement 3

Section 1

Section 2

Section 3

Appendix C: Guitar Rig Presets

The following images show the effects presets that are used in the piece to create sounds with the prepared electric guitar.

Clean Filterpan

Deep Vox

Lattice Rub

Sharpener

Submarine with Demon

A HOLE IN THE WORLD || for prepared electric guitar and Max/Msp

Dave Wall

Performance Notes

1. The duration for each score page is indeterminate, unless otherwise indicated. The piece is read from left to right along the x axis. This indicates the sequential nature of events, but not their temporal placement. Amount of space between events is not intended to communicate the relative time-length of events.

2. The y axis indicates register in guitar sections.

3. Size of graphic symbols indicates dynamics.

4. Information for symbols on score pages containing instructions for control of Max/Msp are found on page v.

5. Two Max/Msp patches used in the piece have been sourced from support materials in *Electronic Music and Sound Design*, (citation).

Guitar Preparation 1 - Movement 1
- weave pocket sharpening stone (c. 2" x 1") between strings E5, B4, and G4 at the 12th fret. Strings E5 and G4 are on top of the stone.
- weave a second pocket sharpener between strings D4, A3, and D3 at the7th fret. D3 and D4 are on top of the stone.
- weave skewer between strings A2, D2, and A3; A2 is on top of skewer.
- weave skewer between strings D3, A3, and D4; A3 is on top of the skewer; skewer extends past string E2.

Guitar Preparation 2 - Movements 2 and 3
- weave 20" x 13" rectanglular aluminum sheet between strings; strings laying on top of the aluminum are A2, A3, G4, E5.
- weave small metal sheet between strings; strings on top of sheet are E2, D2, D4, B4.
- pocket sharpening stone (c. 2" x 1") between strings E5, B4, and G4 remains from guitar preparation 1.
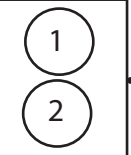
Instructions for initiating sound in Max/Msp patches

(1)
- circled numbers, circled letters, and circled words* refer to keys on the computer keyboard; these intiiate different
- sounds in the Max/Msp patch

(1̸)
- press key to turn sound off

(1)(1̸)
- two circles touching indicates one iteration of the text-
- fragment (i.e. on followed by off immediately after one iteration)

[box with (1) and (2)]
- key-presses in a box indicates improvisation using
- those key-presses

(1)
(2)
- stacked key-presses indicate simultaneous
- key-presses

* left , right, up, down - direction keys; s.b. - space bar

Tools and Actions
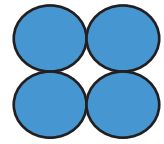
∴ Apply activated Conair hand-held massager to indicated area

∴ skewer

∴ Awl

∴ flick preparation with finger by pulling upwards and releasing

∴ pocket sharpener
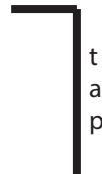
∴ tap indicated area with allen wrench; wrench should be large enough to extend across at least four strings
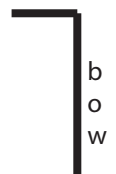
∴ bow indicated area with allen wrench

X ∴ strike one tool with another. (i.e. [⌷ X ⌐] : strike allen wrench with slide)

∴ Bell sound: produced by tapping string with awl

∴ continue indicated sound in a consistent manner
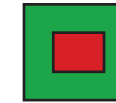
∴ Bell sound: produced by tapping string with awl and holding awl on string; this produces recognizable pitch
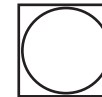
∴ this is symbol is used in one section only, and refers to a gong sound generated by ID 13.maxpat indicated in the intro to movement 2

∴ aluminum sheet

∴ when applied to loopstation phrases, this symbol requires the performer to step on the off pedal once; this will create a fade out

| Logic | Begin audiofile created in Logic Pro; this is inserted into the Max/Msp patch with the label "Logic" |

strike two or more strings simultaneously

drag tool across string

damp strings with hand

| Kinect (lhx) | improvise using the Kinect motion sensor camera; this involves gestures in which the limbs move along x, y, or z axes; the score indicates the limb(s), and the corresponding axes used for that particular improvisation.
lh - lefthand
rh - right hand
rsh - right shoulder
lsh - left shoulder
re - right elbow
le - left elbow
x, y, or z after these abbreviations indicate axis. |
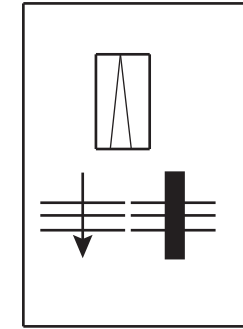
more than one image in a box indicates simultaneous use of those tools and/or techniques indicated; in this example, an awl is dragged across strings while damping strings with a hand

glass guitar slide
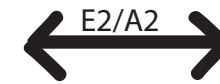
E2/A2 — move tool along indictated strings in either direction

forcefully rotate the guitar's bass volume potentiometer; located in Section "Brakedrums"

