

PORTFOLIO OF ORIGINAL COMPOSITIONS

A thesis submitted to the University of Manchester
for the Degree of Doctor of Philosophy
in the Faculty of Humanities

2019

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[Word count: 15,656]

Portfolio of Musical Works

1. **Several Circles** (April 2014 / 11:31)
2. **Song for Ghosts** (July 2014 / 3:58)
3. **Spertions** (live at iFIMPaC 2014 / 4:51) [video]
4. **Klangwelt** (February 2015 / 8:23)
5. **Music Floats Upwards** (June 2015 / 11:38)
6. **Flowers for Antonin** (August 2016 / 11:07)
7. **Tales from the Voodoo Box** suite (May 2017)
 - 7.1 Pigeon Toad (2:34)
 - 7.2 Clara at the Worm Disco (4:04)
 - 7.3 At the Hop (2:19)
8. **Thunder, Actually Bicycles...** (August 2018 / 12:27)
9. **Everything is Always at Once** (September 2018 / 14:29)
10. **On the Surface, Crying to the Moon** (February 2019 / 17:52)

Total Time: 1h45m13s

USB Stick Content

Portfolio of Musical Works

1. Several Circles
2. Song for Ghosts
3. Spertions
4. Klangwelt
5. Music Floats Upwards
6. Flowers for Antonin
- 7.1. Pigeon Toad (Tales from the Voodoo Box)
- 7.2. Clara at the Worm Disco (Tales from the Voodoo Box)
- 7.3. At the Hop (Tales from the Voodoo Box)
8. Thunder, Actually Bicycles...
9. Everything is Always at Once
10. On the Surface, Crying to the Moon

Appendix 1 — Supporting Material #1: Recordings of Group Improvisation

- A.1.1 Scatter (March 2015), by Richard Scott's Lightning Ensemble
- A.1.2 Abrus (January 2015), by Parak.eets
- A.1.3 Hauch Mit (February 2015), by Vorfeld, Scott, Gratkowski
- A.1.4 Head IV (August 2015), by Axel Dörner and Richard Scott
- A.1.5 That's a Moray (August 2015), by Audrey Chen and Richard Scott
- A.1.6 Live in Berlin (January 2016), by Audrey Chen and Richard Scott [video]
- A.1.7 n (January 2016), by Alexander Frangenheim, Nikolaus Neuser, Richard Scott

Appendix 2 — Supporting Material #2: Etudes, Versions, Transitional

Pieces and Other

- A2.1 Wisdom and Nonsense
- A2.2 A Spark Ignites, Cathedrals Tumble
- A2.3 Spertions [studio version]
- A2.4 Music Floats Upwards Live at SLT Leeds 2016 [video]
- A2.5 Richard Scott Live at Electric Spring 2017 [video, complete concert]
- A2.6 Everyday Arithmetic (in 13 parts) [broadcast]
- A2.7.1 Resonating Sound Objects [video]
- A2.7.2 Not Like your Funk [video]
- A2.7.3 Hordijk Bouncy Space Balls [video]
- A2.7.4 Hordijk Nocturne [video]
- A2.7.5 Electroacoustic Performance [video]

Abstract

The portfolio represents an artistic investigation into the applications and consequences of voltage-controlled analogue (modular) synthesis as a tool for composition and performance in the contexts of electronic musical composition and of freely improvised (i.e. not scored or notated) performance. The thesis consists of a portfolio of ten electronic music compositions, a commentary on each piece and supporting documentation and appendices. Various initial and emergent questions are explored, including different uses and perceptions of modular synthesis, compositional process, free improvisation and the concept of the “molecular” nature of composition and dialogic listening.

Declaration

I confirm that no portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Technical Information

The compositions discussed in this thesis are presented both in the form of stereo WAV files in 44.1 kHz / 16 bit and in the original (and preferable) 88.2 kHz / 24 bit formats. Video files are presented in variety of formats; when possible they are presented in the original format they were shot in.

Acknowledgements

Many thanks are due to Professor Ricardo Climent, Doctor Richard Whalley, Doctor Kevin Malone, Professor David Berezan, Axel Dörner, Rob Hordijk, Jef Chippewa and Beatriz Ferreyra. There are many others to thank who are listed on page 62/63.

1. Introduction

Any sound whatsoever can be the starting point for a musical composition. The ways in which this sound can be transformed are limited only by the imagination of the composer. Musical structure depends on establishing relationships between sound materials. —Trevor Wishart (1994: 1)

The sound and its relation to another sound becomes a tool in the service of meaning, used to express, depending on the inspiration of the moment, an intuition of something more fundamental. —Beatriz Ferreyra (Ferreyra, 2019: 34)

I wanted to see what the devices themselves had to say. —Serge Tcherepnin (2019)

This research is an artistic investigation into the applications and consequences of voltage-controlled analogue (modular) synthesis as a tool for the performance, production and composition of electronic music, specifically in the contexts of studio-based electronic composition and freely improvised (i.e. not planned, notated or scored) performance. The works and concepts presented here proceed from a pragmatic position that composition and improvisation are two different aspects of the same process: of organising, responding to, transforming and of allowing oneself to be transformed by musical material. In this work, there is iteration and movement between the practices of composition and improvisation, which are continuations and expressions of one another — each contains and embraces the other, rather than remaining as polar or binary positions. Although free improvisation itself is not the main focus of most of these pieces, the practice and the spirit of free improvisation nevertheless imbue this entire project, including the development of the compositions and their practical and theoretical contexts. My practice of improvisation and as a regular participant in group free improvisation with many musicians working in that the field and as a soloist is documented in the Appendices, in the forms of recorded examples and commentaries.

I characterise my approach to composition and performance as “molecular”, and the exploration and development of this concept are important aspects of this artistic research. The molecular concept has implications for process, form and aesthetics and is intended less to bridge a perceived gulf between improvisation and composition than to propose an overarching and unifying concept from which better to conceive of their familial coexistence. As an extended metaphor, it

describes both global temporal and spatial processes of molar structuration and formal growth and also, at the more atomic levels of musical interaction, various particulate and granular relationships of attraction and repulsion between individual musical atoms and fragments. But it is not intended merely as a metaphor: it is an attempt to express something fundamental about my method, aesthetic and understanding of music. I should emphasise that this idea is not meant not as a general theory of composition, or as a valedictory theoretical construct. It is an attempt to develop a concept drawn from my interpretation of the process, observation and documentation of my own artistic process, from which it directly emerges.

1.1 Portfolio Contents

The main body of the thesis consists of a portfolio of ten electronic compositions¹, a commentary on each piece and supporting Appendices. While the portfolio compositions are presented here in a *fixed* form, this fixedness is in a sense misleading and so it is important to emphasise that these recorded representations and documentations should be seen in a broader context. The Appendices therefore offer additional information about the contexts in which these compositions have been publically disseminated, about improvised solo and group work, plus some etudes, transitional compositions and reflections on process — all of which tend to stress the more fluid, improvisatory and performative nature of my musical practice.

1.2 Research Enquiry

Taking The University of Manchester's Thesis policy as the starting point, I also lean heavily on Robin Nelson's definitive text (Nelson, 2013) on practice-based artistic research, which he identifies as:

a research project in which practice is a key method of enquiry and where, in respect of the arts (creative writing, dance, musical score/performance,

¹ In this commentary I use the term "electronic composition" as a simple way of generically identifying the works. It is admittedly a problematic term but in my judgement probably somewhat less so than the alternatives, for example, Electronic Music, Electroacoustic Music, Tape Music, Fixed Media, Interactive Music, Acousmatic, Musique concrète, Electronica which all come with conceptual and historical baggage that I am keen to avoid.

visual exhibition, film or other cultural practice) is submitted as substantial evidence of a research enquiry. (Nelson, 2013: 8)

Nelson argues that through processes of iteration, of establishing resonance between theoretical and practical research modes and developing praxis between all aspects of the research process, new questions may emerge out of the practical creative work itself. So although specifying a very clearly articulated point of interlocution might appear to be the safest way to specify the aim and goals of such research, there are also good reasons not to do that. In this respect, my own investigation is not intended to be either question-led or problem-led, but conceived more as practice-led and thus there are certain windows and doors I wanted to leave open. So, in lieu of a precise and penetrative question, I have preferred to begin from a more loosely defined theme, which in Nelson's terms, functions instead as a specified path of research enquiry.

It is helpful to distinguish between those primary points of enquiry specified at the outset, and the more emergent secondary questions. Such secondary questions do not initiate a research enquiry but may emerge as equally or more important in more contextually specific ways throughout the process of the research itself, or they may emerge from the documentation of or reflection upon the artistic process. Creatively it is vital for artistic research to escape an overly restrictive research paradigm in order to embrace a more iterative and fluid approach. As Beatriz Ferreyra points out, such a fluidity may be extended to one's relationship to the musical materials, blurring the line between intent, emergence and creativity:

I had to learn to allow myself to be surprised by unexpected suggestions that came out of the material itself, like winks or sleights of hand that sometimes distracted me from what I had set out to do, to the extent that the morning after, I would discover a work I did not recognise having made the night before. (Ferreyra, 2019: 34)

I wanted to retain such a spirit of awareness of the unfolding nature of enquiry in each aspect of the current work.

Questions that were present at the outset of this enquiry include:

- How can we conceive of “compositional” forms of organisation in practices that prioritise spontaneity, improvisation and live performance?
- How can non-linearity and randomness of the kinds generated by analogue electronic circuitry be directed towards compositionally useful ends?
- How can rather simple inputs of analogue data be expanded into the creation of complex and varied compositions?
- How can a sense of balance or congruity between pulsed, rhythmic materials and more textural, abstract shapes be achieved?
- How can an instrument such as a modular synthesiser which has no obvious performance interface (and at least until recently, rather little performance history) be approached for performance purposes?

While these questions do not define a single path of enquiry, taken together, they do help to define a clear research area and they indicate the contexts for an investigation into the applications and consequences of the particular technology I am interested in exploring. They are stimulating enough to “get the boats out into the water,” as it were, and they leave appropriate space for new questions and specificities to be discovered along the way. Examples of such secondary questions that are addressed through the compositional work and commentary include:

- How can I combine gesturalism with more textural and linear approaches to musical organisation?
- How can I use passages of long sustained sounds, while keeping the ears awake?
- How can I create longer-form compositional structures?
- How can I escape from micro-editing as a compositional technique?

Nelson emphasises that the documentation of practice as research should be “multi-modal” and should include an artistic product or artefact, here represented by a portfolio of compositions. It should also include a documentation of process and “complementary” writing that includes:

locating the practice in a lineage of influences and a conceptual framework for the research, emphasising the critical and reflexive qualities which should be expressed in such work. (Nelson, 2013: 31)

In this portfolio, these contextual prerequisites are integrated into the commentary, appendices, background, introductory and concluding sections, leaving the limelight as far as possible to the artistic works themselves. However, one core concept does emerge as a potentially unifying theme in the portfolio and that is the development of a concept of a *molecular* approach to and understanding of musical composition — a theme I have written about prior to this dissertation, although more specifically in connection with improvisation.² Throughout this research period, this idea has developed as a conceptualisation of my practice, which helps to bridge and connect the practices of improvisation, composition and performance. It is proposed here as an open-ended concept: not as a fully explored thesis but rather as evidence of a *multimodal research approach*, bringing together a variety of artistic practices, aesthetic trajectories and transformations at a more theoretical level.

2. Background and Context

2.1 Introduction

The history of voltage control synthesis has an unusual trajectory, positioning this study at the cutting edge of artistic investigation of an anachronistic musical technology, one thought obsolete for a quarter of a century. I would position this research neither futuristically, as it might have appeared in the 1960s, nor nostalgically, as it might have appeared in the 1990s, but more ambiguously on the cusp between the two. I will provide three brief but essential discussions of the contexts and practices related to this enquiry. The first serves to position my work in the midst of an artistic context defined by the convergence of several overlapping trajectories. The second is a discussion of some basic historical and practical concepts behind the design, playing and programming of voltage-controlled modular synthesisers, as this may not be entirely self-evident to all readers.³ The third entails a brief comment on the musical activities with which I am engaged, activities that fall outside the direct remit of this work but strongly

² See Scott, 2014, in Schroeder and Ó hAodha, 2014; and in Scott, 2014a.

³ This section is intended as only a brief outline of the overlapping fields and interrelated nodes I see this work in relationship to. It is not my intention to give a detailed breakdown of the wider historical importance of these fields, as might befit a more comprehensive literary review.

inform it. These three points of discussion give context both to the questions I have outlined above and to practical aspects of my creative work with these instruments.

2.1 Artistic Context

In both technique and timbre, Morton Subotnick's long-form electronic compositions, created with a Buchla Music Box modular synthesiser (Subotnick, 1967 and 1975), have been influential and are inspiring historical precedents for the exploration of many of the ideas and questions forming this portfolio. The sonic character of those works is both uniquely electronic and abstract, yet also displays "tangible" quasi-acoustic spectromorphological qualities. As such, his extensive use of voltage control for generative pattern-making is an important model for complex electronic composition. Curtis Roads' hybrid approach to electronic composition (Roads, 2005), which combines programming, studio improvisation and non-linear editing, offers parallels to my approach, both in terms of studio technique and gestural timbral aesthetics. The feedback and ARP 2500 synthesiser works of Éliane Radigue (Radigue, 2019, 2019a) are important precedents, as are various historical works realised at the GRM Paris by Bernard Parmegiani (Parmegiani, 2008), François Bayle (Bayle, 2012) and Pierre Schaeffer (Schaeffer, 2012) that made use of the Moog and Coupigny synthesisers (Teruggi, 2007). Although more rooted in analogue tape practices than synthesis, Beatriz Ferreyra's acousmatic work (Ferreyra, 2003 and 2015) has been of particular importance, in terms of its general compositional ethos and typically subtle combination of gesturalism and narrative line. Trevor Wishart's diffusions of his predominantly sample-based works (Wishart, 2011 and 2014) and his documentation and discussion of them (2014, 2015) are also huge conceptual inspirations.

