

Composing with an Expanded Instrumental Palette

by
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A portfolio of musical compositions, written commentary and accompanying materials,
submitted in fulfilment of the requirements of the degree of Doctor of Philosophy

Written Commentary

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Abstract

This thesis is comprised of a portfolio of musical compositions with accompanying media and a written commentary. In each of the seven compositions, the timbral palettes of musical instruments have been expanded through unconventional physical manipulation. The written commentary presents, in detail, specific examples of how this has been achieved. Alongside descriptions of the work in question, select aspects of other composers' music that approach a similar aesthetic are also referred to.

In addition, the fundamental role technology has played in the creation or realisation of certain pieces is addressed. Also included are descriptions of the various customised notational systems used throughout the portfolio. It is outlined how each of these systems has been constructed in a clear and practical manner and, where possible, has incorporated elements derived from the *lingua franca* in order to communicate the required information as efficiently as possible to the performers.

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Media Track List

Audio CD 1: Recordings of Compositions

Track no.	Title and details	Length
1	<i>Marshes</i> (2013) For twelve guitars. Performed by Open Source Guitars. Conducted by Helmut Oesterreich.	8:42
2	<i>Tampered</i> (2014) For solo cello. Performed by Céline Papion.	14:44
3	<i>Sleep Spindles</i> (2014) For percussion duet. Performed by Paul McGuire.	14:22
4	<i>Percussion Quartet</i> (2015) For percussion quartet. Performed by Paul McGuire.	10:29
5	<i>Gravel</i> (2015), demo recording For sixteen guitars. Performed by Paul McGuire.	7:24
6	<i>Panels</i> (2014) For tuba, percussion, prepared piano, mezzo-soprano two violins, viola, cello and double bass. Performed by Oren Marshall, Sarah Nicholls, Loré Lixenberg and the London Sinfonietta. Conducted by Garry Walker.	8:11
7	<i>Garagen</i> (2014), live recording (audio taken from Video DVD) For dismantled piano, percussion, viola and double bass. Performed by Mārtiņš Baumanis, Kaj Duncan David, Paul McGuire and Jens Peter Moeller.	13:19
		<hr/> 77:11

Audio CD 2: Reference Audio

Track no.	Title and details	Length
1	<i>Percussion Quartet</i> (2015), audio guide track For percussion quartet. Performed by Paul McGuire.	11:14
2	<i>Panels</i> (2014), demo recording excerpt (bars 72–101) For tuba, percussion, prepared piano, mezzo-soprano two violins, viola, cello and double bass. Performed in various sessions by Oren Marshall, Sarah Nicholls, Loré Lixenberg and the London Sinfonietta. Conducted by Garry Walker.	1:02
3	<i>Panels</i> (2014), final recording excerpt (bars 72–101) For tuba, percussion, prepared piano, mezzo-soprano two violins, viola, cello and double bass. Performed by Oren Marshall, Sarah Nicholls, Loré Lixenberg and the London Sinfonietta. Conducted by Garry Walker.	1:02
		<hr/> 13:18

Video DVD: Live Video Recordings of Compositions

Track no.	Title and details	Length
1	<i>Garagen</i> (2014), live video recording For dismantled piano, percussion, viola and double bass. Performed by Mārtiņš Baumanis, Kaj Duncan David, Paul McGuire and Jens Peter Moeller.	13:46
		<hr/> 13:46

Chapter 1

Introduction

As a composer, I am principally interested in investigating the timbral characteristics of sound, and in my music this takes precedence over melodic, harmonic or rhythmic expression; where I do employ specific pitches or rhythms, I treat them as components of timbre or as vehicles for timbral exploration. The particular types of sounds I am concerned with could be broadly described as noise. Although it has been a consistent resource in music over the past one hundred years, as a subjective term, noise has generated much critical discourse in that time.¹ Henry Cowell described it in purely auditory terms as a “sound produced by non-periodic vibration.”² Essentially, it is a “complex [sound] that [denies] pitch to be the most prominent dimension,” as Franck Bedrossian put it.³ On the other hand, Edgard Varèse sought to define it in a more abstract manner when he stated: “To stubbornly conditioned ears, anything new in music has always been called noise.”⁴

For me, noise represents the unfamiliar or the musically underexplored. Specifically, I am referring to unstable textures with complex overtone structures. While there is an established tradition of using extended techniques to create unusual sounds within new music and free improvisation, my fascination with noise, in fact, stems from my interest in rock music, particularly my experience of playing electric guitar in bands as a teenager. I had always been drawn to the idea of creating new sounds out of the instrument. This had initially manifested in my use of bombastic distortion, pitch-shifting, delay and modulation effects. However, I later became more interested in physically interacting with the guitar in alternative ways, including playing on the body of the instrument and using bows, screwdrivers and other objects on the strings in order to transform its sonic palette acoustically (albeit with amplification) rather than

1 Aaron Cassidy and Aaron Einbond, introduction to *Noise in and as Music*, ed. Aaron Cassidy and Aaron Einbond (Huddersfield: University of Huddersfield Press, 2013), xiv.

2 Henry Cowell, “The Joys of Noise,” in *Audio Culture: Readings in Modern Music*, ed. Christoph Cox and Daniel Warner (New York: Continuum, 2004), 23.

3 Franck Bedrossian, “Franck Bedrossian,” in *Noise in and as Music*, ed. Aaron Cassidy and Aaron Einbond (Huddersfield: University of Huddersfield Press, 2013), 171.

4 Edgard Varèse “The Liberation of Sound,” in *Audio Culture: Readings in Modern Music*, ed. Christoph Cox and Daniel Warner (New York: Continuum, 2004), 20.

electronically.

I have carried over this interest in the re-imagining of acoustic instrumental performance practice into my composition, and it is central to the pieces in this portfolio. The unconventional noise-generating gestures I have included in these pieces are all practical and ergonomic, and have been derived from my own personal investigation of an instrument rather than from the consultation of technique books. I have not treated these actions as extended techniques, or momentary exotic flourishes in an otherwise pitch-based or conventionally musical sonic palette. Their resulting sounds make up the predominant content of my musical language.

In this commentary, I discuss in detail how, throughout the accompanying portfolio, I have generated noise via this unorthodox manipulation of acoustic instruments (chapter 2). I then outline the ways in which technology has played a fundamental role in the creation or realisation of certain pieces (chapter 3). Finally, I describe the various customised systems of notation I have used, and how each has been chosen in order to communicate the required information as efficiently as possible to the performers (chapter 4).

Chapter 2

Expanding the Timbral Palette of Acoustic Instruments

In this chapter, I outline how, throughout the accompanying portfolio, I have re-imagined the performance practice of instruments in order to generate noise. I do not describe every instance of every gesture, nor do I describe every type of gesture. I address only the most notable occurrences in the interest of ensuring a coherent discussion. Alongside examples of my own work, I refer to certain aspects of other composers' music that I feel approach a similar aesthetic.

2.1 Expanding the Timbral Palette of Drum Instruments

Drum instruments, such as the snare drum and the floor tom, are ideal agents for the creation of complex and unfamiliar textures, owing to their noise-heavy resonances and their ability to project subtle gestures at a relatively high volume. These instruments are most commonly associated with sounds that have a quick attack and a relatively quick decay, such as the sound that occurs when the top head of a snare drum is beat with a drum stick. Such is the case even in a lot of free improvised drumming—Han Bennick's music is a notable example.⁵ In contrast, I have deliberately focussed a great deal of my investigation of drum instruments in this portfolio around continuous textures.

A tool that has been central to my investigation is the retractable metal-stranded brush, featured in *Garagen* (2014), *Panels* (2014) and most prominently in *Sleep Spindles* (2014). In the third mentioned piece, the performer of the Percussion 1 part makes extensive use of a pair of these brushes, and rather than using them for their conventional purpose of swishing and tapping, they hold them with a tense, dagger-like grip, and aggressively stir and drag their metal strands directly on to the top head of a floor tom, as well as that of a snare drum that has been prepared with duct tape and sandpaper tape, to create a series of sustained, bustling and crackly textures. The brushes are partially retracted, which condenses the metal strands together and allows the performer to move them with force. To create a muffled version of this type of sound, as if a low-pass filter

⁵ “Han Bennick Solo Part 1,” published December 29, 2009, video clip, accessed 17 March, 2016, YouTube, <https://www.youtube.com/watch?v=dWYUnfSYtrs>.

has been applied to it, the performer stirs and drags one of the brushes through a tea towel and onto the top head of the floor tom (rehearsal mark E). The performer of the Percussion 2 part forges a particularly harsh variation of this texture by stirring a partially retracted brush on a piece of coarse sandpaper that is placed on the top head of the floor tom (5 seconds after rehearsal mark H).

These brush-generated sounds are layered with continuous and complementary crunching textures, created by the performers directly and forcefully manipulating their prepared snare drums with their hands. For instance, the performer of the Percussion 2 part crushes sea salt crystals into the top head of their instrument with the palm of their left hand (rehearsal mark D), and the performer of the Percussion 1 part busily scratches through a microfibre cloth at the duct tape preparations on the top head of their instrument (5 seconds after rehearsal mark F). With these gestures, I have consciously channelled the violent, tactile interaction with snare drums that occurs in Michael Maierhof's *Specific Objects, 11 min* (2012), when each of the four percussionists simultaneously crushes a plastic cup into the top head of their instrument (bar 21).⁶

Another tool that has been key to my exploration of unfamiliar drum-based textures is the superball mallet, which is essentially a mallet with a large, synthetic rubber head. One of the established uses for this type of mallet in contemporary music involves dragging its head across the surface of a percussion instrument in order to create a sustained, pitch-based drone. In Roger Reynold's *...From Behind the Unreasoning Mask* (1975), for example, this technique is used on the top head of a bass drum, which results in a low, rumbling pitch (ca. 13:30 [mins:secs] mark).⁷ In *Sleep Spindles*, the performer of the Percussion 1 part employs a reinterpreted, more discordant version of this technique on the top head of a floor tom: while the membrane of the top head vibrates from a superball mallet being dragged across it, a second superball mallet is intermittently hovered 1–2 mm above the top head, which interacts with the vibrations and causes a complex buzzing noise that obscures the pitch (15 seconds after rehearsal mark K).