freely turn volume potentiometers on guitar

Temple bowl

Prelude, movement 1

Before proceeding, open:
1. Remember Johann.maxpat;
2. harmo-freeze.maxpat;
3. ID-13_gong.maxpat
4. Guitar Rig preset
Metallic Shine2
5. Synapse

y

x

(allow loop to play)

guitar, loop 1

at least 15"

temple bowl

**strike with beater;
allow to fade completely**

c. 15"
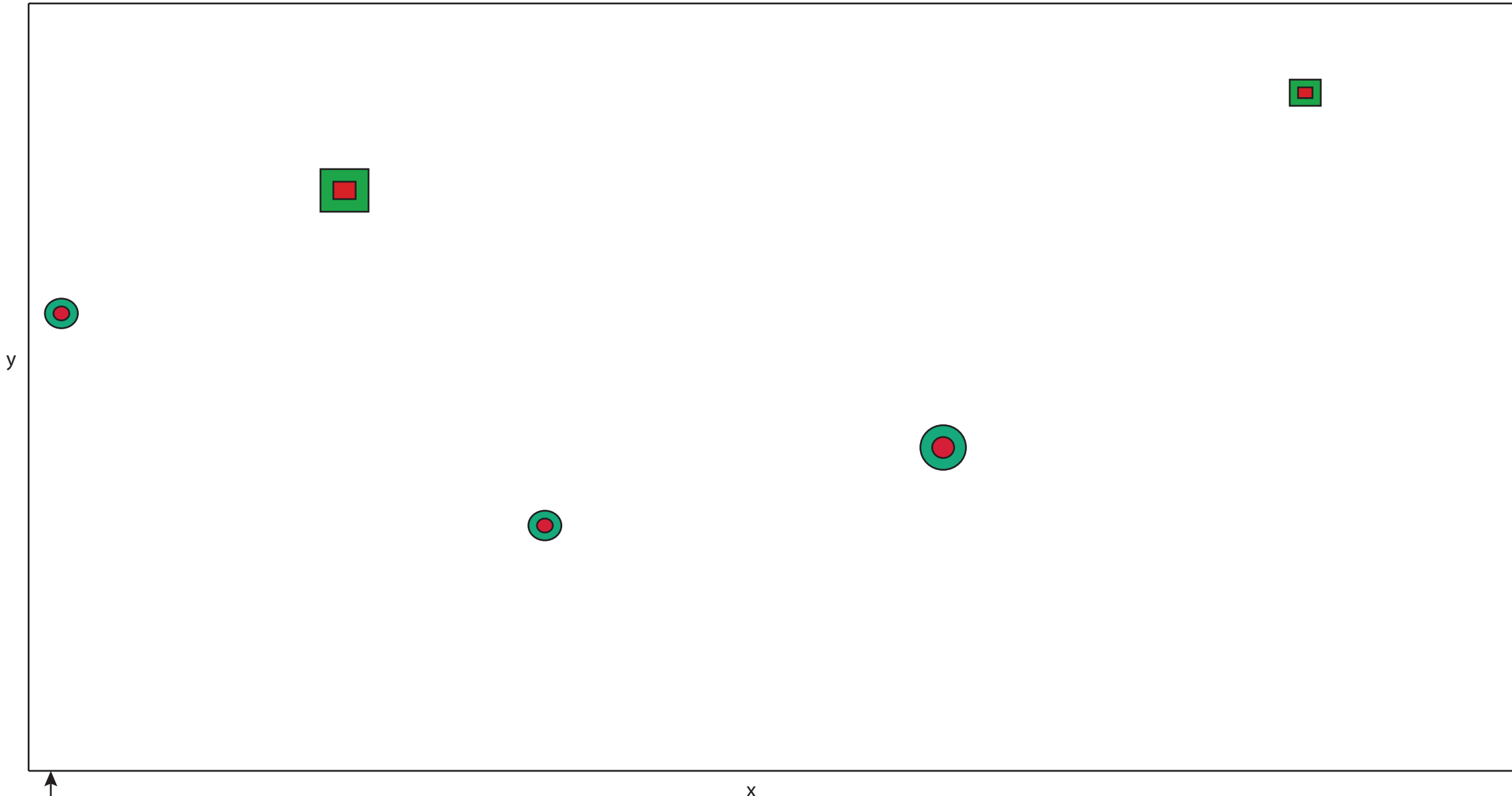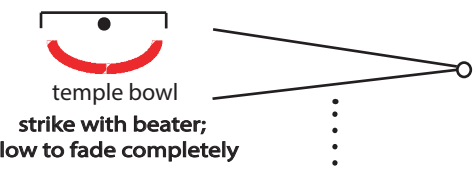
Kinect

(lhz, rhz)

Turn on "Temple Bowl2"
Logic file half way through
temple bowl decay

bell fader
up

"Johann Wall"
fader up

patch
on

(7) (6)   (4)

bell-sound
on/off

[(3) (⊘)]   (sparsely)