Many other historical works have informed my aesthetic and approach, whether specifically in terms of synthesiser usage or more generally in the types of electronic sound worlds explored, for example works by Tod Dockstader (Dockstader, 1966), Pril Smiley (Smiley, 1971), Daria Semegen (Semegen, 1976), Iannis Xenakis (Xenakis, 1997), Andrés Lewin-Richter (Lewin-Richter, 1965) and Jan Boerman (Boerman, 2005), as well as Richard H. Kirk, Stephen Mallinder and Chris Watson's experimental early work as Cabaret Voltaire (Cabaret Voltaire,

1979, 1980), Rainford Hugh Perry (Lee “Scratch” Perry, 1983 and 2003), Osbourne Ruddock (King Tubby, 2005; Pablo 1976), Hopeton Overton Brown (Scientist, 1980 and 2006) and Rupert Parks (Photek, 1995 and 1998). Rob Brown and Sean Booth’s vast catalogue as Autechre requires special mention for their radical combining of the forms and possibilities of experimental and electronic dance music (Autechre, 2001 and 2015), which has been highly influential on my understanding of the creative potential of non-academic contemporary electronic music.⁴

Outside the specific realms of electronic music, John Steven’s unfortunately neglected work with the Spontaneous Music Ensemble (2007 and 1995) has been formative in my musical thinking and continues to be an important force in the development of my musical aesthetics and understanding. Similarly, the oeuvres of visionary composers such as Ornette Coleman (Coleman, 1990 and 1993) and Anthony Braxton (Braxton and Bailey, 1974; Braxton 1991) continue to inspire and have had an impact on some pieces in this portfolio. Throughout this research, Rob Hordijk, the creator of several instruments used in the portfolio, has been an important inspiration, not just as a source of remarkable musical tools but also an artistic ally and a deep reservoir of knowledge, technique and ideas.

2.2 Basic Concepts of Synthesis and Voltage Control

Although the emphasis of this enquiry is less on the synthesiser itself than on its artistic applications and implications, I should clarify some of the instrument’s common forms and uses and some of the key ideas that shaped the kinds of voltage-controlled instruments used throughout the portfolio.

2.2.1 Synthesiser as Instrument

A synthesiser, in what was until recently its most common form, combines programmable sound design functions with some kind of playable interface. Since the invention of Moog Minimoog in 1970, such instruments have tended to rely upon familiar keyboard-based interfaces and were designed with broadly fixed-path subtractive architectures, giving access to only a limited number of functions organised into discrete modules with relatively standardised functions (Pinch,

⁴ The perspective on electroacoustic music as *multi-generic* is discussed in Adkins, Scott and Tremblay, 2016.

2004; Dalglish, 2016). While this does not rule out the possibility that such a device can be employed for more exploratory forms of sound design and composition, this may necessitate augmenting it via MIDI, an external control surface or subverting some of the original purposes and functions via some form of hacking or reprogramming.

2.2.2 Synthesiser as Sound Library

Memory locations in commercial MIDI synthesisers, sound modules, software synthesisers and sample-based synthesiser workstations create a catalogue of stored sounds and functions that can be browsed and recalled when the situation demands, and can further be saved, recalled and transferred between systems. Although historically many models have been designed with keyboard-based interfaces, most sound modules rely on external control sources — an easily manipulated user interface being a less important consideration than the depth of programmability of the sound engine itself or convenient access to a catalogue of preset sound design capabilities.

2.2.3 Synthesiser as Computer or Patch Programmer

The attitude, I believe, of Moog was (...) to have all the parts coordinated so it made music in a traditional sense; to make it sound like a musical instrument, so that is why you had keyboards. We weren't interested in keyboards; we were interested in other kinds of control of the music. (Tcherepnin, 2019)

Serge Tcherepnin's expression of the idea of voltage control in his patch-programming paradigm has asserted a crucial influence on contemporary voltage-controlled module designers and brings us closer to understanding how the synthesiser is used in this research. In this model, a voltage-controlled system is derived from an "atomic" sub-modular integration of a freely assignable array of "elemental" functions (Tcherepnin, 2019). Although these functions are quite simple in themselves, through modulation, cross-modulation and feedback they can be used to design all of the basic synthesiser functions and, further, it is possible to combine these into complex and unpredictable networks. Unlike Buchla and Moog, Tcherepnin's Serge modular synthesiser designs made no distinction between control functions, audio sources, modifiers and their various algorithmic functions. They can all be patched together and combined within a

highly flexible and adaptable experimental system, inviting an approach to programming that is perhaps not far away from what we might refer to today as “circuit bending” or “hardware hacking”. Tcherepnin’s designs may thus be understood to give access to “lower” levels of programming.

Tcherepnin’s patch-programming concept is derived from Harald Bode’s original statement of the principles of voltage control (Bode, 1960) that lay behind his “Modular Sound Modification System” and “Audio System Synthesizer” (Bode, 2013; Palov, 2013) — the first integrated, voltage-controlled modular system. Bode’s instrument merged the standard functions one would expect to find in an electronic music research studio in the 1950s into a set of functions that could be combined together under a unified principle of voltage control. Here, voltage functions both as a kind of data and as a communication protocol, but also, of course, as an audio signal. Such a device can be seen both as an Electronic Music Studio and as a kind of analogue computer. These ideas formed much of the theoretical and conceptual basis for Moog and Buchla, and for Tcherepnin’s later innovations. Rob Hordijk similarly describes his own more contemporary modular system as an “analogue computing device” (Hordijk, 2016 and 2017) arguing that, at the design level, synthesiser modules should be conceived as groups of mathematical functions organised as algorithms that are realised in analogue circuitry. An important difference is that although the algorithmic functions of such a device can be patched to be an instrument, it is not necessarily itself an instrument by design. It is a collected group of potential functions and processes for which the role of assigning exact instrumental and compositional roles is left to the programmer, composer or performer.

If we do see a voltage-controlled modular synthesiser as a type of computer, we should not confuse its capabilities with those of a digital computer. A synthesiser adds, subtracts, divides and multiplies waveforms rather than digits, so unlike the calculations made by a digital computer, the calculations made by these analogue algorithms may not be exactly repeatable. This has important implications both for the character of audio signals and for the composer’s potential musical use of the instrument as an analogue data generator. An interesting artistic consequence of the non-linear nature of analogue circuitry is that it dictates a certain degree of inaccuracy and unpredictability in the circuitry,

which puts machine and player-composer into a relationship that challenges typical models of control or instrumentality. This lack of control may hinder, but in some circumstances may also augment, the general playability of the instrument and its abilities to accurately accomplish certain musical tasks. Crucially, such a system generally offers no facility for memorising patches, and even if patch sheets or some kind of preset programming are used, there tend to be so many variables and so much non-linearity at play that the exact recall of any particular sound behaviour is quite unlikely. The voltages from a synthesiser module based upon such random or chaotic algorithmic circuitry can, for example, be used as control sources for events and modulation values throughout the system, exploring outcomes that are never fully predictable or repeatable.

An example of the patch programming approach is found in *Resonating Sound Objects* [Appendix A2.7.1]. The synthesiser shown in the video is largely generative and self-running, featuring complex and unrepeated modulations and cross-modulations alongside some relatively minor adjustments from the performer.

2.2.4 Synthesiser as Interactive Algorithm

In order to obtain more predictable and controllable outcomes from an algorithmically patched synthesiser, various interfaces and control sources can be employed alongside chaotic, randomising and self-generating sources, creating a more “interactive” algorithm whose outputs can be more precisely manipulated. An example in which these aspects of manual control and self-playability are combined is found in the portfolio piece *Song for Ghosts*, derived from a “played” patch-programmed feedback network. Another generative and patch-programmed example, which includes more decisive interaction from the composer, is shown in *Not Like Your Funk* [Appendix A2.7.2]. A similar approach is taken in *Hordijk Nocturne* [Appendix A2.7.4] but the much slower tempo of the pattern makes its pitch relationships less legible as a pattern. The transformations we attend to are instead more related to the various timbral effects of cross-modulation.

2.2.5 Synthesiser as Ensemble: Malleability and the Paradox of Control

Within the patch-programming paradigm there is a distinction that should be made between the specific playability of any one aspect of the system and its

overall control malleability. Whereas a system's *playability* is focused towards instrumental and expressive detail within a particular zone, region or layer, control *malleability* refers to systematic meta-control at a "higher" level in which we use a modulator to control not so much a single parameter or instrument as multiple parameters over a whole ensemble of instruments.⁵ Such modulators could also themselves be modulated via the influence of another level of meta-control; for example, by human interaction, by a form of digital automation or by another source of analogue voltage. A more malleable aggregate system, despite an apparent increase in overall systematic controllability, may in practice take on recursive and iterative qualities that make it more difficult to predict than a system with less overall meta-control malleability and a more specifically controllable range of possible outcomes. For example, a gesture may potentially have very different consequences in a highly malleable system each time it is repeated, depending on the precise state of the changing web of interdependent parameters it impacts. In *Electroacoustic Performance* [Appendix A2.7.5], the shape of the overall piece is determined by the combination of the patch programming and the composer's physical interaction. The composer precisely controls key variables — the tempo and overall timing of events, the potential pitch range of randomised events, resonant filter frequency and audio rate modulation frequency — yet, despite this overall malleability, there is no single event whose exact pitch or timbral character can be precisely predicted or repeated. An example of a more malleable complex system is *Not Like Your Funk* [Appendix A2.7.2]. This patch is programmed to function as an aggregate of percussive functions that have distinct interlocking parts or layers. As in *Hordijk Bouncy Space Balls* [Appendix A2.7.3], the ribbon potentiometer (seen on the edge of the table) functions as a manual meta-controller, setting the mean values for multiple parameters that are modulated throughout the system.

2.3 Final Comments on Background and Context

In conclusion to this contextual discussion, it should be emphasised that all these models allow us to view and to use the synthesiser in different ways. The contemporary modular system is a toolbox of possibilities and functions that, as a whole, offer the composer multiple possibilities for control, sonic creation,

⁵ The idea of the modular synthesiser as an ensemble is discussed in Hyde, 2016.

programming, performance and composition. There is no singular and purely theoretical way to approach playing a modular synthesiser. Such paradoxes between control, playability, self-playability and unplayability are part of the everyday experience of working with modular synthesis and contribute to both the structure and texture of the pieces in this portfolio. While the compositional implications of these changing states and the instruments' innate non-linearity can to some extent be controlled by the development of mature and flexible programming strategies, it is arguable that even the most sophisticated programming strategies gain musical value only when we also learn how to relate them to those parameters that cannot be precisely predicted, remaining highly responsive to the considerable number of singular and unpredictable audible outputs. Although such unpredictable networks might be harder to control, they might be more compositionally useful in some circumstances because they require us to interact with the machine's capacities more dialogically, to pay attention to its web of ever-changing sonic interdependencies and to listen better; or at least to listen differently. A theme of this research is that a modular synthesiser may not only be an instrument for the generation of sound materials and their composition but also a tool that helps engender specifically dialogic and open-ended modes of listening. Such modes of listening give access to rich and unexpected sources of musical material and ideas. When the output the machine produces is not, and cannot be, identical with the composer's intention, this non-linearity changes the relationship between composer and instrument in interesting ways: it encourages me to listen more intensely to what it is producing; it makes me question what I intend; it might even make me reconsider the expectations behind my own musical practices and aesthetics in a more fundamental way.

Finally, to complete this image of the contexts in which the pieces in this portfolio should be properly understood, during the time of this research I performed over 200 concerts in 10 different countries, performing both solo and with a variety of other musicians,⁶ most of whom are improvising musicians and/or modular synthesiser players. I curated, or co-curated 3 concert series in Berlin comprising

⁶ See the Thanks section in Appendix A3.2.

70 concerts.⁷ I performed upon and released 18 albums of original material on Sound Anatomy⁸, Cusp Editions⁹ and Doubt Music. I initiated and co-organised 2 editions of the Sines & Squares Festival/Conference¹⁰ and made many public presentations of various kinds. My own perspectives and practice have been richly informed and greatly broadened by these activities and the communities that support them; indeed they form a vital context for this work.

3. Commentary on the Compositions

In this portfolio I present ten electronic compositions predominantly employing analogue modular instruments as sound sources; each of these represents a dialogue with its own unique sonic materials and with the other pieces in the portfolio, as well as representing responses to preliminary and emergent questions forming my initial and subsequent paths of inquiry. The compositions were completed between January 2014 and December 2019 in the NOVARS Research Centre at The University of Manchester (UK), in my Sound Anatomy studio in Berlin (Germany), and in additional periods of residency at the University of Huddersfield (UK), the Institute of Sonology in The Hague (Netherlands), at Elektronmusikstudion (EMS) Stockholm (Sweden), at the Konfrontationen Festival in Nickelsdorf (Austria) and in Bergen (Norway). Additional field recordings were made on the coast at St. Andrews, Scotland and inside the Manchester Velodrome. Shortwave and FM radio recordings were recorded, sometimes serendipitously, including during a concert performance in Berlin.

3.1 Several Circles (April 2014)

Taking as a starting point Trevor Wishart's bold assertion that any sound could function as a potential starting material for a new creative work (Wishart, 1994: 1), my intention in this composition¹¹ was to create a network of relationships between sounds drawn from different sources with a variety of

⁷ Many of these performances, which took place as part of the Sound Anatomy series at Spektrum (Berlin, Germany) between 2014 and 2017, have been documented on the Basic Electricity (2019) and AUXXX Berlin (2019) websites.

⁸ Sound Anatomy, 2019.

⁹ Cusp Editions, 2019.

¹⁰ Sines & Squares, 2016.

¹¹ *Several Circles* featured as the titular track of my double LP of the same name on Cusp Editions (Scott, 2016).

textural, morphological and dynamic characteristics. Certain themes and concepts that have developed in the course of creating this portfolio have emerged in part in response to this specific composition. I will outline the structural aspects of this piece, discuss my intention for the piece and consider something of my relative success and failure in achieving them. I will also say something about the technical aspects of the piece, particularly in order to establish sympathetic correspondence with the non-linear and algorithmic aspects of synthesis discussed in the Background and Context section above. I will also introduce and describe some key features of the concept of “molecular composition”.