Superball mallets are also used for an entirely different purpose in *Sleep Spindles*.

6 Michael Maierhof, *Specific Objects, 11 min* (N.p: n.p., 2012).

7 David Loucky, "Contemporary Notation and Limited Indeterminacy: Roger Reynolds' '...From Behind The Unreasoning Mask'," *Ex Tempore*, accessed September 18, 2015, <http://www.ex-tempore.org/loucky/LOUCKY.htm>.

While holding a pair of these by their plastic sticks so that their rubber heads touch the top head of the floor tom, the performer of the Percussion 1 part bows each of the sticks to generate a series of unstable, murky pitches (rehearsal mark S). Here, the sound emanates from the plastic sticks themselves and vibrates through the rubber heads of the mallets. From there, these vibrations travel through the floor tom, which acts as a sort of resonating chamber, amplifying the otherwise inaudible sound with a very subtle reverberation.

This idea of using a drum to amplify the sound of a bowed object has been explored previously in George Crumb's *Star-Child* (1977), where the eighth percussionist is instructed to “hold a rigid wooden ruler (with metal edge) firmly against edge of membrane with the thumb,” with one half of the ruler protruding over the edge of the timpani (just before performance mark 5).⁸ When the protruding half of the ruler is bowed, the resulting pitched sound vibrates against the head and resonates through the timpani.⁹ While Crumb uses this setup to achieve a single sound, the flexibility of the approach involving superball mallets in *Sleep Spindles* allows for greater sonic control, and therefore more variety. Here, the performer manipulates the tonal quality, or brightness of the sound, by changing the angle of the mallets' plastic sticks in relation to the top head of the floor tom, and alters the pitch by changing the distance of their grip on each of the plastic sticks from its corresponding rubber head, in effect, adjusting the portion of the stick that vibrates, whereby the shorter the portion, the higher the pitch. This works in a similar way to how the pitch created from bowing a string on a cello, for example, is altered depending on how far the string is depressed from the bridge.

In *Percussion Quartet* (2015), a prepared floor tom functions as both a resonating chamber and as a means to change the timbre of a simple, momentary sound. The performer of the Percussion 1 part beats a clave, which is placed on the tea towel-covered top head of their floor tom, with a pair of yarn mallets (Section E). The resulting high-pitched clicking that emanates from the clave is effectively amplified through the drum, which also serves to noticeably transform the sound by both lengthening its extremely quick decay time to that of the prepared floor tom itself, and by adding a particularly deep, resonant quality, as if to process it with a short, filtered reverb effect. The filtering is

⁸ George Crumb, *Star-Child* (New York: C.F. Peters Corporation, 1977).

⁹ *Ibid.*

due in part to the presence of the tea towel, which only allows the lower frequencies of the clicking to penetrate through it and into the body of the drum. The performer repeats the action with a mechanical-like relentlessness that deliberately alludes to a programmed sequence on a primitive drum machine, a point that is discussed in greater detail in “3.3: Acoustic References to the failings of Near-Obsolete Technology.”

2.2 Expanding the Timbral Palette of Orchestral String Instruments

One of the principal ways in which I have tried to augment the sound of orchestral string instruments in this portfolio is through the use of bows that have been loosened to the point where their hair hangs with little or no tension. In *Panels*, the first violinist and viola player each twists a loosened bow against the muted strings of their instrument (bar 37). The rolling stick of the bow pushes the loosened hair against the strings, causing a sonority that resembles the crackling of a log fire. In addition, the violin, viola and cello players use loosened bows to perform what I have termed “vertical tremolos” on their instruments' muted strings (bar 10). Here, each performer rapidly rubs the hair-side of their bow over and back along the lengths of the strings, rather than across them, to create a frantic, percussive sound, without the heavy scratch tone or squeaking that would inevitably be present if they were to use a standard-tension bow or regular tremolo bowing.

In Liza Lim's *Invisibility* (2009), written for solo cello, the performer also makes use of a loosened bow, but here the slackened hair, rather than hanging loosely, is wrapped around the stick. When used on the strings in the manner of a standard bow, the resulting texture rapidly alternates between bright and gritty pitched sounds as the slack hair catches between the stick and the string, and the airy, partially-pitched tones associated with *col legno tratto* bowing as the wood rubs directly against the string (0:41 mark of video).¹⁰

While in both *Panels* and Lim's *Invisibility*, the use of loosened bows is restricted to the strings of the instruments, in *Tampered* (2014), I have made frequent use of gestures involving a loosened bow on parts of the cello other than the strings. For example, during the opening section, the performer aggressively twists and rattles a loosened bow against

¹⁰ “Invisibility for solo violoncello Liza Lim (2009),” [n.d.], video clip, accessed September 18, 2015, Vimeo, <https://vimeo.com/13411678>.

the belly of the instrument, as if trying to crack it open, creating a dense, crunching texture in the process (rehearsal mark A). The cellist also bows the rosin-coated face of the bridge with a loosened bow to produce a mixture of a gritty, white noise sound with an intermittent high-pitched whistle (rehearsal mark E). Performing this gesture with a bow tightened to the standard tension, as the cellist does towards the end of *Panels* (bar 71), results in a more constant whistling sound without the gritty element, owing to the cleaner contact between the hair and the bridge.

The idea of bowing the face of a cello's bridge is not without historical precedence. For example, in Helmut Lachenmann's *Pression* (1969–70), the cellist sporadically bows the face of the bridge with a standard-tension bow (page 5, system 2, beat 5), however the intended effect here seems to be more about creating momentary bursts of white noise rather than a high-pitched whistle.¹¹

This is not the only type of non-standard gesture shared between *Tampered* and Lachenmann's *Pression*. In both pieces, the solo cellist bows the tailpiece of their instrument, however the consequent sounds are quite different. In *Pression*, the performer steadily bows with a standard tension bow and the result is a cloudy noise (page 6, system 2, beat 1), whereas in *Tampered*, the performer produces a combination of noise and a clear pitch due to the tailpiece being made from metal, and modulates the ratio of these elements, in terms of their volume, by manipulating the pressure applied to the loosened bow (rehearsal mark J).¹²

The pitch generated from bowing the tailpiece in this way is intended to match the dominant pitch of the gesture that precedes it, where the cellist bows a “bowed behind the node multiphonic” (rehearsal mark I), in order to emphasise the timbral differences between the two sounds. The latter technique, which I first observed in Caspar Johannes Walter's *Split Tones* (2013) (stave IV, bar 35), involves touching the given string at a specific harmonic node, and bowing the string approximately 1–2 cm behind this with a slow bowing speed and a firm pressure.¹³ The multiphonic written in the score for *Tampered*, based around the harmonic node above D#4 on a fourth string that is tuned down from C1 to B0, is used because, on the particular cello the piece was composed

11 Helmut Lachenmann, *Pression* (Wiesbaden: Breitkopf & Härtel, 1969).

12 Ibid.

13 Caspar Johannes Walter, *Split Tones* (N.p: n.p., 2013).

with, the dominant pitch of this multiphonic precisely matches the pitch of the tailpiece. However, if the dominant pitch of the written multiphonic doesn't match the pitch of the performer's tailpiece in this way, I have recommended in the score that they should choose a different harmonic node or re-tune string IV of their instrument until it does, even if this requires tuning the string to a microtonal pitch.

One of the more unusual noises used in *Tampered* is generated when the performer bows the wooden tip of Bow 1 (a loosened bow, held with their right hand) with Bow 2 (a standard-tension bow, held with their left hand), while firmly holding Bow 1 against the belly and bridge face of the instrument (rehearsal mark N). The low, rumbling, noise-drenched pitch sounding from the stick of Bow 1 resonates through the body of the cello, and when the bowing of Bow 2 becomes aggressive, Bow 1 rattles against the instrument, which further obscures any audible sense of pitch and increases the complexity of the overall texture. This gesture concludes the piece, and it is my intention to give the listener the aural impression that the cello is once more on the point of being violently cracked open, on this occasion with a sluggish and stuttering motorised saw of sorts, as if to suggest a more laboured counterpart to the opening section.

A similar gesture is used on the viola in *Garagen* (rehearsal mark B). Although the consequent sound of this is, in itself, not as deep as that found in *Tampered*, due to the comparative size of the viola, it is reinforced by the double bassist who bows the prepared lowest string of their instrument at the same time. However, the most texturally-complex manifestation of this type of gesture occurs at another point during *Tampered*, when the performer bows the head of Bow 1 while simultaneously bowing the centre of the bridge face, resulting in a bizarre combination of the aforementioned low rumbling, which resonates through the cello via the bridge, and a high-pitched whistling and crunching (rehearsal mark K). This is inevitably interrupted by loud and spasmodic scratching noises from time to time, as Bow 1 slips along the face of the bridge due to the pressure applied to it from Bow 2. This is a feature that I fully embrace as part of the texture.

On a number of occasions in this portfolio, the string players use their fingers to create uncharacteristic sounds from their instruments. In *Tampered*, the performer frantically plucks and flicks the muted strings of the cello with their left hand while tapping and scurrying on the belly of the instrument with their right, creating a busy and

uneven, popping and scratching sonority, reminiscent of heavy rainfall on a corrugated roof (rehearsal mark G). In *Panels*, these types of actions are spread out among the second violin, viola and double bass, while complementary noises are played on other instruments in the ensemble (bar 48), resulting in a more colourful version of this texture that intentionally recalls the bustling chaos of Krzysztof Penderecki's *Polymorphia* (1962), when the ensemble of string players play their instruments as finger drums (rehearsal mark 41).¹⁴

2.3 Expanding the Timbral Palette of the Guitar

As a stringed instrument, one of the more practical means of achieving unusual sounds from the guitar is through the use of a bow. In *Marshes* (2013), the acoustic guitars and acoustic bass guitars are each bowed with a bow intended for use on a violin, viola or cello. I had observed this type of approach in the guitar work of Jón “Jónsi” Þór Birgisson of Sigur Rós. For instance, during live performances of 'Glósóli' (2005), Birgisson, with a considerable amount of distortion and reverb applied to his electric guitar signal, bows his instrument in an aggressive fashion, varying the bowing position to bring out intermittent harmonics.¹⁵ Here, he primarily bows monophonic lines on the lowest string of his instrument, giving the sound a cello-like quality (2:40 mark of video).¹⁶

In *Marshes*, on the other hand, I have used bowing as a means for building dense and slowly shifting walls of texture, rather than for melodic purposes. At one point, for instance, the full range of all six acoustic guitars' strings are bowed simultaneously while the performers' fingering remains static.¹⁷ As each of the acoustic guitars is tuned to a uniquely-transposed quartertonal cluster, whereby the upper strings are significantly looser, and the lower strings are somewhat tighter than usual, the result from this gesture is a cacophonous drone that brings to mind the sound of a particularly thick swarm of insects (4:00 mark). In addition, each of the bows has been loosened to the point where its hair hangs with little or no tension. Each performer controls the tension of the hair by

¹⁴ Krzysztof Penderecki, *Polymorphia* (Celle: Moeck, 1962).