"wa" (glottal)

(b) (⊘)   (b) (⊘)   (b) (⊘)

"wall"

(m) (⊘)   (m) (⊘)

"wa"

(1) (⊘)

"We've got to remember."
off

"Johann"

(e)

"We've got to remember."
fader up

(5)   (8)

"Wall"   all off   all on   "Johann Wall"   all off but "d"

(f)   (=) (=)   (=)   (d)   (=)   (⊘)

"Johann"

(g)
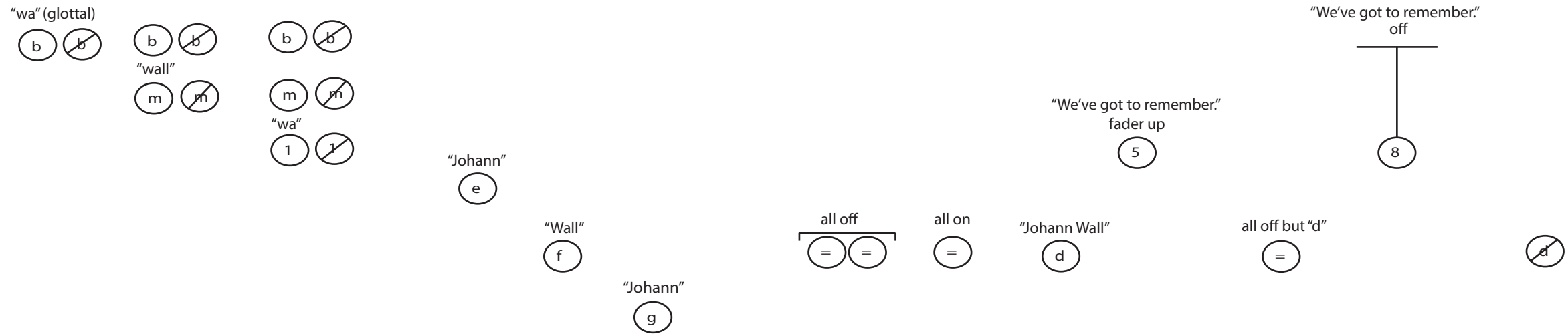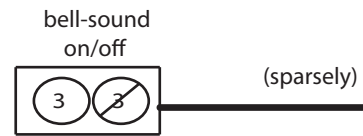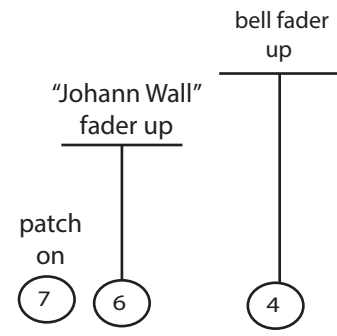
Kinect cont.

guitar, loop 1

"Temple Bowl2" logic file

continuous bell

bell-sound
on/off

(sparsely)

3

3

x

"wall"

m

"wa" (glottal)

b

"remember" slows
down and fades out

,

"wa"

y

·

noise
fade up

"Johann"

truncate to
"remember"

all on but "d"

"Johann Wall"

"remember" on

/

z   c

=

d

9

"Wall"

noise
fade down

"Johann"

g

d

Kinect

(lhz, rhz)

(guitar, loop 1 cont.)

(Temple Bowl2 (Logic) cont.)
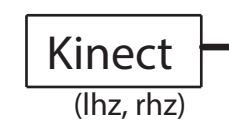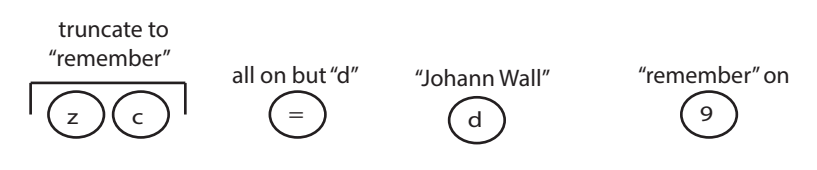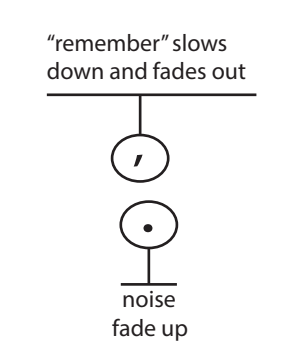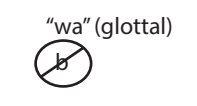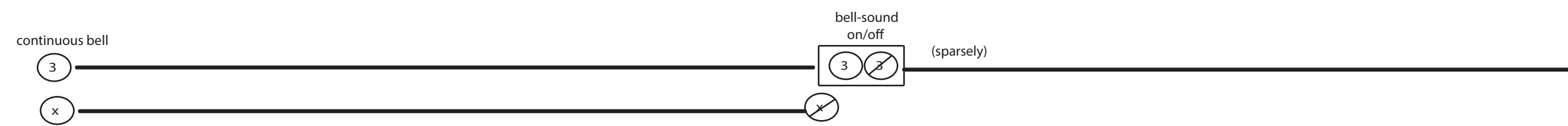
Guitar section 1, movement 1