My intention was that a compositional structure should emerge based on the collage and *bricolage* of these disparate materials, the resultant structure being a consequence less of an imposed compositional plan than derived from the specific possibilities inherent in the material. To this end, I chose not only sounds that I found to be complementary but also some sounds that were less obviously compatible.

3.1.1 Compositional Structure

Several Circles comprises three sections and falls between ternary and sonata forms.¹² At its simplest, it may be seen as ternary (ABA), with the third section being a reiteration of materials from the first. But as this reiteration is combined with material from B it might also be seen as ABC form, more comparable with a sonata in which A represents exposition, B development and C recapitulation.

The opening A section (0:00–1:40) is a quasi-serial melodic structure derived from a Serge Variable Q Filter (VCFQ) as a sound source excited into percussive self-oscillation by pulse waves, created from a fluctuating pattern derived from 16 values stored on a Serge Touch Keyboard (here used as a sequencer). Frequency shifter and delay modules are also used to create timbral variations. As in other pieces in the portfolio, the complex behaviour of the synthesiser is driven by a single voltage source, which is modulated and routed in a number of ways. In this case, the sequenced pattern is cross-modulated by the bipolar voltage output of a Serge Universal Slope Generator, which also serves as an audio source, with

¹² As the piece make no attempt to arrive at or reflect formal correspondence to historical forms, this ambiguity does not need resolving; each of these forms is merely a lens through which to view the work.

sequence and voltage source feeding back on each other recursively as each becomes a modulator for the other, resulting in a fertile but rather unstable system.¹³

The B section (1:40–9:20) explores two different timbral and harmonic plateaus of similar length made from materials drawn from different synthesisers, processors and samples. In addition, processed recordings derived from a kalimba (thumb piano) are layered and into abstract sequences exploring resonant sonic spaces created by the cessation of more intense percussive activity from A. The first of these plateaus (1:40–5:27) introduces a brass-like chord that implies a sense of harmonic-suspension. The second plateau (5:27–9:20) introduces new material that is more layered and textural/timbral in character, making use of audio processing, including repeated delays. The reduced gesturalism of this section is interpolated by percussive interjections from the kalimba. This passage is characterised by an overall arc of slowly increasing density and energy, whose final dissolution (around 9:10) gives way to reiterations of the gestural material from A.

In section C (9:20–11:20), a recapitulation of the Serge VCFQ's theme is combined with the continuation of material from B and also with new material. This recapitulation of material has two functions. Firstly, this repetition announces and initiates the ending, which despite lacking any real harmonic movement nevertheless functions as a quasi-resolution. Secondly, we can hear how this material appears to have been impacted by the preceding material in B. This recapitulated material appears weaker and more dislocated on repetition, as if the energy from the more energetic and optimistic opening of the A section has been drained of life by the preceding material. This sense of weakening and dissipation of the theme, via the two "suspended" plateaus of B, to the recapitulation in C form the composition's narrative trajectory.

3.1.2 Duration Freed from Gesture

Several Circles combines both highly energetic pointillist passages and more static or plateau-like materials within a single piece. This idea is partly stimulated by my listening of such pieces by François Bayle as *Son Vitesse-Lumière* (Bayle, 1981) and

¹³ Two interesting discussions of the nature of this remarkable device are to be found in Stinchcombe, 2016 and Navs, 2016.

Erosphere (Bayle, 1982), which combine gesturalism with more ambient layering. The coexistence of these contrasting elements in Bayle's work illustrates the possibility of presenting sonic information whose consequences are "left in the air", i.e. their narrative consequences may not be immediately evident, an organisation of sound objects that may appear at first to be more timbral than structural. In addition to the innate individual characters of the sounds, this sense of duration freed from gesture and conversation potentially concentrates the ear on the interrelatedness between sounds and on their behaviour and interactions over longer durations. Perhaps as a consequence of this sense of concentration, Bayle's sustained ambient durations retain strongly compositional and abstract narrative qualities. In *Several Circles* I started to explore such possibilities of more sustained duration, but the two less gestural plateaus comprising Section B are perhaps not sufficiently asserted or developed in order to play this compositional role, leaving me with questions about exactly how to find better ways to integrate less gesture-rooted passages within a broadly event-oriented gestural context (or vice versa). This suggests a broader question: beyond sonic homogeneity, how can heterogeneous and less obviously compatible musical elements be contained within a single piece? The concept of *molecular composition* is one way in which I reflect upon with such questions — it relates both to the determination of the sound materials and to their organisation in *Several Circles*, and illustrates a broader compositional idea.

3.1.3 Emergence of "Molecular" Aspects, Concepts and Processes

The process of articulation does not depend on a unifiable or unifying form or a meter, cadence or any regular or irregular measure, but on the action of certain molecular couplings released through different layers and different rhythmic layers. We are not only using a metaphor to speak of a similar discovery in music. (Deleuze, 2007: 158)

In *Several Circles* this molecular idea informs the thinking behind the choice of material, how I work with that material compositionally and the emergence of structure, form and narrative. This concept is not intended directly as a theory of composition, as a musical language nor as a compositional method — although it encompasses aspects of each. The molecular is rather an image of the social life of sounds, which draws our focus away from their inner lives and towards their extrinsic communicability, towards their abilities to connect and to catenate with

other materials. The two main sources of this idea are from Gilles Deleuze and Félix Guattari's concepts of molecular and molar structures (Deleuze and Guattari, 1977 and 1987)¹⁴ and from my interpretation of the radically critical music and thinking of the early free improvising musician John Stevens, his pedagogic work known as *Search and Reflect* (Stevens, Doyle and Crooke, 1985) and the extraordinary music he made with various iterations of the Spontaneous Music Ensemble (SME) between the mid-1960s and his death in 1994 (Spontaneous Music Ensemble, 1995 and 2007). Stevens pioneered ways of playing, teaching and composing which were directed towards a utopian musical image of intense collective listening, conversing and cooperating which is inseparably aesthetic, social and political in character. Although his musical roots were as a jazz musician, including a spell as the house drummer at Ronnie Scott's in London, he became more associated with a style of post-Webernian chamber free improvisation, in which pointillist, molecular and percussive micro-structures coexist in an open field of play and connection and in which, as Stevens would put it, "form takes care of itself."

Stevens' image of music as social activity defines a process of forming ensemble textures in which no individual line or element can be meaningfully extracted; each takes on meaning only through the context of their collective interaction:

It doesn't matter what it sounds like. You're listening to the interaction and that's what you're giving over to other people. (Scott, 1991: 246)

Stevens himself never settled upon a single word or term to encapsulate his socio-musical thinking and teaching¹⁵ but I interpret his concepts to be expressions of improvisation as a molecular process, in which we see collective co-creation not only in the process of creating musical structure, but also in the interaction of atomic musical materials, out of which new forms spontaneously and organically emerge. The blurring of divisions between conventional musical function implies not only radically new musical forms, practices and listening modalities but also new ways of actualising experiences of musical, personal and social collectivism.

¹⁴ The concepts of the molecular and the molar are more complex than can be fully explored here and they also occur throughout their solo writings, for example: Deleuze, 2007; Guattari, 1984, 2009, 2011 and 2013. Also see: Marks, 2006; Merriman, 2018; and Campbell, 2013.

¹⁵ Stevens liked to use the simple term "group music," which was not very specific. Christopher Small, influenced by Stevens, proposed the term "musicking" (Small, 2011).

Such experiences are expressed in concrete sonic forms in which both individual players and individual sounds take on molecular connections which may lie beyond the expectations and boundaries of any particular musical idiom.

The molecular concept is helpful here to help articulate the bridging of the “inner” and the “outer” life of sounds, and I believe this has consequences not only for the practice of group improvisation but for other practices too, for example, for electronic and acousmatic composition. Despite the radically contrapuntal post-Webernian language of much of the Spontaneous Music Ensemble’s output it is important to emphasise that such a molecular approach to composition need not be based on any specific musical vocabulary,¹⁶ post-Webernian or otherwise. Rather than a characterisation of the individual qualities of any particular musical language, the molecular concept should be understood as a radical principle of organic and hyper-dialogic formal structuration through musical interaction. The emergent, process-based aspect of this concept also has something in common with Edgard Varèse’s more compositionally rooted idea of musical form as a consequence of organic processes of growth and transformation, and with Pierre Schaeffer’s concepts of form emerging from perception of the inner characteristics of sound objects. The idea also finds resonance with Curtis Roads’ characterisation of *ground-up* and *opportunistic* forms in electronic music (Roads, 2015: 283–317), and his overall characterisation of electronic composition as a “multiscale” coexistence of multidimensional hierarchies — an idea partly derived from his interpretation of Luciano Berio’s concept of reciprocal partial systems.¹⁷

For Deleuze and Guattari, a molecular process is conceived less in terms of the internal qualities of materials than in the dynamic relationships it forms with other materials and with forces from which they derive. The idea rests partly upon their concept of geological formations as sedimentary, rocks being previously molecular organisations of material that become fixed and hardened into

¹⁶ Richard Barrett relates this concept with Evan Parker’s identification of an “atomic” approach to improvisation, for example the typically pointillist hyper-interactivity of the Spontaneous Music Ensemble, defined in contrast with the more layered and laminar forms favoured by the ensemble AMM (Barrett, 2019: 51). But, as Barrett argues, the molecular concept can be applied equally well to highly gestural or to more “laminar” musical practices.

¹⁷ The idea of the molecular also finds some interesting parallels in the ideas of granular synthesis (Roads, 2001), but that is perhaps a rather too technically defined method to be of any direct help to our understanding here.

inflexible molar solids. Larger organisational units such as these are seen in the context of their relationship with more fluid, minute and dialogic kinds of relationship interactions upon which they rest or from which their morphologies unfold. Deleuze also writes of the molecular specifically in relationship to musical time in reference to ideas he credits to Pierre Boulez (Deleuze, 2007: 156–160) related to non-pulsed or non-striated time, calling upon parallels in molecular biology:

A population of molecular oscillators capable of passing through heterogeneous systems, in oscillating molecules coupled together that then pass through groups and disparate durations. The process of articulation does not depend on a unified form or a meter, cadence or any regular or irregular measure, but on the action of certain molecular couples released through different layers and different rhythmic layers. We are not only using a metaphor to speak of a similar discovery in music: sound molecules rather than pure notes and tones (...) are capable of passing through totally heterogeneous layers of rhythm and layers of duration. (Deleuze, 2007: 158)

Important to this idea is that competitive molecular processes and molar structures in nature or in music are not seen in binary opposition. The molar and molecular exist in a kind of relationship, each containing the forces that create the other and so they may be understood not so much as a warring dialectic heading towards a decisive resolution, but rather as a constant process of mutual growth, decay and transformation.¹⁸

3.2 Song for Ghosts (July 2014)

Drawn from the album *Several Circles* (Scott, 2016), *Song for Ghosts* is an improvised solo (strophic) form rooted in the modulation and development of a single kind of musical material that is sustained throughout the piece. Aspects of its sound generation, patch structure and form relate to issues discussed above, notably those of playability and instrumentality.

3.2.1 Patch-Programmed Algorithmic Variations

The sound materials in *Song for Ghosts* are derived from a patch-programmed interactive algorithm — a self-modulating patch utilising cross-modulation, non-linearity and iterative audio feedback. Pitches, tempo and timbres are created by

¹⁸ Other iterations of *Several Circles* as created in live performances are discussed in Appendix A2.5.

a mixture of interacting functions and a played (morphing) element that controls modulation indexes and the overall tempo of events. These combine to create a somewhat linear and thematic musical performance in which the player makes only relatively minute adjustments to potentiometers, without attempting to transform the output of the system too radically. So although its variations stay within reasonably well-defined melodic and rhythmic regions, and the piece is strongly thematic and parametric, throughout the piece (for example at 0:53 and 3:29) the audio feedback exceeds the threshold of the timbral control, clipping the circuitry of the frequency shifters and tipping over at the edges into hard distortion / waveshaping. Programming a patch such as this that constitutes a “balancing act” that can all too easily descend into predictable reiteration at one extreme or to uncontrollable noise and/or silence at the other. Something of this wayward aspect, and threat of catastrophic collapse, seems quite audible in this piece.

3.3 Spertions (2014)

Spertions is presented in the form of a video documentation of a live performance recorded during the International Festival for Innovations in Music Production and Composition (iFIMPaC) at Leeds College of Music in 2014. For this performance, fixed electroacoustic media was combined with a layer of live improvised material.¹⁹ This is the third and final piece in the portfolio that was included in the *Several Circles* album (Scott, 2016). For the present discussion, I will focus on the thematic, narrative and molecular aspects of the piece and upon some of the connections between this piece and others in the portfolio.

3.3.1 Interactions of Three Types of Phrasing

The events that make up *Spertions* fall into three categories of phrasing, quite distinctive in pitch, timbre and amplitude. The piece is characterised by the changing relationships of these three basic types of phrasing that are shaped by abrupt changes, gradual transitions and various kinds of layering and diffusion.

¹⁹ I also recommend consulting the alternative version of this *Spertions* in Appendix A2.3. The comments made in the main commentary apply equally well to this as to live version and the three phrasing types as discussed here are more easily perceptible, although the timings vary slightly.

The first phrasing type is derived from a single voltage source that determines the envelope shape, amplitude of an oscillator and also functions as an audio-rate modulation index. This envelope proposes a distinctive spectro-gestural or morphological trajectory that could perhaps be imagined as a line traversing space, drawn by an object that has been flung into the air; or as an object being pushed through the surface of a weaker yet resistant material with some force. In terms of its character, it might be heard as resembling something such as a belligerently repeated question as if from which the rest of the piece unfolds.