¹⁵ “Sigur Rós - Glósóli Live (Benicassim Festival 2008),” published November 8, 2012, video clip, accessed September 18, 2015, YouTube, <https://www.youtube.com/watch?v=HJnELpTIKjQ>.

¹⁶ Ibid.

¹⁷ Unlike orchestral string instruments, which have curved bridges, guitars have flat bridges that allow for all six of their strings to be bowed at once, as well as for either of their outer strings to be bowed in isolation.

pushing their middle finger against it while bowing. As they allow the hair to loosen, a grinding and fizzing sound is generated from the hair getting caught between the stick of the bow and the strings, and this feature becomes more pronounced as the bowing moves closer to the bridge.

During the opening section, the electric guitars, which are also tuned to variously transposed quartertone clusters, are bowed with pieces of wooden dowel (i.e. narrow wooden cylindrical rods). Here, each of the performers bows a given number of strings above fret 6, in relation to their particular capo transposition (rehearsal mark C).¹⁸ The strings are muted between frets 5 and 6 with the performer's fretting hand, to ensure that each string only vibrates between fret 6 and the bridge, and also so that the position of the dowel is supported. As a result, the pitches that sound are those corresponding with fret 6, where the dowel is positioned, rather than with those of the open strings. When performing this gesture, the dowel inevitably deviates from its intended position from time to time, as it is extremely difficult to bow precisely in a straight line, and this causes a subtle and uneven vibrato. The overall texture is undulating and discordant, and as it builds, it starts to almost resemble the sound of a colossal choir, massaging their palates with their tongues while they sing.

In live performances of Radiohead's 'House of Cards' (2007), guitarist Jonny Greenwood achieves a related effect by rubbing a coin back and forth over a series of positions along a muted string of his electric guitar (2:17 mark of video).¹⁹ However, because the movement of the coin here is parallel to the string and much more rapid than the moderately-paced bowing movement of the dowel in *Marshes*, and because it is only possible to perform the gesture on a single string at a time, there is considerably more vibrato and less density present in the sound.²⁰

During his free improvisation performances, Fred Frith often inserts a short piece of dowel or a drum stick behind his electric guitar's strings and uses it, among other things, to bow them unevenly and abruptly (0:08 mark of video), while also feeding the

18 As the upper strings of the guitars in *Marshes* are detuned, and therefore particularly loose and malleable, it is possible to bow a subset of these strings (two or three strings at a time, for instance), as long as the subset includes the upper-most string.

19 "Radiohead - House of Cards, Jools Holland," published February 1, 2008, video clip, accessed September 18, 2015, YouTube, <https://www.youtube.com/watch?v=12TbigLk3Vo>.

20 Ibid.

instrument's signal through a ring modulator.²¹ The result here is much more harsh and jagged than that of the dowel bowing in *Marshes* because of the combination of the pressure at which the drum stick pushes against the strings, Frith's deliberately blunt movement of the drum stick, and the ring modulator.²²

At times, I have written for the guitar as if it were a percussion instrument. For example, in *Percussion Quartet*, the second and third percussionists, who play prepared acoustic guitars laid across their laps, treat their instruments almost like finger drums. In one instance, they tap with their fingertips in repeated semi-quavers on the saddle-board of their guitars, resulting in a deep, kick drum-like throbbing (Section C). This sort of percussive approach to guitar playing can also be observed in flamenco music. The established *golpe* technique involves the performer hitting the body of the instrument with their ring finger or thumb, and it is often used to create drum-like patterns, alongside more traditional, pitch-generating finger picking techniques, turning the instrument into a sort of guitar-drum hybrid.²³ Similarly, in Lachenmann's *Salut für Caudwell* (1977), the second guitarist taps on the body of their instrument with their finger (guitar 2, bar 141) and also with a plectrum (guitar 2, bar 142), which produces a sharper percussive sound. Here, both actions are used together as part of a repeating rhythmic figure that acts as a sort of drum beat.²⁴ As with the flamenco example, the percussive playing style here is used alongside more recognisable techniques, including finger picking.²⁵ In *Percussion Quartet*, on the other hand, I have ignored the guitar's traditional pitch-generating role altogether to ensure that its repositioning as a percussion instrument is felt explicitly.

I have also employed a percussion-like approach to the guitar for the purposes of generating sustained walls of texture instead of rhythmic material. For instance, in *Marshes*, the electric guitar players tremolo drum on the back of their instruments with soft marimba mallets, which causes the detuned open strings to vibrate, resulting in a thick, opaque, tam-tam-like drone (rehearsal mark I). Additionally, in *Gravel* (2015), the

21 "FRED FRITH - solo concert at MÓZG," published September 5, 2008, video clip, accessed March 17, 2016, YouTube, <https://www.youtube.com/watch?v=M2WSeZZV6iQ>.

22 Ibid.

23 Ioannis Anastassakis, *The Art of Rasgueado* (Pacific: Mel Bay Publications, 2010), 66–68.

24 Helmut Lachenmann, *Salut für Caudwell* (Wiesbaden: Breitkopf & Härtel, 1977).

25 Ibid.

performers carry out an overlapping succession of distinct, scurrying-type finger gestures on the bodies of their acoustic guitars, recalling those used on the orchestral string instruments in *Tampered* and *Panels*. However, because these gestures are realised on a much larger scale in *Gravel*, with, at one particular instance, as many as sixteen performers implementing several permutations simultaneously (rehearsal mark D), the consequent sound is a continuous and evolving wash of fragmentary noise.

2.4 Expanding the Timbral Palette of the Piano

As a symbol of pitch-centric music, the piano is perhaps not an obvious choice as a medium for generating noise. However, in preparing the instrument, which essentially involves attaching objects to the strings, it becomes possible to create a variety of complex and unexpected textures. This idea of preparing the piano was pioneered by John Cage who, when composing the music for Syvilla Fort's dance piece *Bacchanale* (1940), sought to recreate the sound of a percussion ensemble with a single piano.²⁶ By applying screws, bolts and fibrous weather stripping to certain strings and then engaging these strings through the keyboard (as in traditional performance practice), he managed to generate a series of sounds that resembled, among other things, bells and tambourines.²⁷ He claimed that his desire to transform the timbral palette of the instrument was largely inspired by Henry Cowell's experiments with the so-called string piano—that is, a piano whose strings are directly manipulated with the performer's hands—in pieces like *The Banshee* (1925).²⁸ Since Cage first introduced it, the prepared piano has featured prominently in new music, free improvisation, and even, on occasion, in popular music, with practitioners as diverse as Sarah Nicolls and Aphex Twin having employed it in their work.

In my own composition, *Panels*, the pianist performs on a prepared instrument. As in *Bacchanale*, my overall aim here has been to transform the piano into a percussion instrument of sorts. However, the soundworlds of the two parts are quite different, owing to the fact that, unlike in *Bacchanale*, most of the pianist's performative gestures in *Panels* occur on parts of the instrument other than the keyboard (including string piano-type

26 John Cage, "How the Piano Came to be Prepared," in *Empty Words* (Middletown: Wesleyan University Press, 1979), 7–9.

27 John Cage, *Bacchanale* (New York: C.F. Peters Corporation, 2001).

28 Cage, "How the Piano Came to be Prepared.,"; Stuart Grais, "Prepared Piano," *DePaul University*, accessed 15 March, 2016, http://facweb.cs.depaul.edu/sgrais/prepared_piano.htm.

plucking gestures on the strings), as well as the fact that the preparation material in *Panels* is adhesive tack, as opposed to screws, bolts or weather stripping. A sphere of this tack, ca. 1.5 cm in diameter, is placed on the strings of each of the top thirty-four notes, just in front of the bridge pins, in order to suppress their pitch and resonance. When the prepared strings are busily plucked, the resulting sound resembles the bursting of bubble wrap (bar 48). Additional spheres of tack are placed on the half-way point of the strings of the notes G6 and D7, which modifies the tone of these notes further, giving them a slightly deeper percussive quality.

This type of adhesive tack-based preparation is also used in Rolf Hind's *Cloud Shadow and Solgata* (2000). However, because the performer in Hind's piece triggers the sounds through the keyboard, and because much of this type of preparation is focused on the low-to-middle range, many of the resulting sounds give off more of a discernible pitch, and are therefore more piano-like than the prepared strings in *Panels*, which are mostly plucked.²⁹

At times during *Panels*, the pianist performs on their instrument using percussion mallets. In these moments, the prepared piano part functions as an extension of the percussion part. For example, towards the end of the piece, the pianist beats on a cluster of the non-prepared lower strings of the instrument with a soft timpani mallet to create a ringing, cymbal-like wash of sound that seamlessly blends with the percussionist's tam-tam and bass drum drone (rehearsal mark J). Elsewhere in the piece, the pianist stirs the metal strands of two brushes into the bridges of the notes B4 and E6 to produce a continuous, non-pitched, crackling texture, effectively doubling what is concurrently played by the percussionist on the snare drum (bar 39).

These types of gestures involving percussion mallets are also used in *Garagen*, but on a dismantled upright piano, consisting of only the soundboard, the frame and the exposed strings. With the instrument laid flat on its back, on top of a pair of oil barrels, it resembles a sort of large-scale, chromatic hammered dulcimer. Although my choice to write for this instrument over a standard piano was purely based on what was available for the commission, I found it, unsurprisingly, to be the superior option for general inside-piano techniques, owing to the ease at which it allows the performer to access the strings.

²⁹ Rolf Hind, *Cloud Shadow and Solgata* (Milan: Ricordi, 2000).