Loopstation phrase 1

Guitar Rig Preset: Metallic Shine1 | Loopstation phrase 2 | ＊ ＊

sparsely

Guitar Rig Preset: Metallic Shine1 | Loopstation phrase 3 | ＊ ＊

sparsely

Guitar Rig Preset: Lattice Rub 4

E2/A2
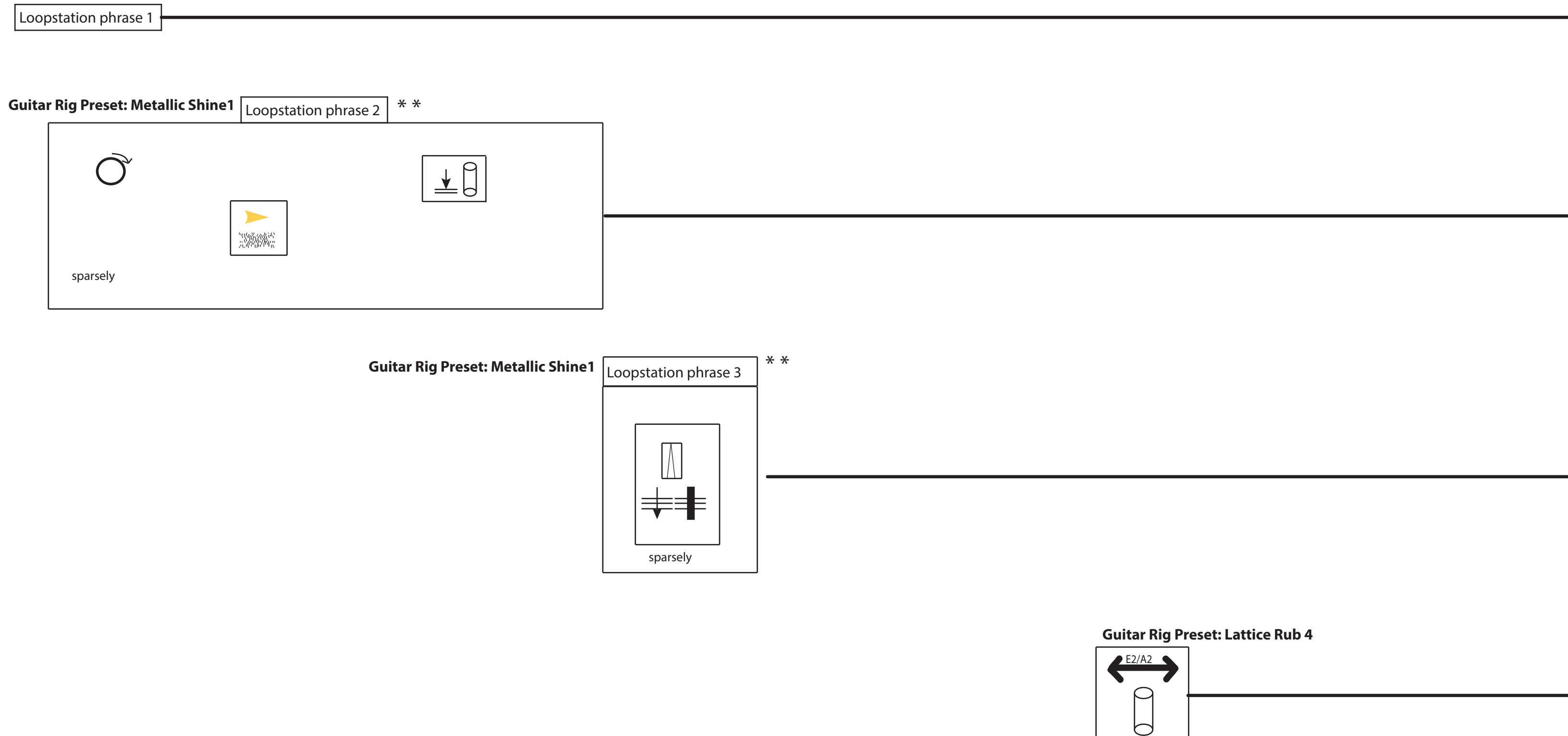
(Temple Bowl Logic file cont.)

＊ The performer is free to add as many overdubs as he/she feels ia appropriate to the needs of the sound being created. The overdubs presented here should form the base for subsequent overdubs. The notation implies that attacks between overdubs are simultaneous. Do not be concerned about accuracy here.

＊ ＊ These boxes are not temporal containers. They indicate only those techniques that are used for the loop in question.