The second phrasing type (starting at 0:14) is a rapid cluster of attacks having the subjective character of, perhaps, a set of smaller metallic objects being repeatedly struck or agitated and then coming temporarily to rest. This faster layer is derived from the same control voltage sources as the first phrasing type; effectively, it is a kind of variation. While there is no set intervallic scale here, there is a certain familial logic between the sounds, in which pitch morphologies remain important. Although not necessarily directly audible, the common source relationship of both envelope shapes and pitch between the first and second phrasing types help connect and assist them in creating a thematic relationship, from which dynamic events and variations appear.

The third phrasing type fades in and becomes clearly audible at 1:51. It is higher in pitch than the two other phrasing types and has a noisy, granular character. This sound introduces a new instability and unpredictability to the piece (and is not directly involved with the call and response between the other two parts). Rather it maintains its own integrity as an independent layer and gives a broader spatial context for the other interactions — although at certain points it threatens to overwhelm them (4:00–4:20). Its structures are less repetitive, and it is modulated at audio rate to a point where it becomes chaotic and lacking in any obvious pitch — it is more a texture or a swarm of sound. This phrasing type functions in this piece as a kind of plateau or *weather element*, floating above the other events while creating a sense spatial context. The behaviour of this third layer further suggests a dissolving or masking quality that interferes and disrupts the transmission of dialogue and is harder to contain within the more conventional call-and-response, event-consequence relationships characterising the first two phrasing types. Each of the three elements also has its own spatial quality: the

first is mono, becoming layered in quasi-stereo; the second is dual mono (although both channels are derived from the same voltage source and the left channel shares no audible information with the right channel); the third more textural element is stereo and panned, suggesting a wide spatial image. These spatial qualities are modulated as the piece progresses. For example, the second element inverts its panoramic position several times. Such spatial variations add spatial variety and a further aspect of unpredictability.

3.3.2 Commentary: Thresholds of Control

Spertions is investigative in character and is constructed from the specific organisation and behaviour of its sound materials. How do these behaviours function as sources of momentum and structure? How can the affectivity between them over time create a form? The aim of the composition is to create a sense of narrative that emerges as a consequence of the coexistence and dialogue between all these elements.

In a similar way to the manner in which the over-modulated feedback in *Song For Ghosts* crosses a threshold and becomes clipped, *Spertions* also threatens to go a little over the edge of control and to descend into noise. This threatened collapse is interesting as it suggests that the sound world might change quite radically once this threshold is exceeded — an idea to be taken up by later compositions.²⁰

3.4 Klangwelt (February 2015)

3.4.1 Compositional Structure

Klangwelt takes the form of a single, continuous movement woven from several individual layers, each of which remain at a relatively stable dynamic state throughout, meaning this movement does not rely upon gesture or conflict to move forwards in time. I will discuss the compositional process, as well as some of the aesthetic and methodological issues that emerge from it. The structure and form of *Klangwelt* are emergent and are derived from the detail of and interactions between the initial layers of sound material. These materials were recorded at different times and initially without any intention to combine them.

²⁰ This idea of the sound material collapsing into noise as a narrative device recurs in *Wisdom and Nonsense* [Appendix A2.7], in *When Sparks Ignite, Cathedrals Tumble* [Appendix A2.6] and in *On the Surface, Crying to the Moon*.

As in *Several Circles*, I selected disparate materials for this piece as much from curiosity as from a conviction that they would necessarily combine together in an interesting way. Rather than being based on individual phrases or gestures as in previous pieces, these materials were derived from performances of longer duration, whose development over time (unlike the microscopically edited *Several Circles* and *Spertions*) is retained in a relatively intact form in the final composition.²¹ Editing and mixing are minimally executed on this piece, and although some elements of the original recordings were stripped away to help highlight certain of the interactions, my intention was to leave the recordings alone as far as possible, and to use the studio to bring out *that which is already there*, thereby enabling the implicit qualities of the material to come to the fore. The piece reflects the molecular concept in a direct way, so I will comment upon that aspect, its relationship to memory and to the idea of “outwardness”.

3.4.2 Commentary: Dislocation Between Recording and Composing

The process of *Klangwelt*'s construction could hardly have been more divergent from that of *Several Circles*, and this may in part be in reaction to the obsessive micro-editing that characterised the composition of the earlier piece. *Klangwelt* proceeds instead from the cosmic molecular principle that every sound is already related and that they already reach outwards for connection. These are questions of a different order, for example, regarding the “problem” of how different materials might be related and how we might bring them into relationship, or how the sounds might seek a common point of origin or an essential proposition from which to interact. The starting point here, subtly altered from Wishart's position, is that a molecular process of composition might start anywhere, with any one or two sound fragments, and proceed to explore how such fragments might connect with others and to see what vectors and tendencies might emerge between them. *Klangwelt* thus attempts to harness such forces, to sense their affects and to reveal their functioning with sonic expressions of their unfolding processes of attraction and repulsion, their various trajectories and potentials for connection as they unfold.

²¹ The source material for this piece includes recordings of a prototype Arduino/Csound instrument, *The Fingers*, created and kindly lent to me by Ian McCurdy, and granular processing of modular synthesiser sounds from Serge and Eurorack modular systems utilising Diemo Schwarz's (Ircam) CataRT and the Max/MSP program controlled with a Buchla Thunder midi controller.

In common with most pieces in this portfolio, while composing *Klangwelt* there was no intention to establish continuity between the creation of the source recordings and their eventual compositional use. Such a dislocation between the processes of recording and composing enabled me, during composition, to hear the content of the recordings freshly, regardless of anything I might have been intending when I recorded them. The compositional process of *Klangwelt* thus relies upon two kinds of memory: organic and non-organic; it depends on the efficiency of non-organic memory in the form of digital storage that is subsequently filtered through my actual memory and by constant auditioning and remembering. There is a kind of brutal discipline to this practice: intention is abandoned, forgetting is embraced. The original thinking behind the recording either survives intact and encoded in the recorded material, or it is simply lost, leaving the musical material independent from the intention that formed it; the materials are freed to become *molecular*, free to connect with others in ways that could not at the outset have been envisaged.

Klangwelt feels to me almost like a self-generated composition that found its own shape and distinctive character built upon the convergence of a clear energetic trajectory, articulations of cause and effect, and a sense of narrative. The process of composition left me with a sense that sounds could get on fine without me, and with the realisation that there may be no direct relationship whatsoever between the amount of time and energy I invest into a composition and my perception of the quality of the final result. Indeed, this piece showed that these effort/quality ratios can sometimes even be inverted.

3.5 Music Floats Upwards (June 2015)

Music Floats Upwards addresses some aspects of the issue of rhythmic organisation. I will concentrate my comments upon the implications of concepts of pulsed and non-pulsed time for a molecular compositional approach and upon the thematic nature of this piece.

3.5.1 Dual Tendencies

Music Floats Upwards is characterised by shifts between two different thematic sound worlds. The first, introduced at the outset, is more pulsed and rhythmic (although not metric), whereas the second, introduced at 1:08, is floating and more spectromorphological in character. The piece attempts to maintain a sense

of balance and fluidity between its different elements, for example, implying connection between instigative rhythmic momentum and spectromorphological “consequences”, and addresses some of my initial questions in regard to combining rhythm, timbre and improvised materials along with compositional decision-making. I hear the rhythmic aspect in a specific and perhaps quite personal way, suggesting heartbeat and breath, but also in the sense of providing gravity and a kind of rootedness to the earth. Whereas I hear the non-pulsed sounds more as a feeling of weightlessness, space, movement, of escape — more a *denial* of gravity. The piece builds through the push and pull of these two tendencies. There is also a tension between the more harmonically congruent tonal aspects characterising the piece as a whole and occasional more dissonant interruptions, such as the section beginning around 2:12. Such irresolutions contribute to moving the piece forwards in time. Compositionally, a tension is created by the different kinds of materials that in many ways suggest different directions, rather than a contradiction that needs resolving. This tension forms a kind of forward-moving momentum, also giving a sense of rhythmic momentum that is sustained even when no overtly rhythmic element is audible.²²

3.5.2 Commentary: Becoming Molecular

Music Floats Upwards is unique in this portfolio in the way it uses clearly reiterated samples of musical material, which in general I did not feel was something appropriate to explore in this research. However, in this case it does serve a distinct purpose — the clear statement of tempo in these “loops” positioned in a context that implies other tempi are explored as examples of a non-pulsed and molecular concept of musical time, which Deleuze defines as follows:

Non-pulsed time puts us first and foremost in the presence of a multiplicity of heterochronous, qualitative, non-coincident, non-communicating durations. The problem is therefore clear: how will these heterochronous, heterogeneous, multiplistic, non-coincident durations join together?
(Deleuze, 2007: 157)

²²Two rather different live versions of *Music Floats Upwards* are presented in the Appendices: A2.4 from the Sounds Like This Festival at Leeds College of Music in 2016 the other as part (27:22–34:15) of the documentation of a full solo performance; Appendix A2.5 Electric Spring Festival 2017 at the University of Huddersfield. These are included as examples of how the pieces in the portfolio can be employed as starting points for improvisatory explorations of various different moods and characters.

While *Klangwelt* and *Spertions* are full of transient and percussive sounds, and multiple rhythmic implications that already explore the concept of non-pulsed time, they do not do so directly; in fact, there is rarely a suggestion of sustained meter in those two pieces. The inclusion of more metric elements in *Music Floats Upwards* suggests rhythmic relationships between different meters. This brings rhythm to an unfolding movement of molecular relationships between points in a field, a dialogical (and multi-logical) modulation of proximities and distances between individual events, onsets and transient variations, rather than a repetitive restatement of structure — rhythm as dialogue and a marker of space rather than as a measure of metre. Achim Szepanski interprets such a rhythmic context as a kind of spatialisation of sound:

The movement and the relation of sound molecules itself [sic], their catenation happens for Deleuze/Guattari in the context of rhythmical territorialisation and de-territorialisation, which they describe as the ritornell, a kind of crystallisation of time-space, the temporalisation of space and the spatialisation of time. (...) As such “music” or the audible has a fractal dimension, which cannot be reduced to metrics, number and beat time. (Szepanski, 2019)

Non-pulsed time becomes a medium of relationship outside of any indexical or grid-like disciplining structure. Molecules are free to position themselves and to couple free of externally imposed points of temporal demarcation, in order that the temporal map may be drawn all the more freely.

3.6 Flowers for Antonin (August 2016)

The sonic raw material for *Flowers for Antonin* was derived from a corpus of fragments originally collected for improvisation using STEIM’s LiSa software and my digital WiGI instrument (Scott, 2012). One motivation behind this composition was to revisit these very familiar materials which help form my own improvisational language in a different compositional context. Although originally compiled to be addressed as non-linear sample buffers, I discovered that without further manipulation these short stretches of audio material already made intriguing “found” sources; almost little etudes in their own right. For the compositional process of *Flowers for Antonin* (perhaps with a respectful nod to Bode’s Modular Sound Modification System) I re-edited and processed these samples using techniques familiar from electronic music of the 1950s and 60s,

including manipulation via a Revox reel-to-reel tape recorder.²³ The influence of French playwright and poet Antonin Artaud on my thinking and how this connects with the molecular concept is considered, along with a presentation of my artistic intentions for the piece and how it arrived at its final form. This is followed by critical reflections upon the composition and a discussion of how it might be seen as a turning point in the context of this portfolio.

3.6.1 Compositional Structure

Flowers for Antonin takes the form of three continuous sections. It is “led” by a solo synthesiser voice, which appears right at the outset. The piece maps the changing relationship of the solo voice against the other layers, which represent more of an ensemble layer. The solo line serves more as a connective thread amidst the more fragmented and discontinuous sections rather than itself being the aural focal point.

The first section (0:00–2:19) is agitated and gestural, and introduces the basic material and atmosphere of the piece, much of which is maintained and revisited throughout the other sections. The solo voice is present from the outset but is integrated and hard to distinguish.

The second section (2:19–8:10) comprises two passages of slightly different characters. The passage between 2:19 and 6:14 is slightly less frenetic than the opening section, allowing for varied and playful interactions between tape and solo voice. Denser sections and percussive interjections are introduced and the lead voice is sometimes subsumed by these events. In the second passage, starting at 6:14, the solo voice again becomes more apparent; high-frequency sine wave chirps create a more continuous element through subsequent passages. The solo part finally becomes indistinguishable as it is subsumed under overlapping layers of gestural events and sound masses.

The final section (8:10 – end) is initiated by a distinctive descending phrase from the solo voice and moves away from the hyper-gesturalism of the previous sections, allowing for the growth of a more “orchestral” sound mass, into which the solo line is completely absorbed, taking the piece to a conclusion.

²³ I employed a Revox PR99 as a vari-speed delay and pitch processor.

3.6.2 The Influence of Antonin Artaud

Artaud's desire for a fundamentally *visceral theatre* and for a *cinema of the body and the senses* parallels Edgard Varèse's vitalist proposition that new music should be influenced less by musical aesthetics than by "natural objects and physical phenomena," and that it should "pulsate with life" (Schuller and Varèse, 1965: 34). Discussing musical form, Varèse highlights the importance of:

internal structure, expanded and split into different shapes or groups of sound constantly changing in shape, direction, and speed, attracted and repulsed by various forces. The form of the work is a consequence of this interaction. Possible musical forms are as limitless as the exterior forms of crystals. (Varèse and Wen-Chung, 1966)

Artaud similarly proposed a newly visceral image of an art, an action theatre structured not through representation nor abstraction nor aesthetics but instead materialised via the "epidermis of reality," thereby creating "situations that arise from the mere collision of objects, forms, repulsions and attractions (...) whose inner significance (...) goes from the outside to the inside [and] in which even psychology is engulfed by actions" (Artaud and Sontag, 1988: 149–151):

From a collision of objects and gestures are derived real psychic situations among which the cornered mind seeks some subtle means of escape. Nothing exists except in terms of forms, volumes, light, and air — above all in terms of the sense of a detached and naked emotion that slips between the paved road of images and reaches a kind of heaven where it bursts into full bloom. (Artaud and Sontag, 1988: 149)

Flowers for Antonin is influenced by these ideas and attempts to realise them in musical form; particularly Artaud's image of the "collision of objects and gestures" whose behaviour and trajectory are, as Varèse put it, "constantly changing in shape, direction, and speed, attracted and repulsed by various forces." Particularly relevant in this energetic spectromorphology is the concept of artistic form developing "from the outside to the inside," derived less from the supposed inner qualities of its material than from being "attracted and repulsed by various forces" (Varèse and Wen-Chung, 1966).