For instance, because the casing is removed, it is possible to use a bow on the strings, unobstructed, and in *Garagen*, a cluster of the highest strings is bowed in this way, behind the agraffe, to create a piercing hiss (rehearsal mark J).

A similar idea is used on the prepared piano in *Panels*, but it is achieved through different means, with slightly different results. Faced with more limited access to the inside of the piano, the performer uses a piece of rosined, nylon fishing line to bow the strings corresponding to the note B5, behind the bridge (bar 72). The consequent hiss is more granular than that heard in *Garagen*, because it is not possible to distribute rosin as evenly along the fishing line as it is along the hair of a bow. This technique is a core feature in the performance practice of Stephen Scott's Bowed Piano Ensemble, who tend to use it only on the tuned part the strings; in other words, on the part that is in front of the bridge.³⁰

2.5 Expanding the Timbral Palette of Other Instruments

In my opinion, the majority of sounds that are possible to create with a human voice, even those involving extended techniques, are ultimately recognisable as being vocal in nature, and as I am particularly interested in working with unusual sounds whose sources are difficult to determine, I don't often write for singers. However, with *Panels*, I had an opportunity to work with a sizeable and instrumentally-diverse ensemble, where the mezzo-soprano could be treated as an ensemble instrument. Here, the singer supplements textures sounding from the other instruments with subtle, imitative sounds. At one point, the mezzo-soprano is instructed to produce the highest possible “sss” sound with her mouth while both exhaling and inhaling (bar 71). Used on it's own, this sort of sonority brings to mind the work of contemporary vocal soloists such as Franziska Baumann, but in this particular context, it blends seamlessly with, and serves to add a subtle thickness and colour to the extremely high, piercing texture sounding from the strings and the bowed prepared piano.³¹ Elsewhere in the piece, the mezzo-soprano makes chewing and consonant noises with her mouth, which adds density to the busy and comparatively loud

30 Ryan Raul Bañagale, “The Bowed Piano Ensemble,” *Amusicology: Musicology in 1,000 Words or Less* (blog), published September 27, 2009, accessed 18 September, 2015, <https://amusicology.wordpress.com/2009/09/27/the-bowed-piano-ensemble/>.

31 “Franziska Baumann - timeless+désire,” published June 26, 2010, video clip, accessed September 18, 2015, YouTube, https://www.youtube.com/watch?v=E8gJl1l_xyo.

tapping texture generated by the rest of the ensemble (bar 57).

For much of *Panels*, the tuba serves a similar function to the mezzo soprano, supplementing sounds created on the other instruments. For instance, while the vocalist produces the highest possible “sss” sound, the tuba player does the same, but through their instrument, via the mouthpiece, which serves as a sort of low-pass filter for their particular rendition (bar 71). Similarly, the tuba player doubles the busy chewing and consonant noises of the mezzo-soprano, but through the mouthpiece and while also depressing and releasing the valves of the instrument, which adds an extra metallic dimension to the overall texture (bar 57).

However, during the opening section of the piece, the tuba is at the forefront. Here, the player fingers the note G1 while simultaneously performing a deep, granular growl through the mouthpiece, producing the sound at the back of the throat but without engaging their vocal cords. This results in a thick, ambiguous, ostensibly non-pitched band of low fuzz, completely isolated in terms of frequency from the frantic tremolo texture of the percussion and string instruments (bar 10). In using this sound, I am indebted to new music and free improvisation tuba players like Oren Marshall, for whom I wrote the part, and Robin Hayward, who regularly use growling as part of their practice, although they often do so in tandem with a multiphonic, which results in a much more pitch-centric sound than that used in *Panels*.³²

32 “Oren Marshall / Improvised Tuba / Kammer Klang,” published April 1, 2015, video clip, accessed March 16, 2016, YouTube, <https://www.youtube.com/watch?v=juImliQNKhU>; “Jeroen Vandesande - CIRCUIT 03 with Robin Hayward,” published January 13, 2016, video clip, accessed March 16, 2016, YouTube, <https://www.youtube.com/watch?v=WFKP5gkexbU>.

Chapter 3

The Role of Technology in my Music

In this chapter, I explain how I have used certain studio techniques as compositional tools in many of the works contained in this portfolio, despite having written exclusively for live acoustic instruments. In addition, I discuss how I have made numerous acoustic references to the sounds of technology, and also why amplification so often plays a key role in the live realisation of my music.

3.1 Sampling, Looping and Demoing as Compositional Tools

There have been a number of instances in this portfolio where I have made use of the practices of sampling, looping and demoing as part of the compositional process. In the case of *Panels*, these practices have directly influenced specific characteristics of the finished piece (this is something I will discuss in “3.2: Acoustic References to Technology”). Sampling involves segmenting an audio sample from its original context and reusing it in a recording or a live performance.³³ This technique was first used in 1948, in the *musique concrète* of Pierre Schaeffer.³⁴ In his development of the *sillon fermé*, or locked groove, in which a short audio sample is recorded onto a complete circular groove (rather than on an inward spiral) on a phonograph disc, he is also responsible for the practice of looping, whereby a sample is made to repeat over and over again.³⁵

A demo essentially functions as a recorded approximation, or demonstration of how a piece of music is intended to sound, before it is performed or recorded properly.³⁶ The act of demo-recording has been a fundamental step in popular music record production for over fifty years, having been practiced by the likes of The Beach Boys, The Beatles and countless other artists.³⁷ Giacinto Scelsi is an example of a composer who

33 Nicholas Jennings, “The Art of Sampling,” *Words & Music* 9, No. 4 (Winter 2002): 25.

34 Hugh Davies, “A History of Sampling,” *Organised Sound* 1 (1996): 7.

35 Ibid.

36 Bruce Kaphan, “Demos Into Deals: Making a Plan of Attack to Get into the Business,” *Recording: The Magazine for the Recording Musician*, accessed September 18, 2015, <http://www.recordingmag.com/resources/resourceDetail/106.html>.

37 Joe Marchese, “The Beatles and The Beach Boys Beat The Boots On 'The Big Beat 1963' and 'Bootleg Recordings',” *The Second Disc*, accessed September 18, 2015, <http://theseconddisc.com/2013/12/17/the-beatles-and-the-beach-boys-beat-the-boots-on-the-big-beat-1963-and-bootleg-recordings/>.

used sample-based demo recording as a compositional tool. He recorded Ondiola improvisations onto tape, and later segmented these recordings into samples that were then overdubbed and rearranged into demos.³⁸ These demos were then transcribed, usually by an assistant, so that they became scores for performance on live instruments.³⁹

With the advent of affordable, computer-based DAWs (digital audio workstations), it has become possible, in pitch-centric instrumental composition, to create a reasonably accurate-sounding demo using high quality samples from commercially available, software-based, orchestral sound libraries, such as EastWest's Hollywood Strings.⁴⁰ As a composer who works with an unfamiliar, noise-based sonic palette, however, these types of sample libraries rarely contain sounds that I would consider using in a piece. For this reason, any demos I have made in the creation of this portfolio have been constructed in the same way as Scelsi, that is, with the aid of samples I have recorded and manipulated myself.

In *Panels*, for example, I created short recordings of every single sound used (many of which are recordings of the performers playing in the early-stage workshop of the piece) and then segmented, looped and layered each sample in various ways using a DAW. After auditioning hundreds of different combinations, I was able to decide upon the final arrangement of the piece. I then created a mix down of this arrangement that became the demo (listen to tracks 2 and 3 of Audio CD 2 for a comparison between the demo recording of bars 72–101 and the final recording of the same passage).

The practice of constructing demos either entirely or partly from home-recorded samples in this way, has become quite popular in new music, with composers like Michael Maierhof, Matthew Shlomowitz and Alexander Schubert employing it as part of their composition processes.

3.2 Acoustic References to Technology

On a number of occasions in this portfolio, I have set out to imitate, through acoustic

38 Cat Hope, Stuart James and Lindsay Vickery, "Sogno 102: Harmoniously Revisioning the Compositional Techniques of Giacinto Scelsi," in *Harmony: Proceedings of the Australasian Computer Music Conference 2014*, ed. Timothy Opie (Melbourne: Australasian Computer Music Association, 2014), 61.

39 Ibid.

40 Rob Shrock, "Orchestral Sounds Roundup," *Keyboard*, accessed September 18, 2015, <http://www.keyboardmag.com/gear/1183/orchestral-sounds-roundup/48460>.

means, the sonic artefacts that result from using specific types of technology in the process of music production. In *Panels*, for example, certain elements of the finished piece, written for live performance by an acoustic chamber ensemble, deliberately allude to the aforementioned sampling-centric manner in which the demo was constructed. Here, the sounds are arranged into dense slabs, or panels of noise. The unnaturally abrupt entries and exits, and repetitive, looping-like quality of these slabs recall a sort of crudely jagged “note-on” and “note-off” triggering of various recordings on a digital sampler. It is as if the conductor's cueing triggers the players to perform live samples.

In *Tampered*, the performer bows the cello's tailpiece in a specific way so that, at times, the dynamic shape of the resulting pitch, which slowly swells and suddenly cuts off as it peaks, resembles a recording of a sound that has a quick attack and a slow decay, such as a held piano note, played backwards (rehearsal mark J). This studio technique, commonly known as *reversing*, is another whose popularity can be attributed to Pierre Schaeffer, who in *Étude Violette* (1948), for instance, applied it to a series of piano chords (ca. 1:00).⁴¹

In *Gravel*, I have set out to recreate the electronic process at the heart of works such as Karlheinz Stockhausen's *Elektronische Studie II* (1954), in which synthesized “white noise” is filtered into various bands of “coloured noise,” but with an ensemble of acoustic guitars rather than an electronic music studio.⁴² Each of *Gravel*'s coloured noise bands is a fragmentary wash, created, for the most part, through the continuous performance of rapid finger gestures on the bodies of the guitars. Each of these washes conspicuously relates to the others, to the point where it sounds as though they all derive from a single, granular white noise sound. The perceived variety of filtering is achieved through a number of factors, including the particular choice of area on the body of each acoustic guitar that is tapped, scratched or scurried upon with the performer's finger pads or nails. Each area on the guitar, when struck, emits a unique set of dominant frequencies, thus colouring, or filtering the sound in an individual way. Occasionally a material, such as a piece of coarse sandpaper (Group B, bar 64) is placed between the performer's active

41 Thom Holmes, *Electronic and Experimental Music: Technology Music and Culture* (New York: Routledge, 2012) 170.

42 Elliott Antokoletz, *A History of Twentieth-Century Music in a Theoretic-Analytical Context* (New York: Routledge, 2014), 367.

fingers and the chosen area on the guitar, and serves, in a sense, to filter the sound further.