Homestead Ghost

(Loopstation, phrase 1)

(Loopstation, phrase 2)

(Loopstation, phrase 3)

Harmo-freeze *

$\boldsymbol{p}$
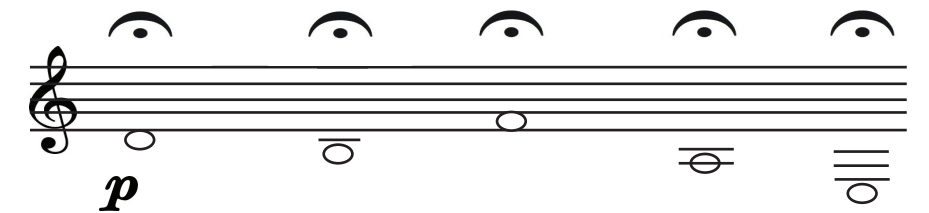
Begin with fader down. Fade up once all notes are in.

granular bells on

1 7

granular bell sounds

2 3 4

bell gate on

s

fader up

right

bell

b

fader up
"I still remember..."

d

s

c 8
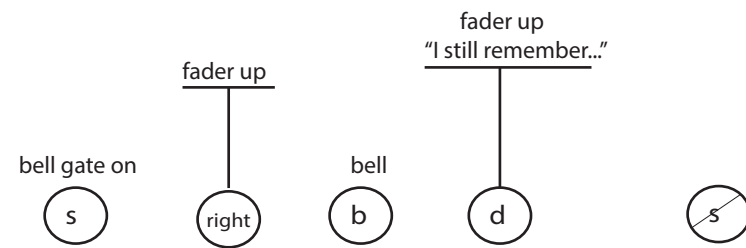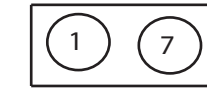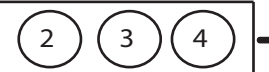
fader up
"I had a great childhood
on that homeestead."

patch on

a   up
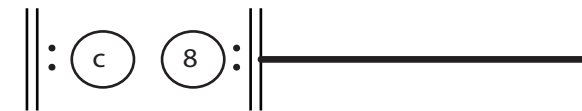
left

different speeds for "I had a great childhood...."
Improvise sequence of use.

8   9   s.b.   z   x   8

on
"I had a great childhood
on that homestead."

c

6

5

(Temple Bowl Logic file cont.)

* Indicated pitches are optional; the performer can choose the pitches, but they must be below F4. Play notes with fader down; bring fader up when all notes are in.

(Loopstation, phrase 1)

Guitar Rig Preset:
Metallic Shine1 | Loopstation phrase 2 | ******

X *

x *

X *

Guitar Rig Preset: Metallic Shine1 | Loopstation phrase 3 | ******

press frets randomly
between fret 12 and 21
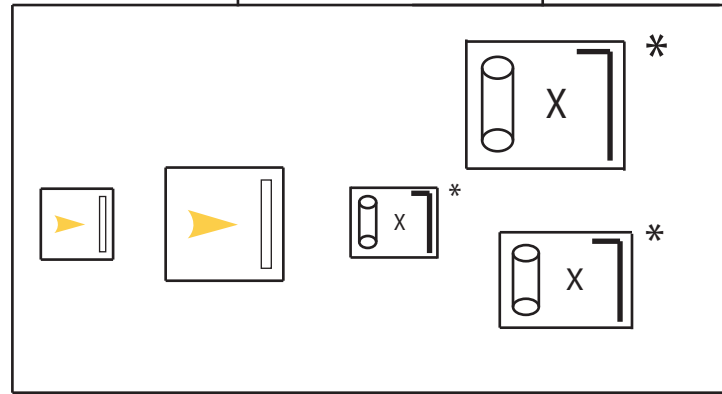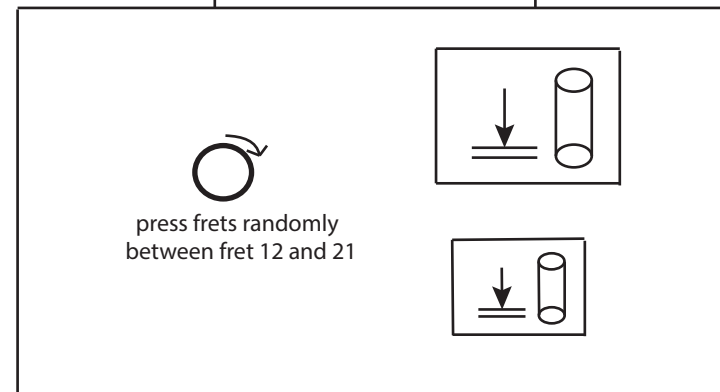
* lay wrench across strings and strike with slide; move wrench

** frequency of attacks should be greater than in immediately previous loops; images indicate relative amplitudes, not sequence of events, specific number of of events, or register.