3.6.3 Commentary: Ensemble Composing and Linear Resolution

While composing *Flowers for Antonin*, it was not entirely clear to me how Artaud's ideas would come to life or how the interactions between these fragments and

molecules of sound, and their expansion and multiplication via the tape recorder, would give rise to a compelling compositional structure. The hyper-contrapuntal language I explore here, while working well for shorter pieces such as *Spertions*, might easily become too exhausting to the ear when sustained over a longer duration and proved problematic as a source for the development of larger-scale structures. The sheer amount of detail and micro-editing involved probably led me to lose an overview or to be able to define the narrative of the piece quite as clearly as I hoped. There was a surfeit of information in the source material of this piece that tended to blur dialogue and block interaction, and that ultimately impeded the development of a compelling musical form. I spent a great deal of time, for example, deleting material that I subsequently reinstated, and then sometimes deleted again — a drawn-out compositional process full of redundancies. While working on the piece it had already become obvious that I needed to explore other approaches as well.

Towards the end of this process I began to introduce more linear elements as new material in an attempt to compensate for some of this sense of fragmentation. One specific experiment while seeking solutions to this problem involved me recording a solo part “blind”, i.e. without monitoring the rest of piece as I recorded it, with the structure and timing of the piece existing only within my memory and imagination. Despite this eccentricity, the solo fits the backing well and it did succeed in bringing the fixed material back to life and in creating a more compelling sense of narrative. Partly due to this introduction of a more linear aspect, I had again to remind myself that the idea that a molecular approach to composition need not imply a superficially molecular musical vocabulary, but could function as a far broader concept that could be applied to a wider range of materials, and to musical relationships between both similar and dissimilar materials. The remaining pieces in the portfolio proceed in part from this recognition.

3.7 Tales from the Voodoo Box Suite (May 2017): Pigeon Toad; Clara at the Worm Disco; At the Hop

3.7.1 Overview

This suite is extracted from an album of solo free improvisations, *Tales from the Voodoo Box* (Scott, 2018), that were played on a recently manufactured EMS

Synthi A “Cornwall” synthesiser and a Haible frequency shifter. All three pieces are derived from slight variations of the same basic Synthi patch. After struggling with the possibly unnecessary sonic complexities of *Flowers for Antonin*, this suite represents if not exactly a “ground zero” then at least a return to the drawing board in the form of simpler and more direct musical material. An “interactive algorithmic” approach is again used here, but in contrast to *Song for Ghosts*, here it allows the potential for both gradual transformations and for more radically discontinuous shifts in frame, for example in the B section of *Pigeon Toad* (at 1:26), or in the timbral shifts (at 1:13, 2:23 and 3:07) and the introduction of rhythmic material (3:28) in *Clara at the Worm Disco*.

3.7.2 Form, Rhythm and Sonorities

A momentary plateau of rhythmic stability is captured within a complex patch-programmed scenario in *Pigeon Toad*, the first work of the suite. All the sounds are derived from three cross-modulating pulse waves making a repetitive although not very stable groove that excites an audio rate-modulated 24 dB filter. Although the piece echoes some of the previous ideas of gravity and spectromorphological weightlessness explored in *Music Floats Upwards*, it does so here in a simpler ABA form lacking any real sense of development: the B section consists of framing only a single phrase before shifting back to the A pattern.

In *Clara at the Worm Disco*, a variety of spectral gestural shapes are explored that are transformed into different timbres, textures and rhythms, including a passage (starting at 3:25) near the end that appears almost as a reprise of the groove from *Pigeon Toad*. This particular component of the suite illustrates the relationship between the playable and unplayable in a patch that produces a wide range of potential sonic outputs — some predictable but some very unpredictable. The sonic language explored here, including feedback, distortion and spring reverberation, relates directly to my discussion of the “darker” sonorities in improvised pieces recorded with Axel Dörner and Audrey Chen [Appendices A1.4 and A1.6, respectively].

The third and final work in the suite, *At the Hop*, is a more explicit study in rhythmic instability that starts with a quite familiar step-sequenced synthesiser trope and explores both pulsed and non-pulsed time and variations, slipping between various tempos and timbres. The tempo underlying the piece is “soft”,

i.e. there are no *ruling events* and it is not aligned to a stable grid but becomes itself an active and modulated variable musical element.

3.8 Thunder, Actually Bicycles... (August 2018)

Thunder, Actually Bicycles... is composed from several sound sources: recordings of voltage-controlled synthesisers, field recordings of a Velodrome cycling track and hydrophone recordings made near St. Andrews on the east coast of Scotland; none of these recordings were recorded with the intention of using them in combination. The composition also repurposes material drawn from recorded documentation of a duet concert²⁴ with Axel Dörner (live-processed trumpet and a Max/MSP patch), in which I performed with a modular synthesiser and FM radio. As will be discussed, the qualities of particular sections and thus the compositional structure emerge from the different ways the source materials are combined. I go on to discuss the issue of gesture and its relationship to duration and space, the slightly different strategy I take to these aspects in this composition and the implications they have for its form. An approach by which the material is allowed to “have its say” is evident in the composition.

3.8.1 Compositional Structure and Analysis

The composition can be divided in four sections. The opening passage (0:00–1:31) of the first section (0:00–4:55) introduces most of the material for the piece. The opening phrases, featuring processed trumpet breath, wind-like analogue noise and delay feedback, serve to introduce the sensations of wind and breath along with sustained rising and falling synthesiser phrases characterising the following passage (1:31–2:55). Here a sense of rhythmic urgency is suggested by small percussive phases that come in and out, but which are never fully developed. A short trumpet gesture (2:55) gives way to a more percussive and gestural passage. At the outset of the final passage in this section (4:42), the trumpet ushers in a more expansive spatial atmosphere and again there are rhythmic motifs. By the *bricolage* of these elements I intend to create a sense of overall narrative in such a way that the listener is guided through a complex environment of scenes, shifts and cinematic transformations as well as dynamic variation, rhythmic propulsion and a constant sense of timbral variation. The end of this section mirrors the laminar or soundscape feeling of the opening of the piece.

²⁴ Recorded at Sound Anatomy III at Spektrum (Berlin, Germany) on May 7th, 2016.

The previous rhythmic implications become more explicit in the second section (4:55–8:05). Although the groove that is developed here has some consequences for succeeding events, its dynamics and causes and effects remain largely internal and self-contained. It is in conversation, but mostly with itself, rather than with any “outside” elements or materials. In a flat, almost motionless pause (6:01), the rhythmic section is abandoned, subverting the expectation of continuity, which is both satisfied and broken by the subsequent percussive trumpet phrases (6:17). These phrases create a sense of interruption, but also continue to exploit the energetic momentum of the previous section. Thunderous bicycle sounds and an indistinct spoken radio voice suggest distance and reveal both a larger spatial vista and a sense of separation between proximate and distal events.

The solo trumpet, for the first time playing clear pitches (and without electronic manipulation) opens the third section (8:05–10:41). Exposed and vulnerable, it is virtually attacked by the electronics, which echo and mimic the earlier radio voices and are subsequently themselves echoed rhythmically by the breathing trumpet. Water recordings enter and quickly become blurred and indistinguishable from the trumpet and synthesiser parts. This section is free, moving between and resolving its electronic, electroacoustic and acoustic sources. The water and wind recordings are heard here for the first time by themselves.

The final section (starting at 10:41) begins and ends with a simple electronic drone. Breath/wind sounds enter, building dynamically and suggestive of distal sound sources. Trumpet breath and wind become more obviously related (as versions of the same thing) here. The drone takes the piece to a close.

3.8.2 Commentary: Sound Sources and Letting the Materials “Have Their Say”

The process of collecting the sound materials for *Thunder, Actually Bicycles...* was quite convoluted. The concert material was recorded at a duet performance in Berlin by Axel Dörner and I. This concert had both striking individual moments and a compelling sense of compositional trajectory. Unfortunately, the recording was not a technical success and parts of it came out too distorted to use. I was able to salvage fragments that had survived the flawed recording process and reorganised them into a new shape. At the same time, I was working on a stereo

reduction of a multi-channel/ambisonic piece *Buzz Sculptures*²⁵, which combined quadrophonic recordings of the Hordijk synthesiser and ambisonic recordings made by positioning an ambisonic microphone underneath the floorboards of the Manchester Velodrome.²⁶ I extracted some of these elements from this piece and all these elements were combined with hydrophone recordings made on the shore near St. Andrew's in Scotland.²⁷ Wind and water emerged as connective sound ideas that help develop the sense of continuity in *Thunder, Actually Bicycles...* These materials form motifs that are represented by the field recordings, by the microcosmic breath and spittle of the trumpet and by the filtered white noise, feedback and delay from the modular synthesiser. Without any subsequent processing, the water sounds seem to almost mimic the other sound materials in the piece, as if imitating the effects of resonant bandpass filtering in the analogue synthesiser. This happily blurs the idea that the field recordings are “real” against the metaphoric hyper-reality of the electronics, as the sounds both lose and retain their native referential qualities. Such a technique relies on an element of disorientation in the listener; the sounds remain recognisable but the ear does not necessarily know exactly what it is hearing at any one point. I suggest the dynamic and energetic potentials of the source material are better captured and deployed here than in the previous pieces. The establishment of a plausible flow of causes and effects here is helped by my resisting my native bias towards gesturalism. By allowing sections a longer time to develop according to their own internal durations, I avoided the temptation to overuse gesture as a way of organising time, instead trusting more the interactions of the sounds themselves to create narrative and structure. A significant amount of gestural information is nevertheless retained, especially from the trumpet phrasing, which is often deployed to announce, mark or to disguise transitions between the different types of material.

The molecular concept returns as an important aspect of *Thunder, Actually Bicycles...*, especially in the way that apparently unconnected materials, durations and spaces are combined — this is accomplished more convincingly here than in

²⁵ This piece premiered at Spektrum (Berlin) in September 2017 and was later performed at the Into Worlds festival as part the Immersion Conference at Martin Gropius Gallery (Berlin) in January 2018.

²⁶ Recorded with the help of Andy Adkin.

²⁷ Recorded with the help of Tim Scott.

previous pieces. Such combinations create the energetic possibility of the longer phrases and sequences from which the piece is constructed, and these are by no means restricted to the gestural or the percussive. By letting the material “have its say”, by using a greater variety of lengths and envelope shapes, by slowing down the rate of events and by leaving more space for events to have consequences and resonances²⁸, I was able to achieve a better balance of and communication between the elements than in some previous pieces. Materials are allowed more *horizontal expansiveness*, resulting in a more compelling sense of form and narrative than is found in earlier works such as *Several Circles* or *Flowers for Antonin*.

3.9 Everything is Always at Once (September 2018)

A study in sustained density and polyrhythmic organisation, *Everything is Always at Once* brings together several different source materials in a manner that owes something to Ornette Coleman’s Harmolodic concept.²⁹ The piece veers towards a more referential and acoustically viable approach to sound design than other pieces in the portfolio, implying somewhat feasible acoustic and instrumental sources, a distinct division of musical roles and characteristics of the kind one might expect to hear in an acoustic ensemble.³⁰

3.9.1 Compositional Structure

The piece is comprised of four iterations of similar material, followed by a final section. It can be heard as A-A1-A2-AB-B. The fourth iteration (AB) adds substantial new material that is followed by the fifth and final section in which the new material is entirely dominant.

The opening section (0:00–3:59) introduces most of the materials in the piece and could perhaps also be taken as a simpler standalone version of the entire piece. The second (3:59–5:35) reiterates material from the first, fragmenting it and

²⁸ Such ideas are explored at length in the composition *Everyday Arithmetic* [Appendix A2.6], which provides substantial background context on this piece.

²⁹ There is no single source that adequately describes his heterophonic concept, but Coleman’s Harmolodic Manifesto is as good a place to start as any (Coleman, 2019).

³⁰ The Hordijk modular, driven by its Rungler and Frequency Shifter modules, functions here as surrogate rhythm section providing a forward momentum on which the rest of the material is built. Sampling is also used extensively, including sound sources such as saxophone and orchestral percussion, which are processed, and spatialized using CataRT and Max/MSP under the control of a Buchla Thunder midi controller.

exploring relationships between its various parts and layers. The third iteration (5:35–8:02) reiterates the material in ways in which the elements disintegrate into new and perhaps less obvious layers and combinations. A new element (the B material) is also introduced here: a slow, simultaneously rising and falling “orchestral” barber-pole glissando from a Buchla 200 synthesiser³¹ that contrasts greatly with the material we have heard so far. Over the course of the first half of the fourth (8:02–12:18) iteration, the rhythm section drops out and some of the microscopic interactions between different elements become more exposed. The glissandi are now revealed as a more distinct layer. This section builds in intensity and density until the rhythm section is reintroduced into a dense and multi-layered structure in which all individual parts nevertheless remain perceptible. In the final section (starting at 12:18), the glissandi and waves of processed cymbal and gongs come to prominence, the distinct materials gradually merging into a single sound mass that finally takes the piece to a conclusion.

3.9.2 Commentary: Molecular Interactions and the Integration of Disparate Materials

Part of the specific challenge of *Everything is Always at Once* was to integrate a fairly explicit and continuous variable rhythmic element, reminiscent of a free jazz rhythm section³². This groove tends towards a sense of an open and non-metric pulse rather than an explicitly stated meter and gives momentum to, rather than contains, the complex, delicate and intermittent micro-narratives from which the form of the piece — an unfolding of molecular interactions between its various layers — is derived. A specific aspect of this composition is that most of the sounds here carry a representative *function* of one kind or another; percussion parts, rhythm section functions, horn sections, orchestral references, etc. By adopting such referential and quasi-instrumental functions, the piece embraces to some extent the idea of acoustic viability more so than in any other work in the portfolio.