This idea of assimilating the sounds of technology into music was central to the compositional aesthetic of Italian futurist Luigi Russolo.⁴³ In the early years of the Twentieth Century, Russolo rejected traditional, “anemic” musical sounds, and instead sought to channel the vibrant and brutal noises of the industrialised landscape, which included “the muttering of motors,” “the bustle of pistons” and “the shrieks of mechanical saws,” into his music.⁴⁴ Not content with the limitations of traditional orchestral instruments, he set about inventing his own noise-generating devices called *intonarumori* to create these sounds.⁴⁵

3.3 Acoustic References to the Failings of Near-Obsolete Technology

While Russolo and the Futurists, in their allusions to technology, were trying to create a soundworld centred on the idea of progress, in *Percussion Quartet*, I intentionally make reference to what can be interpreted as the shortcomings or failings of near-obsolete technology.⁴⁶ The relentless, almost mechanical repetition of percussive sounds is intended to bring to mind a simple automated sequence programmed on a drum machine. Many of the percussive sounds used in the piece, which are produced through unconventional means, vaguely resemble, but don't entirely recreate familiar drum kit tones. For example, when the performers of the Percussion 2 and Percussion 3 parts tap on the saddle of their prepared acoustic guitars with the tips of their forefingers, the resulting sounds could nearly be compared with those of a partially tuned kick drum (Section C). Also, when the performer of the Percussion 4 part rimshots with their forefingers near the edge of their prepared floor tom's top head, while the performers of the Percussion 2 and Percussion 3 parts tap on the belly of their prepared guitars with the pads of their forefingers, the aggregate sounds almost recall those of a snare drum (Section D). This repetitive sequencing of approximated drum kit sounds brings to mind early drum machines, such as the Roland TR-808, which had limited sonic capabilities and only the means to

43 Luigi Russolo, “The Art of Noises: Futurist Manifesto,” in *Audio Culture: Readings in Modern Music*, ed. Christoph Cox and Daniel Warner (New York: Continuum, 2004), 12.

44 Ibid.

45 Valerio Saggini, “Intonarumori,” *Theremin Vox*, accessed September 18, 2015, <http://www.thereminvox.com/article/articleview/116.html>.

46 Russolo, “The Art of Noises,” 10–14.

produce crude estimates of familiar drum tones.⁴⁷

Certain elements of *Percussion Quartet* intentionally recall sonic quirks associated with analogue magnetic tape. For example, the audible presence of pink noise throughout the piece, caused by high-gain amplification, brings to mind the type of hiss one might hear on a multi-tracked tape recording.⁴⁸ In addition, the performers, who all play along to an in-ear metronome, aim for rhythmic precision throughout, however subtle deviation is inevitable through human error. I fully embrace these deviations and view them as references to the type of sonic artefacts that could result from recording a programmed drum sequence on old and dirty, wow and flutter-prone tape. In the context of tape playback, wow and flutter can be defined as types of frequency distortion caused by fluctuations in tape speed.⁴⁹

Because of these references to the sounds of old technology, *Percussion Quartet* could be described as a hauntological piece of music. Originally conceived in 1993 by philosopher Jacques Derrida in relation to what he regarded as the spectre of Marxism, which he felt would haunt Western society long after the collapse of the Soviet Union, hauntology is a term that has since been applied to music that is possessed by sonic spectres of the past.⁵⁰ Boards of Canada channelled this idea in their albums *Music Has the Right to Children* (1998) and *Geogaddi* (2002), through their use of vintage synthesisers and audio samples from old broadcasts of Sesame Street, for example, to create a quasi-bygone soundworld.⁵¹ For me, the grainy production value of these albums suggests an imagined idea that their master tapes had been re-discovered in a damp and dusty basement somewhere, having endured years of degradation, and this is the same sort of impression I have set out to give the listener in *Percussion Quartet*.⁵²

47 "Roland TR-808 Rhythm Composer," *Vintage Synth Explorer*, accessed September 18, 2015, <http://www.vintagesynth.com/roland/808.php>.

48 R. G. Gupta, *Audio and Video Systems* (New Delhi: Tata McGraw-Hill Education, 1995), 106–108.

49 *Ibid.*, 106.

50 Adam Harper, "Hauntology: The Past Inside The Present," *Rouge's Foam: Excessive Aesthetics* (blog), October 27, 2009, accessed September 18, 2015, <http://rougesfoam.blogspot.co.uk/2009/10/hauntology-past-inside-present.html>.

51 *Ibid.*

52 Boards of Canada, *Music Has the Right to Children*, Warp Records WARPCD55, 1998, CD.; Boards of Canada, *Geogaddi*, Warp Records WARPCD101, 2002, CD.

3.4 Amplification

For live performances of *Tampered*, *Sleep Spindles* and *Percussion Quartet*, the instruments are amplified. The primary function of amplification in *Tampered* and *Sleep Spindles* is to project the sonic microdetail of the performance to the audience, so that they hear what the performers hear. As Gérard Grisey stated in relation its use in his piece *Dérives* (1974), amplification “renders perceptible all the imperfections [and] the incessant mutations of an instrumental sound.”⁵³ In *Percussion Quartet*, the amplification is also intended to significantly increase the volume of the performance, to the point where the audience should almost feel as though they are listening to lo-fi, drum machine-based music in a nightclub.

The way in which the instruments are amplified in these pieces is through close miking, rather than through the use of clip-on microphones or instrumental pickups, which tend to only focus on a particular part of an instrument, such as the strings of a cello. I find that with close miking, it is possible to amplify a larger portion of an instrument, and therefore capture a larger picture of its sound, without sacrificing its microdetail.

In *Marshes*, the electric guitars are amplified with pickups and amplifiers, as one would expect. The amplifiers are placed immediately in front of the corresponding performers, so that the amplified sounds project from their position, rather than from a set of speakers at the front of the stage, and therefore integrate homogeneously with the acoustic sounds in the ensemble. Here, as with *Panels*, *Gravel* and *Garagen* (which are entirely non-amplified pieces), I am not interested in projecting the sonic microdetail of individual gestures. Instead, my principal concern is the sound of the ensemble as a whole.

⁵³ Gérard Grisey, Liner Notes, *Partiels/Dérives*, trans. Liam Cagney, Ensemble Ars Nova, conducted by Boris de Vinogradov, Orchestre national de France, conducted by Jacques Mercier, Erato STU 71157, 1981, LP.

Chapter 4

Notation

In this chapter, I discuss the different approaches to notation I have used throughout the accompanying portfolio. The particular notational style used in each piece has depended on a number of factors, such as the types of performers, instruments or actions involved. I have taken an unconventional approach only when the traditional option has proven to be less effective in communicating the required information to the performer. In each instance, I have aimed to present the notation in a clear, practical and efficient manner.

4.1 Temporal Notation

One of the fundamental decisions to be made when notating a piece relates to the manner in which musical time is indicated. I have used various methods in this portfolio, the choice of which has been determined by the particular requirements of the given piece. In *Panels*, for example, each gesture has a very definite beginning and ending, and precise synchronicity between these gestures is a priority. For these reasons, time is illustrated here using conventional rhythmic notation.

Temporal accuracy is essential in *Marshes* as well. However, because the score contains numerous graphical elements that would render traditional rhythmic notation redundant, the time is instead counted upwards in minutes and seconds from the beginning of the piece, and indicated at regular intervals above each system. In order to ensure absolute precision, the performers and the conductor all follow synchronised stopwatches.

As the score for *Sleep Spindles* also contains graphic components, the unit of time is again measured in seconds rather than in beats. However, taking a cue from Penderecki's *Polymorphia*, I have indicated the duration of each section here, and not a progressive timeline.⁵⁴ These durations are approximated so that the performers are given the required freedom to deliver the various textures, which are, on an individual level, more complex and nuanced than those heard in *Panels* or *Marshes*, with vigour.

⁵⁴ Penderecki, *Polymorphia*.

4.2 Guitar Tablature Notation and Modified Guitar Tablature Notation

A lot of the unconventional notation I have used in this portfolio is ultimately derived from the principles of guitar tablature notation. Guitar tablature, in its traditional form, is used to communicate fingering rather than pitches and rhythms to the performer.⁵⁵ Each horizontal line of a six-line guitar tablature stave represents a specific string of the instrument, and numbers, rather than note heads, are written on these lines, indicating the fret number (i.e. the position) at which the given string(s) should be depressed.⁵⁶ In a sense, tablature is a type of action-focussed notation, whereas standard staff notation is, at least in regard to pitches, result-focussed.

When notating unorthodox gestures that occur on the strings of a guitar, tablature can sometimes prove to be a more efficient foundation for doing so than standard notation, due to the simple visual connection between the tablature stave and the strings of the instrument, as well as its established use as an agent for communicating actions rather than results.

In *Marshes*, during passages where the guitarists perform bowing gestures, one of the principle ways in which each performer achieves sonic variety is through changing the amount of detuned strings they focus their bows on at a given time, and I have used a modified form of tablature notation to communicate these changes. As the performers' fingering remains static throughout each passage, this is only indicated once (along with resulting harmony when all six strings are bowed), immediately before the passage begins. Playing commences from the triple vertical line (to the right of the fingering notation), and the cut-up tablature stave thereafter indicates which strings the performers should focus their bowing on (fig. 4.2.1).

⁵⁵ Ralph Denyer, *The Guitar Handbook*, 2nd ed. (London: Pan Books, 1992), 67.

⁵⁶ Ibid.