(harmo-freeze)

1 - 3: timbre changes
4 and m: speed changes

(1) (2)
(3) (4)
(m)
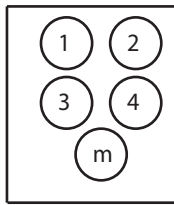
on
(n)

fader up
(up)

"I also remember going with
my mother to get water."
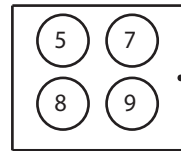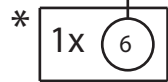
* 1x (6)

(5) (7)
(8) (9)

adjust text speed

Loopstation phrase 1

"I remember very little about
my father those first years."

* 1x (j)

(h) (k)
(l) (j)

adjust text speed

Loopstation phrase 2
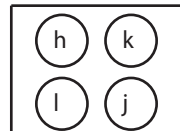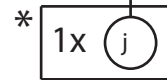
Loopstation phrase 3

"Here are some of the things
I remember of that house."

* 1x (x)

(b) (z)
(c) (v)
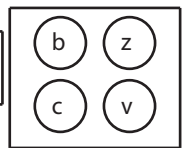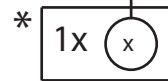
adjust text speed

Kinect   improvise

rhx
lhx
rshz
lshz

(0) (/)
(s.b.) (=)
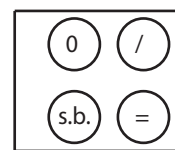
gates for
kinect

"Unfortunately, we lost track of them long ago."
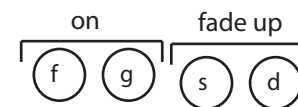
on
(f) (g)

fade up
(s) (d)

"mother"
"my father"
on
(left)
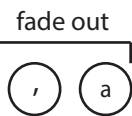
fade out
(,) (a)

(Temple Bowl Logic file cont.)

* The text-fragment resulting from the indicated key press will be clearly intelligible. Allow it to be stated clearly once; pressing keys indicated in the adjacent message box obscures the clarity of the text-fragment. This acts perceptually as an off switch.

Prelude, movement 2
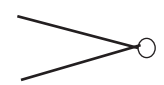
Change Guitar Rig preset:
Submarine with Demon

Change guitar preparation *

Begin "section 2 Gong, Logic Pro X

Loopstation phrases 1, 2, 3

* 1) Aluminum sheet (approx. 18"x 9") woven between strings with A2, A3, G4, and E5 on top of sheet. 2) Metal plate (approx. 4"x 1.5") woven between strings with E2, D2, D4, and B4 on top of plate; 3) leave pocket sharpener under strings E and B

Alberta.maxpat

cont.

Turn on
ID_13_gongs.maxpat;
gong will sound every 10 seconds

"I wanted to come
back to Alberta."

on	off
(left)	(-)

"Alberta became home."

on	off
(0)	(=)

(0) (left)

"I wanted to come back to Alberta"
phrase truncation

7	d
8	s
9	a

"Alberta became home"
phrase truncation

f	l
g	k
h	j

Logic

truncation:
random, processed
syllables

*
fader up

1	6
2	5
3	4

*
fader up

;	b
z	v
x	c

*
fader up

h	'
m	/
,	.

Loopstation phrase 1

delete loop

Loopstation phrase 2

delete loop

(Section 2, gong Logic file cont.)

t
a
p

improvise

* end before Logic file

cont.

(continue improvisation)

tap

lightly
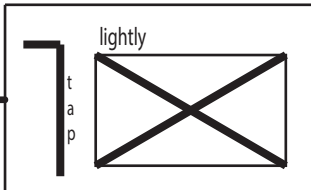
Speech Delay and Feedback.maxpat

Cochrane.maxpat

cont.

Preparation. No sound.

patch
on

k

faders up

1   2

truncation:
"I rode the bus for two days and
three nights to get to Cochrane."

v   down

truncation:
"Within a half an hour, I felt I had
come to the place I belong."

b   n
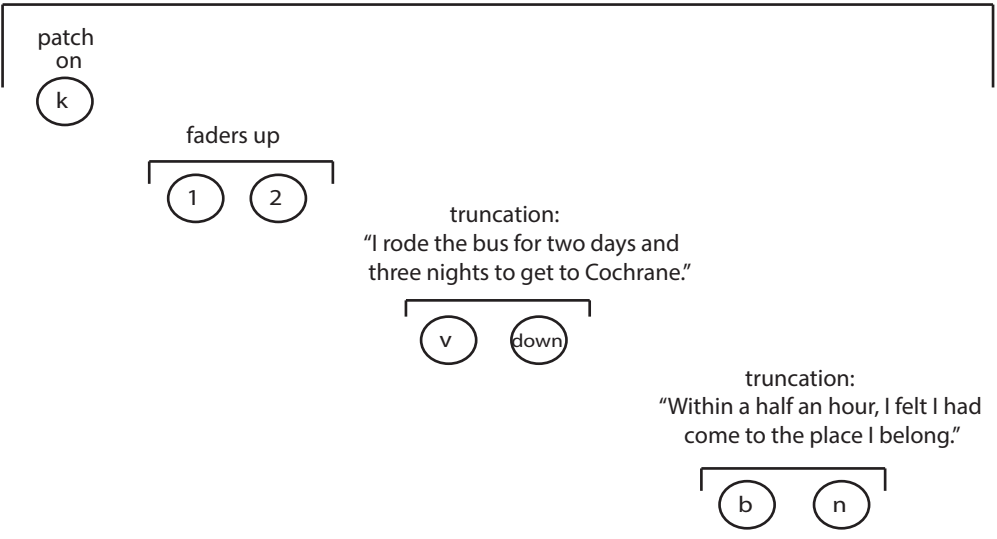
44"   1'30"
"I rode the bus..."   "Within a 1/2 an a hour..."
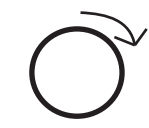
Logic