³¹ Recorded at Elektronmusikstudion (EMS) Stockholm (Sweden).

³² There are many examples of this kind of playing, but two I find particularly inspiring are Gary Peacock and Sunny Murray’s free-form rhythm section on the Albert Ayler Trio album *Spiritual Unity* (Ayler, 1965) and Peacock and Barry Altschul’s playing on the album *Virtuosi* (Altschul, Bley and Peacock, 1976).

The composition brings together several of the approaches to layering, editing and processing that I explored in the other pieces in the portfolio: from the more sculptural micro-editing of *Several Circles* and *Flowers for Antonin* to the more outwardly reaching connectivity of materials found in *Klangwelt* and *Thunder, Actually Bicycles...*, as well as something of the more continuous density of sounds found in *Flowers for Antonin*. This is perhaps the densest of the compositional work explored in the portfolio, and it draws upon an appropriately larger number of sound sources and layers. As the title suggests, it is explicitly an attempt to sculpt something from too much information. If this was disturbing to me in some early pieces, notably in *Flowers for Antonin*, in which I struggled to contain the density within a form, I decided simply to celebrate and enjoy that density here.

A further challenge in *Everything is Always at Once* is the execution of the introduction of sonic material (the B glissandi) that does not speak directly to the main tempo of events and is very different in spectromorphology and character from the other materials. Introduced at 4:46 it initially appears as a submerged layer in a quite complex scenario. It becomes more clearly a distinct layer at 8:11, eventually transforming the piece at 11:40 and ending the composition heard by itself, creating an dense atmosphere and spatial imagery which has nothing in common with the composition's rather shy and cautious beginnings. The piece is indeed characterised by a kind of unresolved duality between these materials. Although the B material finally prevails in the last minute of the piece, where we at last hear a sound with a more unified character, rather than reflecting any sort of resolution between them, or even direct conflict, it seems as though the other more frenetic sounds have simply exhausted themselves and have nothing left to contribute to the progress of the piece.

3.10 On the Surface, Crying to the Moon (February 2019)

By the time the other compositions in this portfolio were completed, there remained aspects of my initial and secondary questions that I still wanted to address, for example the questions that arose in *Several Circles* regarding the integration of less gestural material and longer durations. I also wanted to engage again with the possibility of a more thematic, sonata-like form such as *Several Circles* seemed to promise. *On the Surface, Crying to the Moon* attempts to address these questions. There are also other interesting issues regarding the use

of noise, the use of a single sound source and the method of composition that *On the Surface, Crying to the Moon* addresses, and I will comment upon these as well.

3.10.1 Compositional Structure

The form here is a set of blocks of generative variations upon the same basic genetic material, a modulated sequence: i.e. A1-A2-A3-A4-A5-A2'. But, as these materials cannot always be recognised as genetically connected by the ear alone, this schema is rather too theoretical for our purpose. In which case A1-A2-B1-B2-B3-A2' would be a more appropriate way of thinking about the sections and the form in which they are more clearly audible.

The piece opens (A1) with a 64-note “bubbling” melodic theme that is repeated eight times and varies a little with each of its iterations, fading to silence on its final repetition (0:00–1:14). In the second section (A2, 1:14–4:17), the same sequence is played more slowly, and its variations are further randomised and distributed over a wider pitch range. A second layer, derived from the same thematic material, is displaced rhythmically and develops into a more complex, syncopated iteration. A chaotic white noise sound fades in that is still actually derived from the same sequence, but no longer audibly relatable to it. This noisy timbral layer, reminiscent of water or weather, accompanies and challenges the main pattern for attention. In section B1 (4:17–6:04), water and weather sounds become more forceful, taking over the foreground. We also hear sounds from the modular synthesiser that are reminiscent of seabirds, and some variations upon these sounds. In the third section (B2, 6:04–13:03), high-pitched percussive events terminate the previous sounds, initiating long and more static glacial tones. A descending synthesiser phrase introduces more playful undulating electronic textures. Eventually these transform to take on characteristics of drones, weather and water. In the fourth section (B3, 13:03–16:13), the high tones are reiterated, joined by other obviously electronic sounds until more violent and intermittent swathes of weather-like sounds, and sounds of water, birds and bubbles combined into an intense, mutating sound mass. This section is characterised by static, continuous tones and a rising sense of disruption and instability. In the final section (starting at 16:13), the pattern from A2 is reiterated in an over-modulated and less-controlled, bruised and mutilated form. The

pattern does not resolve but rather fades unsteadily into the distance, as if to an uncertain future.

3.10.2 Commentary: Unity of Sound Materials, Fluidity Between Improvisation and Composition

In common with *Song for Ghosts*, *Spartitions* and *A Spark Ignites*, *Cathedrals Tumble* [Appendix A2.2] the thematic material is all derived from a single sound source; the Hordijk Modular and is generated by variations and modulations of a 64-note cycle that is heard in two different versions in the first two sections of the piece. Although this theme helps create a basic unity within the source materials, this is not always audible; for example, when played at greatly multiplied tempos and incorporating audio rate modulation the pattern loses identifiable pitch and becomes more chaotic and noise-like. In this noisy, over-modulated state the Hordijk Modular reveals a wealth of spectral artefacts that stray very far from the original pattern, from which much of the piece is subsequently constructed.³³ The sounds here retain — even when heavily modulated at audio rate — a transparency and precision that are unusual in an analogue synthesiser, making both the more pitched and noisier sections “surgically” controllable via absolutely minute adjustments to potentiometers. The use of the Hordijk Modular synthesiser here is worth noting, as it imprints a distinctive sonic character to this piece that is as clear and identifiable as the use of the Serge in opening moments of *Several Circles*. This single-source approach also helps impart qualities of spontaneity, a “genetic” sense of sonic unity and thematic qualities to the piece in a way that is hard — perhaps impossible — to achieve as convincingly with micro-editing.

The restatement of the stepped melodic theme at the final section directly parallels the return of the initial melodic shapes heard at the conclusion of *Several Circles*. The reiterated A1 material is a clear echo of the earlier statement of the theme but it is both rhythmically and spectrally compromised, and sounds less certain in its progress — the theme-as-subject has not only been on an odyssey but has returned tangibly battered and transformed by it. If in *Several Circles* the resolution may not sound entirely genuine, the prorogate variation here sounds

³³ The audio rate modulations that create these noisier textures are the same sources used to modulate the oscillators, but using different frequencies and indexes.

more plausible, as if the collapsing and disintegrating material in the body of the piece has actually played a role in disturbing and transforming the events in the final section, which, wounded by them, cannot any longer return to their more innocent earlier state.

On the Surface, Crying to the Moon addresses some of the questions that were present at the outset of the creation of this portfolio and also responds to some problematic aspects I perceived in the earlier pieces, especially *Several Circles*. It also represents newly emergent compositional possibilities; in particular the potential for a more fluid compositional process based on a more continuous movement between my practices of improvisation and composition, and between the recording of the raw materials and the completed composition. This enabled the abandonment of extensive micro-editing; longer stretches of the original recordings are used here, with almost no processing and little editing.³⁴ As such, the piece evidences a trajectory that has been traced over the course of the portfolio and has led towards the development of a more organic compositional workflow, involving less micro-editing, post-production, processing, sample manipulation. As a direct result of this process, my recording, composition and indeed performance practices have become more aligned.

4. Conclusion

4.1 Addressing Research Questions

The focus of enquiry for this research, as outlined in the abstract, is “an artistic investigation into the applications and consequences of voltage-controlled analogue (modular) synthesis as a tool for composition and performance in the contexts of electronic musical composition and of freely improvised (i.e. not scored or notated) performance.” My initial questions help to address this main focus and helped to navigate some complex issues, but as stated, these have functioned primarily as invitations to reflect upon an existing and evolving artistic practice, rather than as factors that have been allowed to dominate the actual content of that practice. The purpose of this concluding section is to show that although I have not allowed such questions to permeate my creative process, I

³⁴ In this respect, the composition *Everyday Arithmetic* [Appendix A2.6] is an important influence on this piece.

have nevertheless addressed them along with other emergent themes and questions, both via the compositions and through my subsequent commentaries.

For example, the question “How can we conceive of ‘compositional’ forms of organisation in practices that prioritise spontaneity, improvisation and live performance?” is addressed throughout the commentaries on virtually every work in the portfolio. The question “How can rather simple inputs of analogue data be expanded into the creation of complex and varied compositions?” is also addressed throughout the descriptions and commentaries on the compositions, as well as in the appendices, but is a particular focus for *Song for Ghosts*, *Spartitions*, *Tales from the Voodoo Box*, *Thunder*, *Actually Bicycles...* and *On the Surface*, *Crying to the Moon*, all of which use quite simple and/or single patch-programmed sources for sound generation and control.

Various applications of these voltage-controlled and modular synthesisers within my artistic practice are consistently and explicitly addressed throughout this research, so I do not think it is necessary to repeat all these questions and findings here; however, the artistic “consequences” of exploring these technologies may benefit from further elaboration. These consequences have expanded far more considerably throughout the course of the research than could have been imagined at the outset, and several new insights, questions and concepts have emerged as I have explored different ways of composing with this material. One outcome of this research is that I rediscovered something that, in retrospect, would seem to be quite obvious (and which Raymond Scott³⁵ and Harald Bode had already realised in the 1950s): the promise of voltage control was to offer an alternative to slow and inconvenient non-linear and fixed-media editing techniques. Whereas Scott and Bode developed such tools as alternatives to laborious non-linear tape editing, I rediscovered a similar sense in relation to the Digital Audio Workstation; even more than the cutting and splicing of magnetic tape, the computer provides extremely precise control over the audio materials, but it can also make the compositional experience rather ungainly and lacking in spontaneity — prejudicing certain kinds of decision-making and temporal engagement with sound materials over others. The DAW certainly offers the composer enormous freedom, but it is a freedom that I am not always sure I want

³⁵ Scott, R., 2000.

or that necessarily aids the compositional process, because it is almost completely devoid of any relationship to musical time, or from any tactile immediacy.³⁶ I discovered that, for myself at least, the closer I am able to retain proximity to a real flow of time in the studio the more likely I am to be able to sustain a relatively continuous musical flow between the different parts of the compositional process.

In retrospect, my starting point, which was the micro-editing and manipulation of recorded artefacts of voltage control, was perhaps not an entirely logical one. It tends to cancel out one of the most important features of voltage-controlled technologies, which is that they function in real or singular time and can thus be self-sequencing. This said, the combination of tools offered by bringing together linear analogue recording and non-linear digital editing is extremely powerful and appears to promise the best of both worlds. But I discovered, especially through the compositional processes of *Several Circles* and *Flowers for Antonin*, that this DAW-oriented approach to the organisation of material on a monitor screen could be problematic; it could radically slow down my decision-making, prejudice my visual perception of audio and may even encourage me to doubt my aural perception. However, I did not just want to completely avoid these challenges, abandon the DAW and “just” improvise.³⁷ There is an element of butterfly catching to studio improvisation. It is almost as if the process itself does not really want to be captured, and even once captured it is very hard to keep the creature alive, particularly since microscopic examination typically involves skewering it on a pin, ensuring its death. In the studio we are already dwelling in a different time from that of the improvisation so the DAW has its role too, this is not a question of “choosing sides”, but of how each approach contributes to the other. *Klangwelt* was an important piece in this respect, as its process revealed to me the possibility of a more molecular connection between recordings made at different times and in different places. Such a connection could only be explored compositionally, yet within that the liberties of microscopic editing might actually interfere with rather than support the process. From this experience of being

³⁶ I have discussed this and related themes about time, composition and performance in a number of presentations, including Scott, 2010a and Scott, 2013.

³⁷ *Song for Ghosts* is in fact one of very few free improvisations I recorded in the period of this research that I also consider to be readable as a completed composition.

surprised how easily improvised material could respond to being thought of more compositionally, the concept of the molecular also became more important; I began to think of it less as a technique or an aesthetic and more as something innate to the nature of the kinds of sound materials I am interested in working with.

From this perspective, *Spertions* and *Thunder, Actually Bicycles...* may be understood as methodologically transitional pieces. Although both are still very much dependent on a non-linear approach, each of these two works deploys longer intact passages from the source recordings, and the editing process is less obsessive than in earlier pieces, a tendency that reaches fuller fruition in *On the Surface, Crying to the Moon*. I suspect this possibility emerged as part of a broader process and might not have taken place without the exploration of more lengthy and painstaking studio practices represented in the portfolio; a self-imposed training I perhaps needed to go through in order to get past its limitations. But this learning process has encouraged me not so much to reject my starting points as to augment them with a broader range of compositional strategies that vacillate between pure improvisation and complex layering and micro-editing. Because of the experiences and knowledge developed over the course of creating the portfolio, this increasingly rich compositional “toolkit” can now be deployed with more confidence, and can be used more freely, now informed and driven by a heightened capacity for artistic judgement and a deeper and more complex appreciation of the specific materials at hand. Creating the pieces in this portfolio has thus created more freedom in my compositional method, in my musical thinking and in my listening.

4.2 Research Contribution

The compositions in this portfolio represent a body of exploratory contributions to artistic dialogues within not one but several contexts. The most direct contributions of this research are the original compositional artefacts in the portfolio and appendices and my reflective commentaries upon them; these explore the path of enquiry set out at the beginning using practical methods of artistic research. These artefacts also document paths of emergent research enquiry and of ongoing artistic development. Finally, they may be understood as reflections on the relationship between composition and performance and on the

praxis between theory and practice. The themes and concepts that emerge from reflection on the artistic activities documented here are all examples of a practice-based artistic research enquiry, *à la* Nelson — a two-way, iterative, creative exchange between thinking and doing. They also form an important bridge between free improvisation and composition, forming and informing the creative foundations of the works presented here.