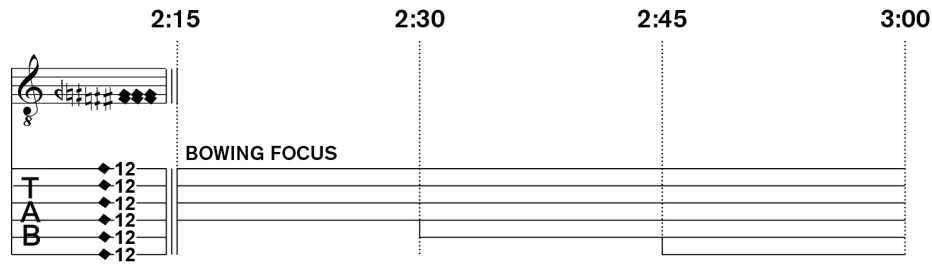


Fig. 4.2.1: Modified tablature (with resulting pitches) in *Marshes*: Performer 9, 2:15–3:00.

Had I used purely result-focussed notation as a basis for communicating these ideas, the outcome would have been cluttered and difficult to read, and not conveyed the performers' fingering; an essential piece of information in this context, given the fact that the strings are dramatically detuned, and therefore render the performers' knowledge of the relationship between finger positions and specific pitches, practically useless (fig. 4.2.2). Simply put, the tablature-derived notation used in the final score is a cleaner, more efficient and descriptive presentation of information.

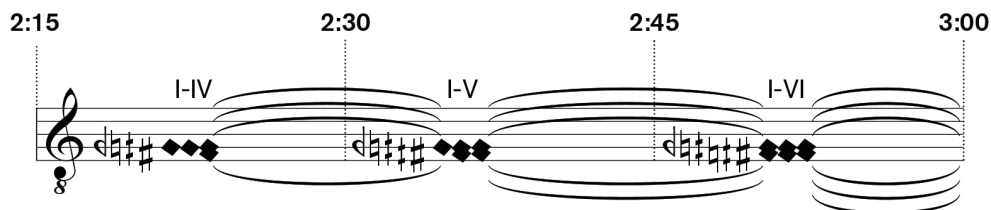


Fig. 4.2.2: Result-focussed notation not used in *Marshes*: Performer 9, 2:15–3:00.

Helmut Lachenmann is another composer who has adapted certain principles of guitar tablature for a customised notational system, but in a different manner. In *Salut für Caudwell*, invented note heads, rather than fret numbers, are plotted on a six-line, tablature-type stave. Each of these note heads corresponds with a particular extended technique, and is given a rhythmic value. Interestingly, the spaces above the horizontal lines, rather than the lines themselves, are intended to represent the strings of the guitar. Presumably this is for the sake of legibility, as the point size of the pen used to notate the score is quite thick. The tablature-type stave is accompanied by a standard stave beneath it, which is only used when the guitarist is directed to perform an action with a specific

pitch or set of pitches, otherwise it is left blank (fig. 4.2.3).⁵⁷

Fig. 4.2.3: Modified tablature notation in Helmut Lachenmann's *Salut für Caudwell*:
Guitar 1 and Guitar 2, bars 24–27.⁵⁸

4.3 Tablature-Type Notation Adopted for Other Instruments

As demonstrated in the score for Lachenmann's *Salut für Caudwell*, the guitar tablature staff may be used as a graph onto which customised symbols may be plotted in order to indicate unorthodox actions involving the instrument's strings.⁵⁹ This type of notational approach may also be applied to non-fretted string instruments, as is the case with *Tampered*, written for solo cello, where triangular symbols are used to convey plucking and flicking gestures. Unlike in *Salut für Caudwell*, the symbols in *Tampered* are not given a rhythmic value, as the piece is non-metrical.⁶⁰ In addition, this type of notation is contained within a box, which in the context of the score, means that the performer is expected to approximate rather than precisely replicate what is written (fig. 4.3.1). The last point is discussed in more detail in “4.8: Waiving a Degree of Control in the Interest of a Non-Rigid Performance.”

⁵⁷ Lachenmann, *Salut für Caudwell*.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Ibid.

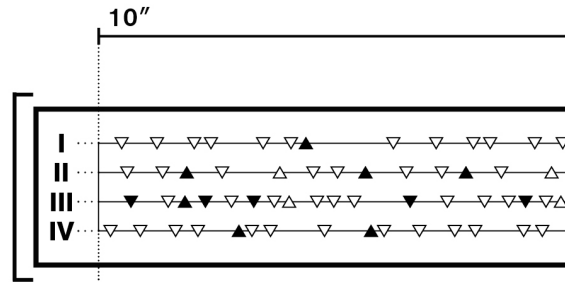


Fig. 4.3.1: Modified tablature notation in *Tampered*: Right hand, rehearsal mark F.

In combination with a customised clef, it is possible to use a tablature-like approach to describe a specific position range on an instrument, other than a range of strings, where the player should perform an action. In *Tampered*, I have invented a clef to define a range along the top face of the cello's bridge, from the point at which it makes contact with the strings, as far as the point at which it meets the belly of the instrument. The vertical axis of the accompanying box-shaped stave corresponds with the clef's range. Various types of lines are plotted on this stave to show how the performer's primary bow should interact with the face of the bridge. For example, a dashed horizontal line depicts the position on the face of the bridge at which the bow should be held still, while a solid curved line illustrates the changing position of the bow, as well as the rate of this change, as it is dragged along the face of the bridge (fig. 4.3.2).

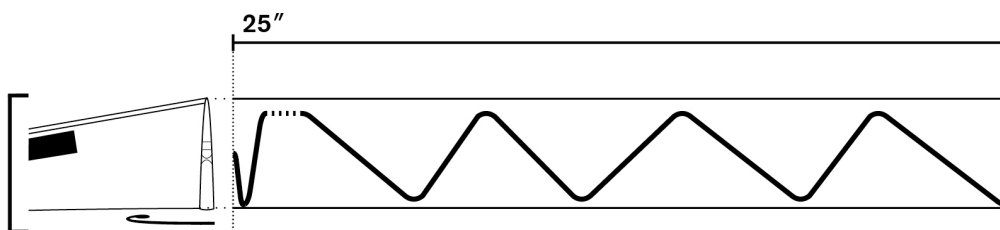


Fig. 4.3.2: Tablature-like notation depicting the how Bow 1 interacts with the face of the cello's bridge in *Tampered*: Right hand, rehearsal mark L.

For the Percussion 1 part of *Sleep Spindles*, I have used a single graphic clef and tablature-type stave combination for depicting both the position of the performer's grip, as well as that of the bow, on the plastic sticks of a pair of superballet mallets. On the stave, the horizontal, line-filled wedge characterises how far the performer's grip on the plastic

sticks should be from the heads of the superballet mallets, while the thicker horizontal line depicts the position at which the plastic sticks should be bowed (fig. 4.3.3). Here, as the clef itself is visually representative of how the performer interacts with the superballet mallets, it appears in numerous variations, updating at the start of each system to show, for example, which part of the sticks are gripped at that particular moment, and whether the bow is being held against them.

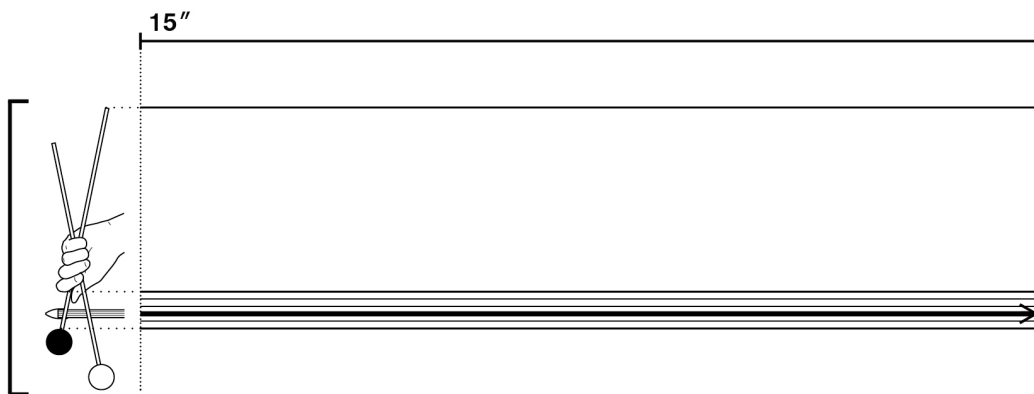


Fig. 4.3.3: Tablature-like notation depicting the position of the performer's grip and the bow on the plastic sticks of the superballet mallets in *Sleep Spindles: Percussion 1*, rehearsal mark S.

It is possible to adapt a tablature-like approach to convey the position of one object in relation to another, as can be observed in Michael Maierhof's *Specific Objects, 10 min* (2013–14). Here, each performer blows through the pierced bottom of a plastic cup in the direction of a microphone, and one of the principle ways in which they vary the resulting sound is by changing the position of their cup in relation to their mouth and their microphone. An invented graphic clef, which is essentially an illustration of these objects, and an accompanying tablature-like staff are used to notate this changing of position (fig. 4.3.4).⁶¹

⁶¹ Michael Maierhof, *Specific Objects, 10 min* (N.p: n.p., 2013–14).

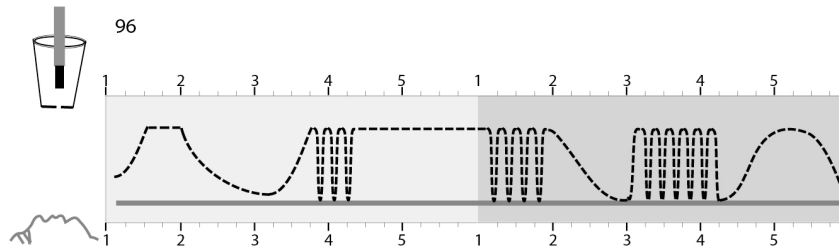


Fig. 4.3.4: Tablature-like notation depicting the position of the plastic cup in relation to the performer's mouth and the microphone in Michael Maierhof's *Specific Objects*, 10 min: Performer 2, bars 96–97.⁶²

4.4 Where Tablature-Type Notation is Insufficient to Describe a Specific Position on an Instrument

In the previously mentioned instances, where a combination of a graphic clef and a tablature-type stave have been used to map a certain range on an instrument or a range between a set of objects, it has only been necessary to refer to a position in terms of a single dimension that corresponds with the vertical axis of the stave. For example in *Tampered*, where the bow is used on the face of the bridge, its position is only determined in relation to the bridge's length (fig. 4.3.2). There is no need to define it in respect to the width because the bow spans the entirety of the width during such gestures. On the other hand, where one is required to define a series of precise positions on a two-dimensional plane, this sort of notational approach cannot suffice as, in my notational system (and in the vast majority of Western notational systems), the horizontal axis of a stave must refer to time and therefore cannot be used to define the second dimension of a position.