"Three days and
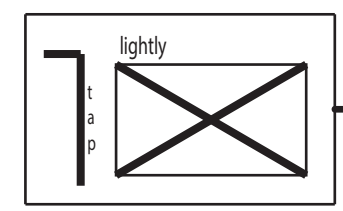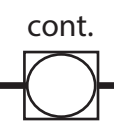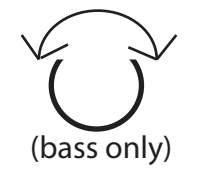two nights."
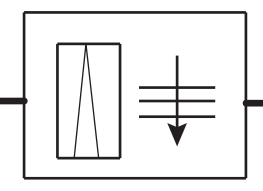
l

"I belong."

c

loopstation, phrase 1
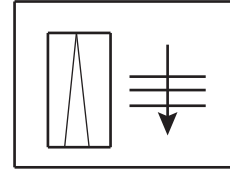
guitar

loopstation, phrase 2

<u>Guitar</u>

cont.

lightly

t
a
p

improvise

(bass only)

loopstation, phrase 1

loopstation, phrase 2

Edmonton.maxpat

patch
on

(v)

granular
bells

(left)

(s.b.)*

(w)

faders up

(l) (j)

(g) (x)

granular
bells

(a)

(s)

(down)

granular
bells

(d)

(f)

(right)

granular
bells

(b)

(6)

(up)

"In March, 1953 I returned to Edmonton
after a month at Churchhill."

"I arrived in Edmonton at the end of
June and reported to Namaio."

"At that time, Station Edmonton was on
118 Avenue and about 97 Street."

"At that time, the city pretty
well stopped at 122 Avene."

on	off
3	2

on	off
5	4

on	off
7	6

on	off
9	8

(3) (5)

(7) (9)

faders down**

(h) (c) (k)

glissandi

(0) (=)   (n) (m)

loopstation, phrase 1

○

loopstation, phrase 2

○

improvise

hold all sliders in one place

Kinect

Logic

* s.b. = space-bar   **all but granular bells

Prelude, movement 3

Change Guitar Rig preset:
Lattice Rub 4

(granular bells)

Latticegong - Logic
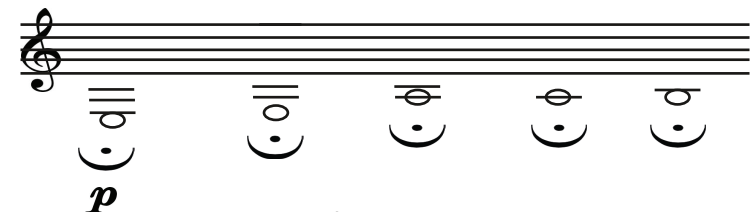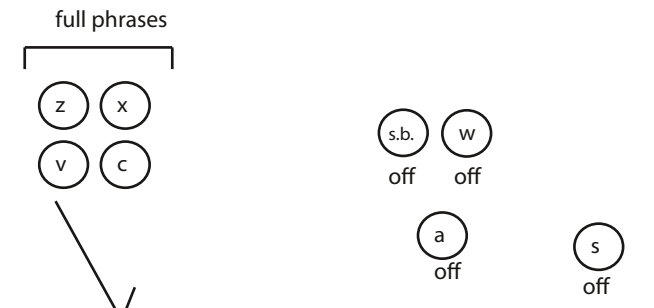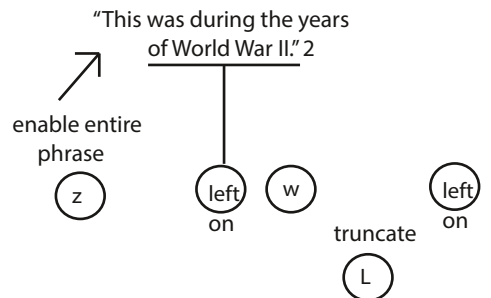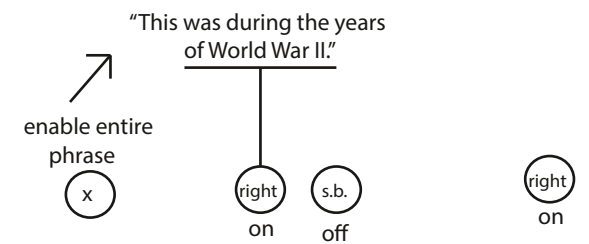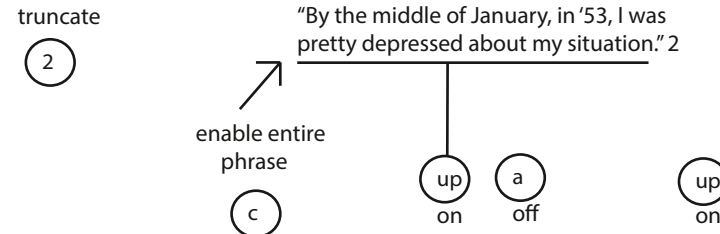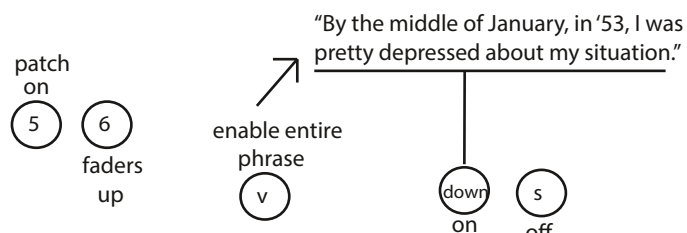
(latticegong cont).