Alongside the studio-based work I have also sustained and developed a busy and intensive performance practice, working with many different improvising musicians. I have been at pains to point out that these activities of composition and improvisation are not to be considered in opposition but rather as deeply related parts of a continuum; indeed this particular strand of thinking can be seen to be inseparable from the creation of these works as well as from the perspectives of this research. As such, these practices inform each other, sometimes quite directly, so I have also discussed the changing and developing improvisational aesthetics that these recordings witness. They have certainly had direct implications on how I approach and understand the process of both improvisation and composition; and so the praxis continues. This dynamic and empirical relationship I have explored between composition and performance practices represents a distinctive research contribution.

Over the course of the creation of these compositions, my artistic approach has been subtly but decisively transformed. At the outset, I explored a more painstaking and fragmented practice whereby I would exploit the non-linear possibilities of the studio and deploy the DAW as a context characterised by a very different sense of time from that of improvised performance, or even of improvisation in the studio. The activities of generating material and subsequently organising that material were initially quite separate, and the method used for the early pieces in the portfolio was based on this separation. But as the portfolio progressed toward a conclusion, these practices moved closer together. I became more concerned with the flow of sounds, with working with longer stretches of material, with as little editing as possible and retaining more and more of the characteristics of the original performance, while also feeling more able to react more authoritatively at a compositional level. Finally, the possibility of a more seamless flow between improvisation and composition gradually manifested

itself, notably in the composition of *On the Surface, Crying to the Moon*. The critical examination and creative exploration of methods and aesthetics that I found to be — to a large degree — common to improvisation and composition have resulted in significant aesthetic transformations of my own musical imagination and practice. The later pieces in the portfolio reflect this confidence, and it is significant that rather than narrowing down my methods or aesthetics towards a single point of conclusion, they do so in different ways, exploring different sound materials, exploiting different creative approaches and developing different levels of material complexity.

Some of the research contributions here have also been positioned at a more conceptual level, witnessing an interactive relationship between artistic practice and theory. The molecular concept discussed initially in the commentary on *Several Circles* and throughout the portfolio requires a final comment here. Although this idea was existent at the outset, I had not initially intended it to become such a significant element in the commentary, but it grew in emphasis as the work progressed and thus emerged as a core concept in my reflections and commentaries upon these works. While I do not explore it here in the detail that a major theoretical contribution would demand, its development, however unintended at the outset, remains a significant outcome of this research.

The emphasis on the dialogic concept between player and instrument has emerged as another important theme, rooted as it is on the importance of listening and being receptive to “what the devices themselves had to say” (Tcherepnin, 2019). By dint of its complexity and non-linearity, the well-patched (and sometimes badly-tempered) modular synthesiser demands an unusual intensity of aural attention from the player-composer: perhaps precisely because it can never be exactly controlled, it is a unique tool not only for composing but simply for listening.

4.3 Future Work

The final three pieces in the portfolio represent different fruitful directions for future work: *Thunder, Actually Bicycles...* combines very different sonic material into a unified musical form; *Everything is Always at Once* embraces and sustains a kind of over-complexity; while *On the Surface, Crying to the Moon* suggests the possibility of a simpler and more organic compositional process and of a more

continuous flow between improvisation and composition. Of these three the last is perhaps the most intriguing as it suggests the potential for a still greater unity in the working methods behind my artistic practice in future. But all three suggest possible models for future work; there remains plenty to explore in these instruments, in my approaches to working with them and in what they have to teach me.

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Appendices

Appendix 1 — Supporting Material #1: Recordings of Group Improvisation

I include seven indicative documented examples and associated commentary, intended as representative of a far more extensive body of practice than can be illustrated in the portfolio alone. These pieces are all completely improvised, played without any prior compositional structuring or specific discussion. Their inclusion here as appendices should not be understood to mean that I attribute to them any less significance than I do the other work presented. But as group improvisations they are somewhat different in nature and their documentation is inevitably less definitive than that of more fixed works. One intention in discussing these pieces is to show some of the ways in which I have worked with the voltage-controlled analogue synthesiser as a performance tool. It is important to illustrate how some features of my improvisation practice have changed in this time and to suggest how some consequences of those changes have impacted my composition practice. This material is both a vital context for the compositions but also in many ways it represents the “front line” of the research, where I think a lot of the learning that has filtered through into my compositional work has really taken place.

A1.1 Scatter (March 2015), by Richard Scott’s Lightning Ensemble

This improvisation from the album *Hyperpunkt*³⁸ [Appendix A1.1], recorded in Salford in March 2015, is addressed towards the creation of a collective percussive hyper-pointillist surface in which each player is focussing as far as possible on hearing and responding to the others rather than on their own playing. Although very different in tone and energy, this way of approaching improvisation owes a great deal to the music of John Stevens and the Spontaneous Music Ensemble. This ensemble’s radically contrapuntal molecular approach to group playing represents an important part of the improvisational language that I bring to the current portfolio and it may help to understand part of my intention in some of the portfolio pieces. *Flowers for Antonin*, for example, uses artefacts of this language as source material. The aim of this kind of group improvisation, as I see it, is to subsume one’s own line entirely to that of the

³⁸ Richard Scott’s Lightning Ensemble, 2017.

group. One technique for this is to position one's own fragments of sounds in the spaces left by others, however tiny, and to respond to the statements of others, ideally leaving one's own interjections incomplete — with question marks rather than exclamation marks. This is very much the role I take with the modular synthesiser on this recording, and a lot of what needs to be trained is velocity or response; the electronics need to be every bit as quick to converse as the acoustic instruments. One image for this is that the synthesiser can function as a kind of connective tissue between the other instruments, and I think this choice of approach can be ascertained in this recording. The resultant textures and forms are ideally made up of a kind of flocking group murmuration in which there is no longer any division of musical functions, or between instruments and players, to the extent that it is not always even possible to hear what instruments are being played.

A1.2 Abrus (January 2015), by Parak.eets

A more playful and expansive example of this molecular approach can be found in this recording by Emilio Gordoa (vibraphone and percussion), Ute Wassermann (voice and birdcalls) and Richard Scott (modular synthesiser) [Appendix A1.2], from the album *Natura Venomous*, recorded in Berlin in January 2015.³⁹ Although the musical language here ranges more freely, the choices are generally similarly molecular and conversational and might be regarded as a more lyrical evolution of the Lightning Ensemble's approach. There is no overt attempt made to achieve any particular kind of aesthetic agreement, however, Parak.eets does rely upon an intuitive sonic compatibility in which the three players generally coexist rather effortlessly. The three individual instrumental voices often become submerged into common group textures and directions in which the musicians' individual contributions are consistently given secondary importance to such negotiated paths of ensemble development. The role of the modular synthesiser in this music is also freer, in that although providing a conversational tissue is still the core value, the kinds of rhythmic and melodic approaches that can be employed are broader and less tied to pointillism.

³⁹ parak.eets, 2016.

A1.3 Hauch Mit (February 2015), by Vorfeld, Scott, Gratkowski

This piece played by Michael Vorfeld (percussion), Richard Scott (modular synthesiser) and Frank Gratkowski (alto saxophone and contrabass clarinet), from the album *Sieben Entrückte Lieder (Seven Enraptured Songs)* recorded in February 2015⁴⁰ [Appendix A1.3], represents a more open-form kind of improvisation, which can travel in many different directions. The approach to group improvisation here gives space for soloistic interludes, abrupt changes of mood and direction, and even for suggestions of different genres. Even less so than for Parakeets, in this trio there is little attempt at creating an aesthetic consensus beyond a basic commitment to conversationalism; indeed different performances of this group have taken on very different characteristics. An example of this is that halfway through this piece the entire character of the music and the relationships between the instruments dramatically shifts: from a stridently gestural and percussive first half, into an absorbed granular molecularism out of which distinctive shapes and phrases eventually emerge, giving way to a passage almost reminiscent of a contemporary jazz or chamber ensemble. Although no less dialogic, this kind of shift represents a slightly different image from that of molecularism — more a shift between different molar blocks of material. Despite its many possibilities of musical direction, a strongly collective sensibility and shared openness to information travelling from and towards any direction remain the keys to understanding much of the musicians' individual decision-making.

On this particular recording, in common with the previous two, I generally elected to use the synthesiser as a kind of intermediary between the other instruments, almost as a bass player or a second percussionist. I'd characterise this approach to playing the synthesiser this as broadly *quasi-acoustic*, whereby I intend to function with a speed and reflexivity more or less equal to that of an acoustic instrumentalist. By mimicking aspects of tactile and material qualities of acoustic sounds and sound-making, electronics can often be made to communicate more freely with acoustic instruments. This intention also helps determine choices made at the level of sound design. My tendency is towards sounds that have a quite tangible spectromorphic character, that represent possible events and that

⁴⁰ Michael Vorfeld, Richard Scott and Frank Gratkowski, 2016.

are acoustically viable — although not to the extent of embrace of embracing for example imitative synthesis or physical modelling.

A1.4 Head IV (August 2015), by Axel Dörner and Richard Scott

Many acoustic instrumentalists in the realms of contemporary, experimental and improvised music are themselves also influenced by more abstract electronic and electroacoustic sounds, whose extended techniques and spectromorphologies might diverge greatly from more conventional instrumental usage. So this is an influence that travels in two directions and there is certainly a great deal of direct mutual influence between electronic and acoustic instrumentalists engaged in improvisation. Trumpeter Axel Dörner, who in my estimation works with an electronic music-inspired aesthetic both acoustically and with electronics and live processing, is a good example of such a player. This improvisation, featuring Dörner performing on acoustic trumpet and myself on modular synthesiser, is taken from the album *Seven Types of Ambiguity*, recorded in Berlin in August 2015⁴¹ [Appendix A1.4]. The kind of conversation that takes place between the instruments on this recording is rather different, and perhaps less overt, than the recordings I've discussed so far. The material in this performance is less immediately dialogic or molecular: material is initiated and terminated, added and subtracted, and duration thus becomes an important and almost independent musical variable.

In conversation with the trumpeter after the recording session I commented that in the moment I hadn't always known how long that some events or textures should be sustained. He replied: "Well, nobody ever knows that." Indeed, in the moment of playing, an improviser is perpetually in a precarious moment of suspension between the remembered past and a formless future, each of which are nothing more than ideas, so of course one never really knows if they are making are "good" musical decisions or not. This perpetually becoming-and-disappearing present moment is a philosophical quandary I can't pretend to solve here, but it does allow an insight into some of the layers of decision-making that are present in the improvised act. In improvisation time becomes less a fact or a grid than an abstract consequence implied by momentary choices of gestures and events. The greater focus on duration found in this particular improvisation might

⁴¹ Axel Dörner and Richard Scott, 2016.

have the effect of freeing musical content from the expectations of the kind of call-and-response patterns characteristic of more gestural approaches to improvisation. As such, the implied space of this exchange is more expansive, more virtual and more malleable. It is worth documenting that the discovery that I can organise sounds in a way that augments rather than contradicts my gestural language was quite new to me, and came not as an æsthetic idea, but more as a musical fact that emerged directly out of playing and has had a direct subsequent impact on several of the pieces discussed in the portfolio — notably *Thunder, Actually Bicycles...* and *On the Surface, Crying to the Moon*, as well as *A Spark Ignites, Cathedrals Tumble* [Appendix A2.2].

A1.5 That’s a Moray (August 2015), by Audrey Chen and Richard Scott

A1.6 Live in Berlin (January 2016), by Audrey Chen and Richard Scott [video]

These two recordings made with vocalist Audrey Chen — *That’s a Moray* [Appendix A1.5], from the album *Hiss & Viscera*, and the video *Live in Berlin* [Appendix A1.6] — were recorded in Berlin in August 2015 and in January 2016⁴², and again represent a different direction from the conversational hyper-contrapuntal approach. After the concert in Berlin an audience member concluded that it “sounded like improvised music from a horror movie.” Indeed, subjectively, a darkness of texture and atmosphere, and a combination of industrial/mechanical spectromorphologies with a strong sense of corporeality gives these recordings a distinctive and possibly somewhat disturbing character. Another reason to include this video is to show the very visceral performative approach taken towards playing the modular synthesiser in this context.

Although there is a lot of explicitly conversational exchange — indeed voice and synthesiser can sound surprisingly similar to each other — this kind of interaction is only one of several sonic relationships explored in this duet. Sometimes the relationship is more like two lines entwined than a call and response; at other times it moves closer to a kind of solo with accompaniment in which the electronics define an environment to which the voice can respond, support or position as a context for more linear vocal phrases and developments. Because this vocalist, like Dörner, is quite influenced by electronic tonalities, this duet also invites me to limit myself less to the requirements of acoustic feasibility and

⁴² Audrey Chen and Richard Scott, 2016 and 2017.

instead embrace a more specifically electronic sound world that can be quite noisy, industrial and almost aggressively visceral in character. Along with the duet with Dörner, this represents a changing of my aesthetic, which has gone on to influence my composed work. I feel the aesthetic emerging from these recordings is generally darker and less sonically pristine; it is haunted, subterranean and mechanical⁴³, no doubt reflecting both my predominantly urban environment and a reassertion of my formative noisy and distorted electronic music influences, in particular Cabaret Voltaire.

A1.7 n (January 2016), by Alexander Frangenheim, Nikolaus Neuser, Richard Scott

The final improvisation included here, by a trio made up of Alexander Frangenheim (contrabass), Nikolaus Neuser (trumpet) and Richard Scott (modular synthesiser), recorded in Berlin in January 2016 [Appendix A1.7] and included on the album *Trialectics*⁴⁴, perhaps relates most directly to the Lightning Ensemble recording. The percussive and hyper-interactive language in this piece is sonically not so dissimilar. But it witnesses a different group dynamic; if the Lightning Ensemble recording sounds as if the musicians are arguing amongst themselves, but actually agreeing, this trio might do the opposite. The three instrumentalists schizophrenically head off into three or more different directions and regularly change their mind about where they are heading, sometimes even halfway through a phrase, yet all the while somehow remaining attached to constantly renegotiated collective statements of timing and form. The role of the synthesiser is again freer here than in the Lightning Ensemble, variously conversational cogent, spatial or interruptive — it moves between conversational and more oblique roles, between acoustically feasible and more abstract electroacoustic timbres. While still very much rooted in collective interaction and molecular in its process, I have the feeling this music has travelled quite far from John Stevens' image of a collectivist way of playing formed in the 1960s and '1970s, yet, in its sometimes fractious and cantankerous manner, it adheres just as closely to

⁴³ Perhaps it is no coincidence that both of these recordings were recordings in the cellar of an old butchery, in one of the oldest houses in the Prenzlauer Berg district of Berlin, within spitting distance of where once lay the Berlin Wall.