In *Sleep Spindles*, I was confronted with this issue. I decided upon a system based around a combination of labelled diagrams that illustrate specific positions and the routes of movement between them on a two-dimensional plane (such as the top head of a floor tom), as well as a horizontal region underneath each diagram where these movements between positions are notated as events in time. The diagrams are shown in the main body of the score itself, numerous times in some instances (depending on the amount of position changes) rather than just once in the performance notes, as there are too many labels to fit onto a single diagram. The labels are numbered according to the order of position changes that take place during a particular gesture, and the shape of each label

⁶² Ibid.

refers to the type of implement to be used. In the horizontal region underneath each diagram, a dashed line after a label indicates that the performer should focus the implement at the given position, and a solid, arrow-headed line pointing towards another label depicts when they should move to the next position along the route shown in the diagram (fig. 4.4.1).

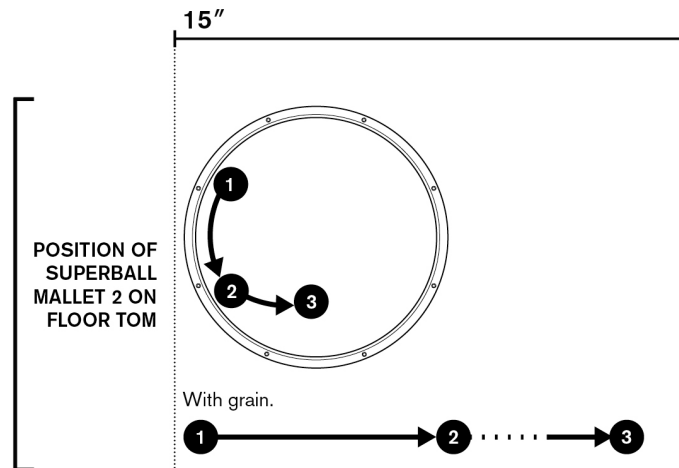


Fig. 4.4.1: Diagram-centric notation depicting the movement of Superball Mallet 2 along the top head of the floor tom in *Sleep Spindles*: Percussion 1, left hand, rehearsal mark C.

4.5 Customised Symbols

In certain instances in this portfolio, the cleanest and simplest way to communicate an unorthodox action to the performer has been through the use of a customised symbol. In order to maximise efficiency, each symbol has been, where possible, derived from an existing *lingua franca* symbol or made to resemble the physical action it corresponds to in some way. For example, the symbol that describes the “vertical tremolo” action in *Panels*, where the string players rapidly drag their bows over and back along the lengths of specific strings, consists of a standard, triple-stroke tremolo symbol with an arrow-headed vertical line behind it (fig. 4.5.1).



Fig. 4.5.1: Comparison between a standard, triple-stroke tremolo symbol (left) and a vertical tremolo symbol (right, as used in *Panels*: All string players, bar 10).

In *Tampered*, the “bowed behind the node multiphonic” symbol is intended to bring to mind the appearance of the action from the perspective of the performer; the vertical line serves as the string, the lower note head represents the nut of the cello and the pitch of the open string, the diamond note head points to the particular harmonic node of the string that is to be touched, while the illustrated bow underneath the diamond note head shows that the string should be bowed behind the node (fig. 4.5.2).

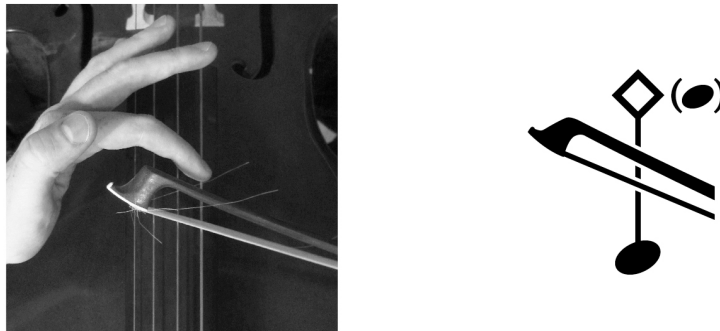


Fig. 4.5.2: Comparison between how the “bowed behind the node multiphonic” action appears to the performer (left) and the symbol used to depict this action (right, as used in *Tampered*: Rehearsal mark I).

This symbol was partly based on that used by Caspar Johannes Walter to describe the same type of technique in *Split Tones*, whereby an image of a bow is shown directly beneath the note head (fig. 4.5.3).⁶³

⁶³ Walter, *Split Tones*.



Fig. 4.5.3: Customised symbol depicting multiphonic in Caspar Johannes Walter's *Split Tones*:
 Stave IV, bar 35).⁶⁴

In *Sleep Spindles*, the symbols that characterise the individual performance implements, for the most part, are based on the physical appearance of those implements. For instance, the star-shaped symbol is intended to resemble the metal strands of a retractable metal-stranded brush spreading out on the surface of a drum, while the circular symbol represents the spherical head of a superbball mallet (fig 4.5.4).

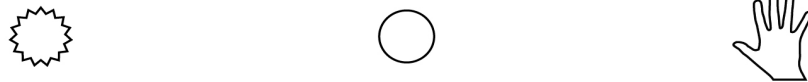


Fig. 4.5.4: Customised symbols depicting Brush 1 (left), Superball Mallet 1 (centre), and
 Right Hand (right) in *Sleep Spindles*: Percussion 1.

4.6 The Use of Graphic Wedges to Notate Dynamic Elements

When bowing a string or another part of an instrument in order to emit a sound, two fundamental factors that affect the dynamic of the resulting sound are the speed of the bowing action, and the pressure applied to the bow during this action. In general performance practice, a string player may interpret a traditional dynamic marking on a score by adjusting both elements simultaneously.⁶⁵ However, each of these can also influence the timbre of the sound in a unique way, and when one wishes to notate independent manipulations of these elements, traditional dynamic markings cannot suffice on their own. This has been something I have had to consider on a number of occasions in this portfolio. In *Marshes*, my solution has been to notate the bowing speed and bowing pressure as wedges plotted onto separate graphs. The two graphs lie on top of

⁶⁴ Ibid.

⁶⁵ James Kjelland, *Orchestral Bowing: Style and Function* (Los Angeles: Alfred Music, 2004), 18.

one another, with mirrored extremes, as if they are two sides of the same object (i.e. the dynamic envelope, fig. 4.6.1).

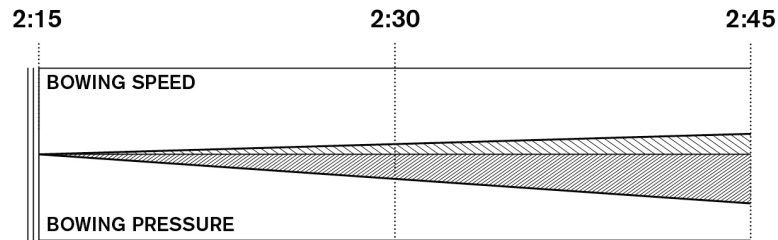


Fig. 4.6.1: Graphic wedges depicting bowing speed and bowing pressure in *Marsbes*: Performers 6–9, 6:30–7:15.

In *Tampered*, when the cellist performs a “bowed behind the node multiphonic” with their loosened Bow 1, I have used a vertically lined wedge to illustrate the dynamic envelope of the dominant pitch in relation to the rest of the multiphonic, and this is controlled through the amount of pressure applied to the bow. The speed of the bow, on the other hand, influences the dynamic of the overall sound in a less biased manner, and this is depicted using traditional dynamic markings underneath (fig. 4.6.2).

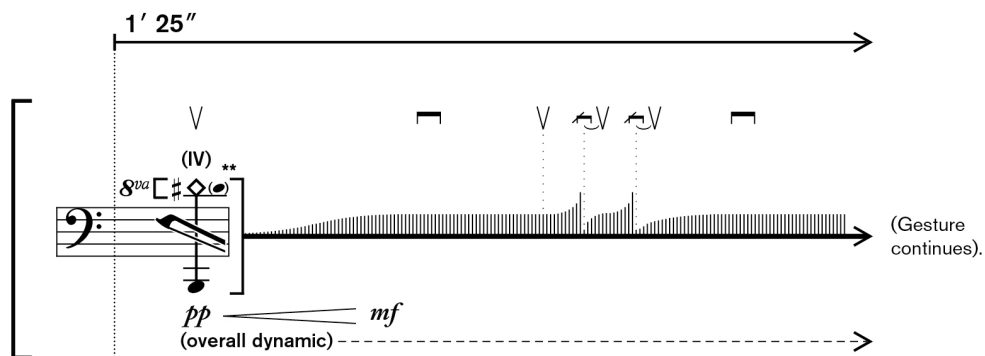


Fig. 4.6.2: Graphic wedge depicting dynamic envelope of multiphonic's dominant pitch (controlled by bowing pressure) in *Tampered*: Rehearsal mark I.

Kaija Saariaho is a composer who, in her cello music, frequently isolates bowing pressure from other dynamic bowing elements, such as the bowing speed.⁶⁶ As with

⁶⁶ Pirkko Moisala, *Kaija Saariaho* (Champaign: University of Illinois Press, 2009), 81.