*
Loopstation phrase 1

**
Loopstation phrase 2

Harmo-freeze

𝒑

Play notes with faders down;
fade up when all notes are in.

patch
on
⑤ ⑥
faders
up

enable entire
phrase
(v)

"By the middle of January, in '53, I was
pretty depressed about my situation."

(down)
on
(s)
off

(down)
on

truncate
②

enable entire
phrase
(c)

"By the middle of January, in '53, I was
pretty depressed about my situation." 2

(up)
on
(a)
off

(up)
on

truncate
③

enable entire
phrase
(x)

"This was during the years
of World War II."

(right)
on
(s.b.)
off

(right)
on

truncate
④

enable entire
phrase
(z)

"This was during the years
of World War II." 2

(left)
on
(w)

(left)
on

truncate
(L)

full phrases
(z) (x)
(v) (c)

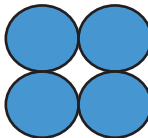(s.b.) (w)
off   off

(a)
off

(s)
off

Kinect

lhx
lhz
rhx
rhz

(L)
Kinect
off

* drag end of chopstick across strings E, B, G ,D; this should be done with great deliberateness, resting the chopstick on each string after playing the previous; a sparse texture should result. Option: hit strings with slide

** drag slide along bass strings - E2 and A2

Harmo-freeze cont.

patcher
on
(2)

Harmo-freeze cont.

"Put the body
in the box."
(3)

dynamic
truncation ✻
(left) (right)

change presets freely
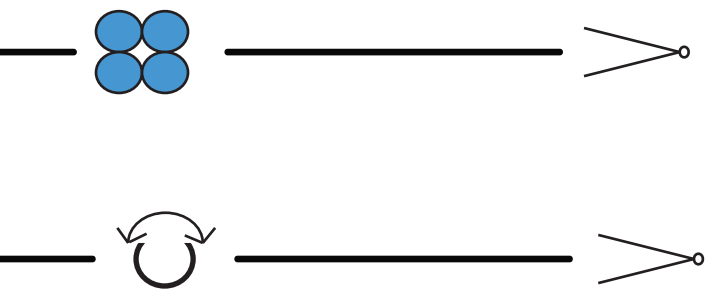
Blocks 122ave.maxpat

"A nice, clean skeleton
in the box."
(4)

dynamic
truncation
(up) (down)

improvise
sound files
on/off

w	s
a	d
b	s.b.
f	c

place on strings; preset: Fuzz Reverse 024

Loopstation phrase 1

place on strings; preset: Deep Vox 022

Loopstation phrase 2

✻ refers to a process whereby the numbers in the number boxes attached to the groove objects continually change

Harmo-freeze *

Harmo-freeze ———— reset

Loopstation phrase 1

*

Loopstation phrase 2

* Indicated pitches are optional; the performer can choose the pitches, but they must be above B5. Play notes with fader down; bring fader up when all notes are in.

Family.maxpat

harmo-freeze cont.

denoise dial

turn dial until beating is heard, then fade out

Patch begins
when opened

truncate

"My family."

s   d

"family"

fade down
" family."

left

"My family." 2
on

1

fade up
"My family." 2

right

"My family." 3   "My family." 4   "My family." 3   "My family." 4
on   on   off   off

2   3   s.b.   down

fade down
"My family." 2

up