⁴⁴ Alexander Frangenheim, Nikolaus Neuser, Richard Scott, 2018.

æsthetics that prioritise collectively group-focussed free improvisation over individual line and statement.

Appendix 2 — Supporting Material #2: Etudes, Alternative Versions and Other

A2.1 Wisdom and Nonsense

Wisdom and Nonsense [Appendix A2.1] is a transitional⁴⁵ piece created using the Hordijk Modular synthesiser and some unidentified generic pop music found on FM radio used as a sound source. The piece explores the single idea of this shifted and distorted source that travels through several transformations in which melodic, rhythmic, textural and more distorted and noisy elements variously come to the fore, giving a clear narrative structure. This etude made me consider the specific possibility of an almost “self-collapsing” piece of music — a single line that travels, becoming incoherent as if it can only just bear the weight of its own internal forces. Although the radio functions more as anonymous data for an analogue computer than as an identifiable source material to be transformed, it is nevertheless interesting that something of the original form and energy of the music seems to survive intact. The piece retains something of a memory of pop music even as it collapses in on itself. The limitation of the raw material and the transformations between melody and noise, plus a certain attitude of sonic belligerence, link this piece both to *Song for Ghosts* and *Spertions*. But the movement between the pitched, referential content collapsing into sheer noise are handled with more certainty here. The realisation that by using the Hordijk Modular I could control and deploy noise in a detailed way and thus could use it more compositionally, had clear implications for pieces such as *A Spark Ignites*, *Cathedrals Tumble* [Appendix A2.2] and the final portfolio piece *On the Surface, Crying to the Moon*, in which precisely controlled noise plays a crucial compositional role.

A2.2 A Spark Ignites, Cathedrals Tumble

A Spark Ignites, Cathedrals Tumble [Appendix A2.2] takes the form of a single movement exploring a simple set of ideas. This transitional piece revisits some of the less gestural, flatter aspects of *Several Circles* and *Thunder, Actually Bicycles...* but explores such plateaus here with more carefully defined and determined

⁴⁵ By which I mean to suggest that it should be seen as something between an etude and a completed composition.

senses of both spectral definition and narrative trajectory.⁴⁶ The piece counterpoises sustained tones with noisier and more chaotic sections on a clearly defined compositional arc of broadly increasing amplitude and density, leading finally to a catastrophic collapse of its spectral coherence into noise. A slow cyclical Doppler motion stretches throughout the piece creating a secondary unifying aspect, although this too is eventually buried in the debris. As the final noisy crisis erupts, the results sound tangible, inevitable and somehow earned, which is a consequence of allowing the piece the long and organic trajectory its materials needed to arrive at such a dramatic endpoint. Arguably the piece remains gestural in some respects, but if so, it is a gesturalism that is very much slowed down, giving it a more textural and transparent musical character.

The material from the piece was created entirely on a Hordijk modular synthesiser and was drawn from the same recording sessions as the final piece, *On the Surface, Crying to the Moon*, to which it forms a sister composition and for which its longer compositional arc has direct consequences. The two works even have a little shared material.

A2.3 Spertions [studio version]

This is the final studio version of this piece [Appendix A2.3], a higher quality recording than the live version included in the main body of the portfolio. It was professionally mastered by Rashad Becker and was released in this form on the *Several Circles* album. The comments made in the commentary apply equally well to this version, although the timings here do vary slightly.

A2.4 Music Floats Upwards Live at SLT Leeds 2016 [video]

Although the sound quality of this video documentation of a concert performed at the Sounds Like This Festival at Leeds College of Music in 2016 [Appendix A2.4] is not ideal, the recording illustrates two things. Firstly, it documents in quite a clear way the interactive nature of the performance and, in particular, of the performer's physical interaction with the synthesiser and other instruments. Secondly, it offers an example of how this particular composition (and by implication the other works in the portfolio) might be transformed in live

⁴⁶ See also *Everyday Arithmetic* [Appendix A2.6] for a more extended exploration of these qualities.

performance. This becomes especially evident through a comparison of this performance of the work with both the portfolio version and the relevant section (27:22–34:15) of the complete concert *Richard Scott Live at Electric Spring 2017* [Appendix A2.5], which documents a very different live version of the same piece.

A2.5 Richard Scott Live at Electric Spring 2017 [video, complete concert]

Alongside the live version of *Music Floats Upwards* [Appendix A2.4] this full performance documentation [Appendix A2.5] is included as evidence that my integration of composition and improvisation does not stop in the studio, and of the “other” lives that most of the compositions in the portfolio have as material to be diffused, remixed, reconstructed and augmented as part of my solo concert performances. In this dissertation, the portfolio is mostly presented and discussed as a series of fixed works, but in performance these are unfixed and remade in different ways each time they are performed, illustrating how they can be employed as starting points for real-time improvisatory explorations of different moods and characters. *Several Circles*, for example, played an important part in my performance practice between 2013 and 2016, and the piece had a number of iterations; sometimes diffusing it *as is*, but more often adding subtracting or remixing materials. By 2014, *Several Circles* had become concentrated into a definite structure, which was diffused in a multi-channel presentation at the From Tape to Typedef symposium at Sheffield University. A very different version of *the piece*, for example, was performed at AUXXX in Berlin later that year, using Max/MSP software controlled by a Buchla Thunder midi controller, creating a parallel granular version of the piece that was mixed live with the original work. The piece was subsequently used as material for live processing and remixing using an analogue modular synthesiser in different versions, including at the International Festival for Innovations in Music Production and Composition at Leeds College of Music in 2015, and at the combined ICMC/SMC Conference in Athens in 2015.

A2.6 Everyday Arithmetic (in 13 parts) [broadcast]

Everyday Arithmetic documents a complete 90-minute barely edited⁴⁷ solo improvisation divided into 13 sections that was distributed as a Mixcloud internet radio broadcast presented on the eatthisradio channel (Scott, 2017; Appendices 2.6.1 – 2.6.13). While the music in this broadcast is not directly related to any particular portfolio composition, it is contextually significant as it represents in a very clear form the kinds of solo studio improvisation from which the raw materials used in almost all the composed works in this portfolio are drawn. These 13 parts also capture my exploring more sustained durational ideas that begin to develop importance later in the portfolio, for example with *On the Surface, Crying to the Moon*. The music on this broadcast is simpler and more linear, it is generally less densely layered, less dependent on gesture and has a more unhurried, gently unfolding sense of form. It rests on a greater reliance on simply playing and listening as sources of form in and of themselves, beyond other compositional considerations and techniques. This piece has a different structure, trajectory and durational character from the other work discussed in this portfolio and appendices, and its inclusion properly completes the musical material offered in this dissertation. Of course there is always a praxis. If such an improvisation as this example represents the front line of my artistic research, it is also informed not only by the more lengthy compositional processes of other works, but also by performing in group improvisation with other players, as for example with *Head IV* [Appendix A1.4], where a more durational approach to improvisation was investigated.

A2.7.1 Resonating Sound Objects [video]

The following five videos, extracted from my Research Diary, are intended as specific demonstrations of particular kinds of control and patching that are utilised throughout the portfolio and are referenced in the Background and Context section in the main body of the text. The first video, A2.7.1, illustrates an example of a patch-programming, generative approach.

⁴⁷ Editing was restricted to a little amplitude corrections in one or two places.

A2.7.2 Not Like Your Funk [video]

A percussive generative and patch-programmed example featuring several “instruments” and showing decisive interaction from the composer.

A2.7.3 Hordijk Bouncy Space Balls [video]

A percussive generative patch-programmed, single-instrument example showing the ribbon potentiometer in use.

A2.7.4 Hordijk Nocturne [video]

A generative patch-programmed example incorporating extensive audio-rate modulation.

A2.7.5 Electroacoustic Performance [video]

A patch-programmed example showing decisive interaction from the performer with a strongly algorithmic quality.

Appendix 3 — Supporting Texts

A3.1 Research Diary Extracts and Discussion

In August 2016, I took on the task of listening back to every recording I had made in the previous two years. During this informative experience, I compiled a list of fifteen informal “findings”:

1. *I record too much, nobody should have to listen to all this.*
2. *It takes two years to know if a recording is any good or not.*
3. *Often the first take is the worst.*
4. *Often the first take is the best.*
5. *Often the worst take is the best.*
6. *Sometimes the best take is not that satisfying to listen to.*
7. *Tentative music can be very intriguing.*
8. *The most appealing takes are the ones where I can hear myself listening.*
9. *Some of the least interesting takes are the ones where I can almost hear myself thinking, "This is great!"*
10. *I am (still) too afraid of being boring.*
11. *All music is incomplete.*
12. *I don't know what I am doing.*
13. *I know exactly what I am doing.*
14. *I haven't got any better in two years.*
15. *I have got a whole lot better in two years.*

An example that helps give context to these comments derives from five different recordings I made in August 2014 based on the same musical idea. At the time of the recording, I narrowed down and labelled the last two of these recordings as the better and more definitive versions. But listening back two years later, it seemed obvious that the idea is far better realised in the first and second takes, when it still taking shape. The ambiguity of these first takes seems to contain the feeling of the process of an idea emerging and developing; whereas by the two final takes the idea is already fixed, but reproduced more efficiently. In some ways, these later takes might indeed be more exact but in the end they do not engage my ear in quite the same way as do the less stable, less defined iterations. This led me to some further introspection:

16. *I need to have forgotten the original idea/intent so I can actually hear what I recorded, as if somebody else made it.*
17. *To really hear what is happening in a take I need to have moved on a bit in my practice.*
18. *I need to balance a desire for "finding the best bits" with a respect for how and where those best bits actually emerge. I.e. in addition to form/structure/clarity, there is always a process aspect to consider, and there are compositional choices as to how much one chooses to reflect this in the selected material.*
19. *It is not that the line between intentions and results does not exist, but in my experience it is a rarely either straight or singular.*
20. *In not-knowing what I am looking for, what is lost in certainty might be gained in an increasing perception of what a sounds appears to suggest in its potential relationships with other sounds.*
21. *Musicians work with time and are tied to it; in this we are closer to storytellers than we are to sculptors.*
22. *Even in the most abstract areas of music, making narrative/song/dance still counts for a lot.*

Listening back to this session again, five years since recording it, I note that the musical content of the idea that is still emerging is more interesting to me than the completed idea itself, and I generalise that precisely because it is unfinished, this emergent quality can in and of itself be a rich seam of the kind of ambiguous molecular compositional material I am most interested in working with.

A3.2 Thanks

Special thanks must go to the many musicians I have performed and recorded with in the last few years, some many times, some just occasionally and also to others who have helped in various ways to bring this project to completion. These include:

Eleanor Scott, Rob Hordijk, Olaf Rupp, Audrey Chen, Kazuhisa Uchihashi, Richard Barrett, Sabine Vogel, Frank Gratkowski, Michael Vorfeld, Evan Parker, Ute Wasserman, Emilio Gordo, Alwynne Pritchard, Stephen Grew, Ulrike Brand, Marta Zapparoli, Gino Robair, Thomas Lehn, Diemo Schwarz, Willi Kellers, Korhan Erel, Jon Rose, Meinrad Kneer, Ursula Sabatin, Bettina Neuhaus, Michael Griener, Kasper Tranberg, Yoshiru Yoshigaki, Gunther Marx, Lan Cao Than, Gregor Seidel, Axel Dörner, Jason Singh, Julyen Hamilton, Sten Rudstrom, Ernesto Rodrigues, Guilherme Rodrigues, Todd Barton, Evan Parker, Yves Charuest, Rodrigues Constanza, Alex Nowitz, Shelley Hirsch, Liz Allbee, Kryton Beyer, Simon Rose, Julia Reidy, Stefan Schultz, Hilary Jeffery, Philippa Jeffery, Jaap Blonk, Tomomi Adachi, Frank Paul Schubert, Uwe Oberg, Magda Mayas, Paul Lytton, Joker Nies, Phil Minton, Steve Heather, Toshimaru Nakamura, Adam Pulze Melbye, Klaus Kürvers, Thea Farhadian, Philip Marks, David Birchall, Samuel Hall, Sam Weaver, Tristan Honsinger, Devin Grey, Sidsel Endresen, Clive Bell, Eliad Wagner, David Ross, Ignaz Schick, Mazen Kerbaj, Seth Zhan, Jos Smoulders, Willem Bromander, DJ Sniff, Leyya Mona Tawil, Yorgos Dimitriadis, Bettina Neuhaus, Wouter von Jaspers, Pierre Alexander Tremblay, Sam Andreae, Navs, Elisabeth Harnik, Zsolt Sörös, Christian Kobi, Akiko Nakayama, Tom Djil, Erik Dower, Birgit Ulher, Insa Langhorst, Georg Wissel, Timothy O'Dwyer, Astrid Baumgärtner, Danny Saul, Dean Roberts, Andrea Parkins, Jonathan Lindhorst, Grgur Savic, Sanja Starčević, Peter Van Huffel, Rieko Okuda, Roy Carroll, Simon H. Fell, Michael Thieke, Thighpaulsandra, Dag Magnus Narvesen, Nikolaus Neuser, Steve Beresford, Victor Schonfeld, Alexander Frangenheim, Martin Kuentz, Martin Howse, Seth Zahn, Derek Holzer, Matthias Muller, Roger Turner, Joke Lanz, Mia Zabelka, Henrik Munkeby Nørstebø, Esok Ewok, Michel Doneda, Silke Eberhard, Shelley Hirsch, Jane Lawson, Tim Scott and Andy Adkin.

There are of course others too, who wouldn't fit on this page.