Tampered, in Saariaho's *Sept Papillons* (2000) the cellist's bowing pressure is notated with a wedge (located above the staff, in this case), while the overall dynamic is notated using a traditional dynamic marking.⁶⁷ Here, the performer combines fluctuations in bowing pressure with shifts in bowing position, to transition between clear and noise-rich sounds (fig. 4.6.3).⁶⁸

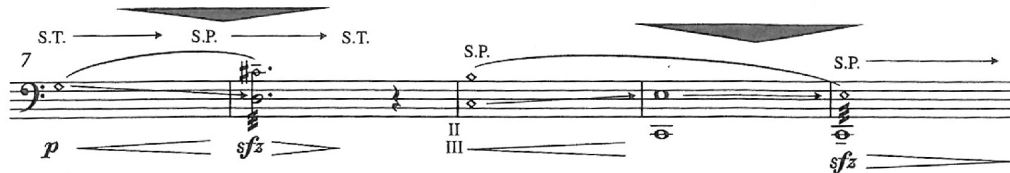


Fig. 4.6.3: Graphic wedge depicting bowing pressure in Saariaho's "Papillon IV" from *Sept Papillons*.
Bars 7–11.⁶⁹

4.7 The Score as an Audio Guide Track with Notated Cues

Unlike the other pieces in this portfolio, *Percussion Quartet* has a very clear pulse and requires the performers to aim for absolute rhythmic precision throughout. For this reason, the format of its score is unique among the rest, consisting of an audio guide track played through the performers' earphones (track 1 of Audio CD 2) and accompanying cue sheets. The audio guide track includes a metronome, which ensures the performers' relentlessly mechanical semiquavers are as synchronised as possible. Because there is no conductor and the individual sections often stretch out over many bars, keeping track of the bar count could potentially distract each performer from upholding the desired consistency, and therefore a recorded voice cues each section over the metronome. This approach enables the quartet to maintain a stiff and clinical demeanour, even while making sudden synchronised changes of texture, which is appropriate for the mechanical nature of the material.

On each of the performers' cue sheets, the individual sections are represented with a single, repeated bar along with a text-based description and, in instances where the performer is active, an illustration of the relevant gesture. This notational information is

⁶⁷ Kaija Saariaho, *Sept Papillons* (London: Chester Music, 2000).

⁶⁸ Ibid.

⁶⁹ Saariaho, *Sept Papillons*.

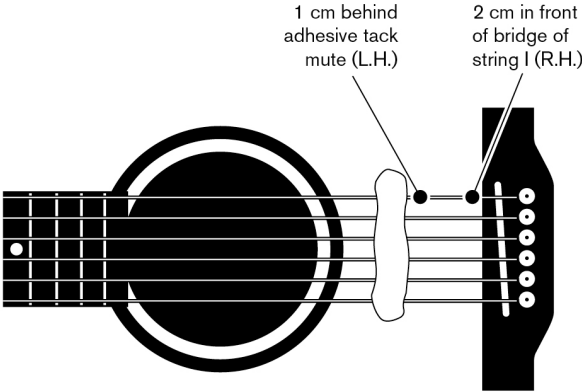
presented in a clean and efficient manner, and spans only two pages per part, thereby eliminating page turns, which would spoil the robotic delivery (fig. 4.7.1).

SECTION E

With Percussion 1.

While muting string I, ca. 1 cm behind the adhesive tack mute, with the fleshy tip of one's left forefinger, pluck string I, ca. 2 cm in front of the bridge, using the plectrum held in one's right hand.

Releasing the tip of one's forefinger from the upper saddle may produce a slight sound. Therefore, one should precisely synchronise the releasing of the tip of one forefinger with the tapping of the other.



1 cm behind adhesive tack mute (L.H.) 2 cm in front of bridge of string I (R.H.)

b. 192 x 56

R.H. UP-STROKE
DOWN-STROKE f :|

Fig. 4.7.1: Notated cue in *Percussion Quartet*: Percussion 3, Section E.

Composer Kaj Duncan David has made use of a similar method of notation in his piece *No News Good News* (2014). Blindfolded performers are cued to carry out specific gestures involving newspapers through an in-ear audio guide track. As the performers' vision is obscured, the cues, which are written on a single sheet of paper, are not used live but instead are memorised beforehand (fig. 4.7.2). Here, unlike in *Percussion Quartet*, the focus is primarily based around synchronised choreography rather than on synchronised sounds.⁷⁰

⁷⁰ Kaj Duncan David, *No News Good News* (N.p: n.p., 2014).

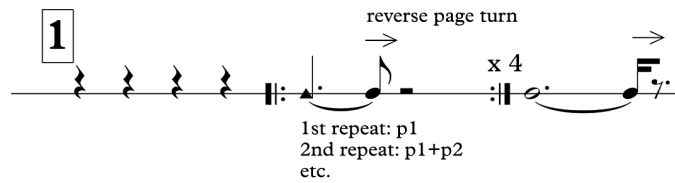


Fig. 4.7.2: Notated cue in Kaj Duncan David's *No News Good News*: All performers, cue 1.⁷¹

4.8 Waiving a Degree of Control in the Interest of a Non-Rigid Performance

Although for the most part, the specific nature of each soundworld presented in this portfolio has demanded an equally specific approach to its notation, there have been occasions where I have ceded a certain amount of control over the interpretation of this notation for the betterment of a performance. In the score for *Tampered*, for instance, many of the musical phrases are contained in boxes, each of which serves as a ten second example of how the beginning of a certain passage could be performed. The cellist is not meant to replicate the content of each boxed phrase precisely, as there is simply too much notational detail to do so. Instead, the intention is that they approximate its textural density using all of the notated actions, but not necessarily in the written order, and continue in a similar manner for the rest of the passage. The high level of detail present in each of these boxed phrases illustrates how the different performance parameters interact with one another, and in doing so it allows the performer to intimately understand how the material works. In essence, while this approximation waives a certain degree of control over particular aspects of the sound, the notational thoroughness ensures that its overall character is achieved (fig. 4.8.1).

⁷¹ Ibid.

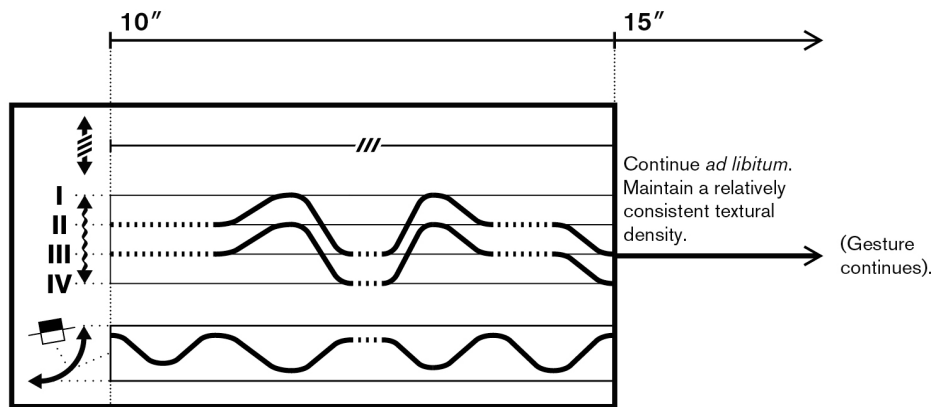


Fig. 4.8.1: Boxed phrase in *Tampered*: Rehearsal mark B.

In *Sleep Spindles*, the full score is only intended to be used as a means for the performers to learn the piece. In a concert situation, it is expected that they recall its subtleties as accurately as possible from memory with the aid of a one-page shorthand score, which essentially functions as a cue sheet. The fifteen-page full score, and the unabridged individual parts derived from it, would all be impractical for live use because the required page turns would interrupt the continuous, overlapping flow of many of the passages, and the presence of dedicated page turners on the stage would distract from the intensity of the performance. A hands-free digital version of the full score or its parts would also be problematic because the automated scrolling would be in conflict with the performers' approximated timekeeping of the piece (see “4.1: Temporal Notation” for more details). The use of a shorthand physical score, on the other hand, allows for a fluid and organic delivery. Despite the inevitable discrepancies that result from this approach, the notational detail provided in the learning process ensures that these are kept to a minimum and the essence of the piece is preserved.

In his third string quartet “*In iij. Noct*” (2001), Georg Friedrich Haas has utilised a comparable notational approach to that used in *Sleep Spindles*.⁷² Here, the quartet are given a detailed score to memorise, and during live performances, which are held in complete darkness, they improvise and interact with one another in a very specific way using pre-learned musical “situations” and “invitations.”⁷³ The performers, vision-deprived,

⁷² Georg Friedrich Haas, “*In iij. Noct*” (Vienna: Universal Edition, 2001).

⁷³ Alex Ross, “Georg Friedrich Haas: ‘Darkness Audible’,” *The Rest is Noise* (blog), published November 22, 2010, accessed September 18, 2015, <http://www.therestisnoise.com/2010/11/georg-friedrich-haas.html>.

play without cue sheets, and are granted more freedom than that given in *Sleep Spindles*, including a flexibility with the length of the piece.⁷⁴ However regardless of this apparent openness, the overall soundworld, like that in *Sleep Spindles*, is a definite one, owing to the level of detail present in the score.⁷⁵

⁷⁴ Haas, "*In iij. Noct*".

⁷⁵ *Ibid.*

Chapter 5

Conclusion

Throughout this portfolio, I have expanded the timbral palettes of a range of musical instruments by reconsidering their performance practice. Because I have painstakingly developed each sound through experimenting directly with the instrument involved, I know that what I have composed can be reproduced in a live context. Nevertheless, there is an inevitable element of risk whenever I introduce my music to previously unacquainted performers. I was particularly aware of this leading up to my collaborations with Open Source Guitars for *Marsbes* and the London Sinfonietta for *Panels*, as rehearsal time was to be limited and, due to the larger scale of the ensembles, my attention divided among many players. In a sense, I felt that these collaborations would be acid tests for how my approach could function in a professional environment. Despite such pressures, these proved to be highly rewarding and successful experiences, as the performers were able to emulate precisely what I had written and the pieces were well received. I now feel more confident as a composer and will continue to incorporate informed risks into my practice, while embracing new challenges.

The customised notational systems I have built as part of this portfolio, due to their derivation from the *lingua franca*, as well as their clear and practical presentation, have been understood by the musicians who have interpreted them, and have thus produced consistently positive results. Moving forward, I am certain I will be able to adapt these systems efficiently for new challenges, as I now have a range of flexible notational templates, as well as a sizeable library of detailed instrumental and gestural illustrations at my disposal. I will continue to base any new developments, where possible, on the established notational vocabulary.

Through the expansion of the timbral palettes of acoustic instruments, and the use of compositional paradigms rooted in audio technology, I have been able to create a body of work that extends the expressive vocabulary of music for acoustic instruments and ensembles. Although, as I have demonstrated, there are historical precedents for each of the methods of working I have explored, I feel I have put these various processes together

in new ways, and in ways that open up exciting new compositional possibilities.

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